# KNOWLEDGE, ATTITUDE AND SOCIO-ECONOMIC FACTORS AFFECTING RECEPTIVITY OF MALARIA CONTROL STRATEGIES IN LINDI AND MTWARA REGIONS, TANZANIA

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## EXTENDED ABSTRACT

Despite efforts to control malaria with its morbidity and mortality rates in Tanzania, it still persists. The main objective of the study on which this thesis is based was to investigate people's knowledge, attitudes and socio-economic factors associated with receptivity of malaria control strategies. The specific objectives of the study were to assess knowledge about malaria control strategies and its association with demographic and socio-economic variables, examine attitude towards malaria control strategies and its association with demographic and socio-economic variables, and determine relationships between receptivity of malaria control strategies and knowledge, attitude and socio-economic factors. The study was conducted in Lindi and Mtwara Regions in 2017 and used a cross-sectional research design. Random sampling was used to select 306 heads of households. Quantitative and qualitative data were collected. Quantitative data were collected using a structured questionnaire, but qualitative data were collected through focus group discussions and key informant interviews. Qualitative data were analysed by being summarized by their themes, and comparing and contrasting arguments given by different interviewees based on content analysis. Quantitative data were analysed using IBM SPSS Statistics Version 26 Software whereby both descriptive statistics and inferential statistics were employed in analysis. Knowledge about malaria was moderate; the overall score on the scale that was used to measure it was 53%. The knowledge was significantly associated ($p < 0.05$) with sex of respondent, education level of respondent, main occupation of respondent, and income of household. The overall attitude towards malaria control strategies was positive (54.5 points above 48.0 points that indicated undecided attitude). There were significant associations ($p < 0.05$) between attitude towards malaria control strategies and sex of respondent, marital status, education level, main occupation, and household income. The minimum, median and maximum scores on a five-point scale

which was used to measure receptivity of malaria control strategies were 126.72 and 198.00 respectively, and 20% and 80% of the respondents, respectively, had lower and higher receptivity. Receptivity of malaria control strategies was significantly different ($p < 0.05$) among respondents with different levels of knowledge, among respondents with different attitudes towards malaria control strategies, among respondents with different marital statuses, among households of various sizes, among households whose heads had various levels of education, among households with different amounts of income, and among respondents who had different occupations. On the basis of the findings, it is concluded that community members in the research area have information on malaria preventive strategies, but that they hardly have knowledge about malaria causes, how to utilize preventive measures, and the importance of using bed nets for malaria prevention. It is also concluded that sex of respondent, education level of respondent, main occupation of respondent and household income are main factors which explain knowledge about malaria in the research area. Another conclusion is that community members in the research have positive towards malaria control strategies, but that they have negative attitude towards distribution and use of mosquito nets. Moreover, sex of respondent, marital status, education level, main occupation and household income are main factors which explain the attitude. Besides, it is concluded that levels of knowledge levels, different attitudes towards malaria control strategies, different marital statuses, household sizes, levels of education, household income, and different occupations are main factors related to receptivity of malaria control strategies. On the basis of those conclusions, in order to increase receptivity of malaria control strategies and hence control malaria more effectively, the following recommendations are given. The government and relevant stakeholders should increase provision of knowledge about the nature of malaria, its prevention and cure. Communities should make effort to get the right knowledge about malaria and practise it. In provision of the knowledge about

malaria, the main factors which are associated with it (sex of respondent, education level of respondent, main occupation of respondent, and income of household) should be given priority. Campaigns to control malaria should address attitude towards strategies to control it since attitude is inextricably connected with receptivity of malaria control strategies. In order to increase receptivity of malaria control strategies, knowledge about the strategies, attitude towards the strategies, marital statuses, household size, levels of education, household income, and different occupations should be given high priority as they are main factors related to the receptivity.

## DECLARATION

I, Zawadi Ally Nkulikwa, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is my own original work done within the period of registration and that it has neither been submitted nor concurrently being submitted in any other institution.

_____ _____

**Zawadi Ally Nkulikwa** **Date**

**(PhD Candidate)**

The above declaration is confirmed by:

_____ _____

**Prof. Joshua J. Malago** **Date**

**(Supervisor)**

## COPYRIGHT

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This thesis reflects commitment and hard work of a number of people who had a hand in the effort to accomplish it. Mentioning the names of each would take some pages. Although, I sincerely thank everyone who helped me in whatever manner, I feel compelled to write down some names of them.

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## DEDICATION

This thesis is dedicated to my late supervisor **Dr. Flavianus T. Magayane,** who passed away when this thesis was at the stage of writing the first paper which emanated from this study. He was my inspiration figure when he was still alive. Unfortunately, death met him before the completion of this study.

# TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## LIST OF APPENDICES

## LIST OF ABBREVIATIONS AND ACRONYMS

| | | |
|---|---|---|
| BBC | : | British Broadcasting Corporation |
| BUSPH | : | Boston University School of Public Health |
| CDC | : | Centres for Disease Control and Prevention |
| DDT | : | Dichloro Diphenyl Trichloroethane |
| DNA | : | Deoxyribonucleic Acid |
| ECDC | : | European Centre for Disease Prevention and Control |
| FAO | : | Food and Agriculture Organization |
| FGD | : | Focus Group Discussions |
| GDP | : | Gross Domestic Product |
| HELI | : | Health and Environment Linkages policy series |
| HIV/AIDS | : | Human Immuno-Deficiency Virus |
| IRS | : | In-door Residual Spraying |
| ITN | : | Insecticide Treated Nets |
| LLNS | : | Long-Lasting Insecticides Nets |
| NBS | : | National Bureau of Statistics |
| NGOs | : | Non-Governmental Organizations |
| ITNS | : | Insecticide-Treated Mosquito Nets |
| PCA | : | Principal Components Analysis |
| PMI | : | President’s Malaria Initiatives |
| SPSS | : | Statistical Package for Social Sciences |
| TDHS-MIS | : | Tanzania Demographic and Health Survey and Malaria Indicator Survey |
| TPB | : | Theory of Planned Behaviour |
| TRA | : | Theory of Reasoned Acton |

| | | |
|---|---|---|
| U.S.A | : | United States of America |
| UNICEF | : | United Nations Children Education Fund |
| USAID | : | United States Agency for International Development |
| WHO | : | World Health Organization |

# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background Information

Malaria is recognized as a serious health problem in tropical and subtropical regions of the world. It has far-reaching medical, social, and economic consequences for the countries in which it is endemic due to its high and alarming morbidity and mortality rates. Each year, approximately 2.5 million people die of malaria, many of whom are children and women (WHO, 2005; UNICEF, 2005). It has serious repercussions for the economies of the countries in which it is prevalent. According to World Health Organization, WHO (2005), it is estimated that the annual economic burden of malaria in Africa is about one percent of the continent's Gross Domestic Product (GDP). Moreover, it rocks the foundations of communities and is corrosive to individuals. Around 300 million people are infected by malaria at any one time, and a third of them develop clinical symptoms of the disease. Ninety percent of these occur in Africa. In addition, it is estimated that one person in Africa dies of malaria in every ten seconds. Among these are children and women, who are also mostly at risk (WHO, 2003; UNICEF, 2003).

This disease, malaria, has existed for as much time as human beings have come into existence (Protharo, 1977). Fossils of mosquitos which are at least 29 million years old indicate that the mosquitos called *Anopheles* have lived and have been living for that long. According to Chowdhry (2010), malaria has had its genesis in Africa. Mobility in the form of pastoral movements, agricultural activities, and subsistence pursuits such as hunting and fishing are attributable to the spread of malaria (Rajagopalan *et al*., 1986). Further, surreptitious forest activities like logging, poaching, cattle and goods smuggling contributed significantly to the spread of malaria (Singanetra-Renard, 1993).

Malaria is prevalent in the sub-Saharan part of Africa including Tanzania. In Tanzania, malaria is wide-spread across the country. It is one of the top ten causes of morbidity and mortality in Tanzania. An estimated 11.5 million cases occur in Tanzania with over 93% of its population at risk of being infected by the disease (Makundi *et al*., 2007). It accounts for the most reported deaths of children below the age of 5 years and pregnant women (Mboera *et al*., 2007). The disease has been depleting the human resources of Tanzania and diverting material resources from national development targets, including drawing financial resources through cash payments for drugs, laboratory expenses, preventive measures and transport for health human resources. Moreover, it has been costly in terms of grief and other psychological and social burden. Further, it has been responsible for premature deaths and wasting productive time through travel, and waiting time spent on its treatment (Sherpad *et al*., 1989).

Malaria is at least transmitted with infection of a parasite called *Plasmodium spp*. Once the parasite is injected into the human body, it becomes prolific in the liver, and immediately commences to spread over red blood cells (Singh *et al*., 1999). A mosquito with malaria parasites is called a vector. Mosquitos become vectors when they suck blood from an infected animal or human being (Shulman *et al*., 1996). Because malaria parasites reside in red blood cells, human beings can also be infected through blood transfusion, organ transplants, shared use of needles or syringes contaminated with such blood (Chowdhry, 2010).

Malaria is a serious febrile illness whose symptoms, for non-immune individuals, are manifested between 10 and 15 days inclusive (WHO, 2019). Nonetheless, symptoms can be detected or experienced as early as seven days, sometimes even later than three weeks after transmission, and at times as late as one-year post transmission (Mbonye *et al.*,

2006; Chowdhry, 2010). Parasites injected by *P. vivax* and *P. ovale* infections can remain dormant in the liver of victims for months as long as four years after the infection. Once those parasites rise from hibernation, they would attack the red cells and cause the person to become ill of malaria or suffer from relapsing malaria (Chowdhry, 2010). In accordance with WHO (2019), the general and common symptoms of malaria are fever, headache, and chills. Other times malaria symptoms may be subtle and complicated. These can be manifested through tertiary fever, quartan fever, or malignant fever (Scolari *et al*. 2002). Malignant fever is associated with the most severe and life-threatening illness. While tertian fever resurfaces on every alternate day, quartan fever recurs after each interval of two days.

The complication of these symptoms is related to headache, pain in muscles, abdomen pain, weakness, fatigue or frailty of the whole body (Scolari *et al*., 2002). *P. falciparum* is known for lethal infections that prompt cerebral malaria, acute kidney failure or anaemia. Cerebral malaria makes a patient exhibit strange or abnormal behaviour. It is responsible for patients to experience frail consciousness, seizures, or neurological abnormalities. Acute kidney failure occurs when 5% of the red blood cells are infected by parasites or when acidosis happens (Sevilla-Casas, 1993; Chowdhry, 2019).

Mosquitos thrive in certain environmental conditions. Rainfall patterns, temperature and humidity are cardinal and primal factors that favour the existence and survival of mosquitos. While mosquitos prefer clean water to polluted water, they can thrive in fresh or saline water, marshes, mangroves, swamps, rice fields, grassy ditches, streams, rivers, water puddles, and some of them spawn their eggs in shaded locations in bushes or forests. Whereas some other mosquitos reproduce in tree-throws with collection of water, some breed in the axils of leaves of some plants (Sevilla-Casas, 1993; Chowdhry, 2010;

WHO, 2019). Since mosquitos, which are vectors, transmit malaria, and since malaria is inextricably connected with other diseases like dengue, yellow fever, filariasis, encephalitis, and zika fever for making patients susceptible to other diseases, it follows that mosquitos are also responsible for other diseases. This indirect corrosive and debilitating effect can start as early as before birth whereby infected pregnant women may contract malaria. This can lead to miscarriages, neonatal or infant deaths. Further, this condition can cause infants underweight including congenital infections (Sachs and Malaney, 2002). Furthermore, malaria can cause anaemia, chronic renal damage and nephrotic syndrome. In addition, malaria exacerbates conditions linked to Human Immuno-Deficiency Virus (HIV) (Herberg *et al*., 1993; Shiff *et al*., 1996).

Not only does malaria link and interplay with other diseases, but also it is debilitating to individuals and corrosive to communities, in which it is endemic. It adversely affects rural development, agricultural productivity, and food and nutrition security. It fosters a negative vicious cycle of disease, food and nutrition insecurity, and malnutrition (FAO, 2019). Malaria is inversely related to advancement of communities. As malaria decreases in endemic communities, so progress is realized in those communities (Brown, 1986). It inflates healthcare expenditure. It keeps the infected members of households from productive activities. Worse enough, it deepens poverty of households by denying the children of realizing their full potential, for it weakens children’s cognitive capacities, and reduces the number of days which these children attend school and hence lowers proficient learning (Wolfensohn, 2001; Chuma, 2005). By implication, malaria is more than a health issue, and it is systematic in nature because it is intimately connected to other diseases, and links with a myriad of other issues (Brown 1986; Wolfensch, 2001).

By and large, malaria poses a great risk on peoples' living standard and well-being. While at the individual level malaria depletes material resources through nursing the patients, its treatment and prevention at the national level interferes with its social and economic prosperity (Sacks and Sher, 2002). Direct costs are incurred through expenses on transport fare, consultation fees, medicines, special diet and food for care givers. Additionally, the costs may be in terms of loss of a patient's wages, human resources, or waste of time for production (Syafruddin *et al*., 2010). Malaria in this perspective exacerbates poverty. Poverty engenders an intolerable and unacceptable waste of talent, creativity, and innovation (Banergiee and Dufflo, 2011). Poverty is not merely unavailability of material resources and their associated means to acquire them like money; rather it is also lack of opportunity and capability to realize one's full potential as a human being. This situation entraps people and countries affected in a quagmire of poverty and misfortunes (Amartya, 1999). It follows then that the major part of the pernicious and debilitating effects of malaria is on development, well-being, and welfare of countries, in which malaria is endemic (Sachs, 2005). Malaria and poverty are inextricably linked and amplify each other (Brown, 1997; Humphrey, 2001; Moyo, 2009).

The morbidity and mortality rates prompted by malaria stimulated efforts in the fight against it. Earlier, endeavours were focused on destroying mosquito larvae. Accordingly, boiling water and covering bodies of water, and draining water land became popular methods in the early 1900s (Whitley, 1972). The dominant curative medicine was quinine, tree barks, which by then were used as an herb to curb as well as cure malaria. By the 1920s, at least four modes of control measures were available. Firstly, killing larvae by drainage of water, smothering them with oil, hand killing, and killing them by the use of arsenic powder and Dichloro Diphenyl Trichloroethane (DDT) (Watson, 1937). The second method was utilizing some curative strategies such as developing and producing

quinine pills (Boyd and Gerald, 1993). The third method was reallocation of prominent people from infected people and moving their settlements away from malarious regions (Myers, 1935). The fourth approach was by provision of basic human needs such as nutritious food, adequate housing, and access to medical attention (Manwell, 1934).

Presently, there are two main categories of malaria control strategies. According to WHO (2019), the two cardinal forms of malaria control strategies are vector control and intermittent preventive treatment. Vector control involves the use of insecticide treated bed nets and in door residual spraying whereas intermittent preventive treatment includes seasonal use of chemoprophylaxis for children between 1-5 years of age (USAID, 2019). Furthermore, as nocturnal feeding of *Anopheles* mosquitos causes transmission to occur at night, other malaria control methods are complemented with wearing clothes that cover most parts of the body and use of insect repellents on exposed skin ECDC, (2019). Because of insecticide resistance and anti-malarial drug resistance, the best alternative approach is utilizing bed nets (Malarisite, 2019). Consequently, WHO (2019), globally, Indoor Residual Spraying (IRS) usage decreased from its vantage point of 5% in 2010 to 3% in 2017. This implies that the only promising malaria preventive strategy for malaria control is the employment of mosquito bed nets. These can be effective in a range of situations.

Sleeping under bed nets, particularly Insecticide Treated Nets (ITN) can shield a host from contact with vectors. Any contact with insecticides of bed nets can be fatal to mosquitos at a large scale. However, this is impossible unless and until there is high access and usage of ITNs in the communities (WHO, 2019). Since ITNs are cost effective and can decrease malaria incidents by 50%, when there is 80% use in a household, WHO (2019) recommends supplying ITNs free of charge to individuals in populations who are

at high exposure to malaria. Moreover, it is suggested that they can be distributed at subsided prices where the coverage is low (Willey *et al.*, 2012).

The distribution of ITNs without charge has punctuated and portioned people's opinion in two groups: the sceptics and proponents. The proponents argue that the distribution of ITNs can protect hosts from being stung by vectors. This, in turn, could prevent poor people from contracting malaria. The freedom from malaria would enable them to realize their full potential, hence escape from poverty (Jaffrey, 2005). To the contrary, the sceptics argue that if people are provided with ITNs for free of charge, then they will not value them. If they do not value the nets, then they will not use them as intended. Therefore, they suggest that ITNs should not be distributed free of charge (Easterly, 2006; Moyo, 2009). In addition, sceptics contend that even if recipients of ITNs are able to use them, the distribution with no charge will render these people wholly dependent upon the delivery of the service. As a result, they will not take initiatives to replace the provided nets, in case the nets fray or get torn. Consequently, this dependence will stifle their ability to solve problems, make their own decisions and implement them (Vicky, 1989). By contrast, Bernerjoe and Dufflo (2011) recommend that, in order to settle and reconcile these opposing perspectives, an understanding of how people make decisions and implement them must be studied and examined. They assert that this comprehensive understanding can unravel what hinders the scale-up of bed net adoption and usage. They believe that knowledge about malaria and utilization of bed nets, attitudes, beliefs, socio-economic factors, as well as mental models may be able to explain what is at play.

Furthermore, Health and Environment Linkages (HELI) (2019) policy series explains the latest strategies for malaria prevention and control. The new strategies put emphasis on synergistic relations between health and environment. The new frameworks stipulate:

"*improve the efficacy cost-effectiveness, ecological soundness and sustainability of disease vector … encourage a multiple disease control approach, integration with other control measures and the considered and systemic application of a range of interventions often in combination and synergistically*" (HELI, 2019). This indicates the shift of approaches to combat malaria, from a linear thinking approach to a systems thinking methodology.

By systems thinking it implies that the interaction and relations of elements of malaria need be explored. These are such as development of malaria vaccine, knowledge about malaria, attitudes, socio-economic factors, demographic characteristics, and environment (Senge, 2004). Knowledge here entails knowledge acquired and integrated, refined and extended, applied and used meaningfully in the fight against malaria. This is attained either through education or in folkways (Marzano, 1992).

Indigenous knowledge about malaria has been contributing to misperception and misconception about malaria. The misconception and misunderstanding range from cause, treatment, and prevention. Hommond-Tooke (1962) asserts that some members of communities of Africa attribute malaria to witchcraft and magic. Raymond (1936), who was the Chief Tanzanian Government Chemist, reported that some ethnic groups in Tanzania believed that malaria was caused by some insects which were inside mosquitos, dirty water, fleas or busking in the sun, change of climate, and dirty environment. Further, some ethnic groups in Zambia link malaria to contaminated air, contaminated water, bathing cold water and sharing the same blanket while sleeping at night (Gressler *at el*., 1995; Greene, 1999). Similarly, Nyamongo (1998) found equivalent beliefs among some communities in Kenya, who believed that malaria was prompted by sweet food such as honey, sugarcane, and ripe bananas.

In an attempt to prevent malaria, by applying traditional preventive strategies, communities resorted to diverse unproven approaches. Lobo (2010), in his research in India, found that people created so much smoke towards mosquitos and that they did not worry about its side effects. Others worshipped the main doors of houses in order to get relieved from the disease. Most people went to traditional and faith healers. In addition, Green (1999) found that, in Zambia, people were wearing warm clothes, avoiding drinking dirty water, and boiling eucalyptus leaves in order to protect themselves from malaria. These kinds of misconceptions and misunderstandings, if unchecked, can interfere with all efforts to control or prevent malaria.

Indigenous or traditional methods of dealing with problems are linked to culture of particular communities. Culture is a set of common beliefs and values (Sinek, 2009). Perceptions determine behaviour (Hatcher, 1998), and perceptions emanate from beliefs, while values form attitudes. These produce knowledge, which is dependent on, and has interplay with, socio-economic factors and demographic characteristics as well as mental models, environment and nature (Marzano, 1992). Socio-economic and demographic factors such as age, education, occupation, income and sex have impact on malaria control (Akambi, 2016). According to Centres for Disease Control and Prevention (CDC), (2019), children are intensely affected by malaria. In Africa alone, an approximate of 28 500 children lost their lives prior to their fifth birthday in 2016 (WHO, 2019). Malaria adversely affects health of both poor and rich, both male and female humans, but the poor and women are most vulnerable. Pregnant women are as three times prone to malaria as women who are not pregnant or men (CDC, 2012; WHO, 2017). Moreover, malaria is considered as an occupational disease; seafarers, fishermen, priests and cattle grazers are mostly infected by malaria (Jeremi, 1998) due to spending many hours

outdoors during nights. In addition, health workers are at risk of contracting malaria due to working during nights taking care of the sick. Among these are janitorial, nursing orderlies, attenders and laundry workers (Rajasekhar, 2000). Further, soldiers as well as loggers are also more vulnerable to malaria infection (CDC, 2019).

As regards education, it is a force which enables communities to advance and empower the next generation (Lample, 2004). It is also a process of facilitating learning. Through learning, people acquire knowledge, skills, values, beliefs, habits, and attitude (Wikipedia, 2019). Ackoff (2018) clarifies that education, through learning, generates facts, information, understanding, and knowledge. When knowledge is acquired and integrated, refined and extended by individuals, understanding emerges (Marzano, 1992). Understanding enables people to use knowledge meaningfully and effectively (Ackof, 2018). Once people have attained proper knowledge, in this case about malaria, they can apply it by utilizing available malaria control strategies, examining and evaluating them to identify what works and what does not, or can employ it to develop alternative approaches to dealing with malaria.

Knowledge about malaria transmission, treatment and prevention can lead to understanding about the disease, hence attain wisdom on how to employ malaria control methods to exterminate it or minimize its effects. Several studies conducted on these components of education indicate varied level of knowledge about malaria among people and different communities. A study conducted by Singh *et al.*, (2014) on knowledge in Northern Nigeria found that there was low knowledge about mosquitos being responsible for malaria and the cause of malaria. Awareness of preventive measures was high by 90%, but its implementation was 16%. However, on the contrary, Yusuoko *et al*. (2018), in their study in Cambodia, revealed that while people (95.8%) utilized appropriately preventive

strategies by sleeping under mosquito bed nets, they had least knowledge about malaria transmission, its aetiology, and breeding habits of mosquitos. Presumably, they used mosquito nets to protect themselves from nuisance of mosquitos, but not for malaria prevention.

Furthermore, a research conducted by Mazigo *et al*. (2010) in Tanzania showed that despite the fact that people had barely adequate knowledge (56%), and in spite of the fact that 77.3% of households owned bed nets, only 64.5% of households used them. This raises questions as to whether these people had knowledge or information, or knowledge with no understanding, which is no knowledge, in fact. Similarly, a research done by Henock (2015) in Ethiopia found that even though most respondents had knowledge about symptoms of malaria (58.8%), high bed nets ownership (83.1%), and awareness of drainage of stagnant water (77.5%), the implementation of the preventive methods was almost non-existent. These studies indicate that it is not always the case that knowledge can lead to application or utilization of malaria control strategies. Instead, it is suggested that some other factors, such as perceptions and attitudes as related to receptivity might be at play.

Attitude, according to Eiser (1980), can be referred to as feelings or thoughts of like or dislike, approval or disapproval, attraction or repulsion, trust or distrust, value or disvalue. It follows that attitude can be defined as subjective experience involving an evaluation of some entity. Many studies on malaria have not discussed attitude in detail nor focused on it as an independent entity. Most of them either merely mentioned it or implicitly indicated the attitude of people towards malaria control strategies in the study areas.

The most recent statistics reveal that malaria has been and is still unbated, recalcitrant, and intransigent regardless of efforts, researches, and endeavours to control it. The World

Malaria Report (2018) shows that in 2017 there was approximately 3.5 million more cases of malaria in ten African countries, Tanzania being one of them. Among the highest malaria endemic countries, it was only India that indicated progress in reducing malaria burden and disease. Unfortunately, malaria mostly hits hard pregnant and children. The most vulnerable and affected are children under five years old and that a child dies in every two minutes (World Malaria Report, 2018). This is equivalent to 15 children in each hour. This manifests clearly that malaria is devastating and threatening to the current and future generations.

This study presumed that the relentless resistance and perpetual prevalence could be attributed to the low receptivity of malaria control strategies by recipient of these strategies. In this study, receptivity means acceptance, sense of ownership, sense of agency, of malaria control strategies, and intrinsic willingness to integrate and implement them. The strategies under focus in this study were both curative and preventive. These include: insecticide treated nets (ITNS), indoor residual spraying (IRS), usage of untreated bed nets, mosquito repellents, and environmental hygiene and sanitation.

The primary concern of this study, therefore, was to determine linkages between knowledge, attitude and socio-economic factors on one hand and receptivity to malaria control strategies on the other hand in Mtwara and Lindi Regions in Tanzania. The pertinent issues addressed are whether people’s knowledge, people’s attitude, and association between knowledge, attitude, and socio-economic factors lead to higher level of receptivity to malaria control strategies or not.

## 1.2 Problem Statement

On the basis of Tanzania Demographic Health Survey and Malaria Indicator Survey (TDHS-MIS, 2015; 2016), 93% of the population of Tanzania are exposed to the risk of malaria infection. While malaria incidence varies from one zone to another in Tanzania, it is the highest in the Western and Southern zonal areas, in which this study was conducted. The Tanzanian government and like-minded NGOs have been making a lot of efforts and spending national resources including human, material, financial, and energy to bring the disease under control. These endevours have been through curative and preventive strategies namely case management through training, early diagnosis and use of Artemisinin Based Combination Therapy (ACT); use of mosquito nets both insecticide treated and untreated nets; and indoor residual spraying (Mboera *et al*; 2007; USAID, 2018).

Despite the above efforts to control malaria in Tanzania, particularly in the research area, receptivity of malaria control strategies in terms of practising strategies disseminated for controlling it is low. For, example, as shown above, a research conducted by Mazigo *et al*. (2010) showed that in spite of the fact that 77.3% of households owned bed nets; only 64.5% of households used them. Reasons for low receptivity of malaria control strategies in terms of practising them are not known empirically. The overarching question for the research was, are people's level of knowledge and type of attitude about malaria control strategies and their socio-economic factors associated with receptivity of malaria control strategies? If practice of those strategies does not increase, malaria will persist.

Malaria has left Tanzania, according to the Malaria Report (2018), one of the ten hittest hard countries in Africa. It still causes morbidity and mortality in Tanzania (WHO, 2017). It is yet a formidable challenge that adversely affects health and well-being of Africans,

Tanzanians being counted in (Sharma *at el*., 2007; WHO, 2017; Malaria World Report, 2018). In 2017 alone, malaria claimed 61% (26,000) of children's lives under five years old. It is estimated that 80% of all malaria deaths globally were accounted for by 17 countries in Africa and India. In addition, it was found that 53% of these deaths occurred in seven countries, namely Nigeria (19%), Democratic Republic of the Congo (11%), Burkina Faso (6%), the United Republic of Tanzania (5%), Sierra Leone (4%), and Niger (4%) (WHO, 2018).

Therefore, the study on which this thesis is based was set out to determine the level of receptivity of malaria control strategies in Lindi and Mtwara regions and relationships between it and knowledge and attitude about malaria control strategies. Although ineffectiveness of these strategies may be attributed to many factors, receptivity, as defined in this study, was deemed to be one of the key factors. When the bearers of the strategies are not receptive of the strategies, they would be unable to strive to understand them, take them as seriously as their survival and living; adopt; integrate and implement them. Least in receptivity of malaria control strategies by the recipients of them would foredoom the potential development that Tanzania would otherwise be able to achieve. This is in line with Mboera, Makundi and Kituas' conclusion drawn fifteen years ago that "*unless malaria control strategy adopts an integrated approach its success is far from being realized*". This conclusion satisfies the ring of the truth about the battle against malaria to date.

## 1.3 Justification of the Study

This study contributes to a new way of thinking about the existing body of knowledge on malaria control. It manifests that while a set of malaria control strategies and the application of each individual specific strategies like using insecticide bed nets is necessary, it is not sufficient. These strategies to be effective as much as intended, they are to be developed, adopted, and applied in integrated ways. This implies that the relation and interaction between and among these strategies must be explored, discerned, synthesized and deployed by the bearers of these strategies. In this connection, unless and until receptivity of malaria control strategies is well established among members of communities, the malaria control will not be successful.

This study, moreover, initiates a nascent step in thinking and practice towards “course change and improve how we combat malaria, particularly in countries with highest burden” as asserted by the Director of WHO (2018). It practically introduces a humble beginning to challenging the approach to controlling the problem of malaria, which has predominantly been utilizing each strategy taken separately, and mainly delivering the strategies to people instead of engaging them. This study gives insight in the importance of engaging people since they are able to take a sense of agency of the strategies, and intrinsically commit their willingness to implement them.

Furthermore, the study contributes empirical information which policy makers may use to change or revise some of the current policies regarding malaria control. Policy makers would realize that both prevention and treatment are coherent dynamic parts of malaria control. These are parts of the whole, and, therefore, the whole is to be improved but not

anyone part taken separately. The improvement of one without the other would make the situation even worse. It would be like trying to improve the tyres of a car and neglecting improvement of its engine as well as other crucial components of the car. For this to occur there must be a vibrant and strong health system. This involves interrelationship and interplay among all elements of health, for instance, environmental, psychological, attitudinal, educational, communal, medical, and social aspects of health. These are to be considered and optimized.

In addition, it is anticipated that the research findings of this study will contribute to the understanding of interaction and association of knowledge, attitude, and socio-economic factors in optimizing receptivity. Accordingly, policy makers can benefit from this insight and enable them to plan and implement policies that are efficient and effective.

## 1.4 Objectives

### 1.4.1 General objective

The general objective of this study was to investigate knowledge, attitude and socio-economic factors associated with receptivity of malaria control strategies among members in Lindi and Mtwara Regions of Tanzania.

### 1.4.2 Specific objectives

The specific objectives of this study were to:

i. Assess knowledge about malaria control strategies and its association with demographic and socio-economic variables,
ii. Examine attitude towards malaria control strategies and its association with demographic and socio-economic variables, and
iii. Determine relationships between receptivity of malaria control strategies and knowledge, attitude and socio-economic factors.

## 1.5 Null hypotheses

i. There is no association between knowledge about malaria control strategies and demographic and socio-economic factors.
ii. There is no relationship between attitude towards malaria control strategies and receptivity of malaria control strategies.
iii. There is no difference in receptivity of malaria control strategies between people who have different levels of knowledge about malaria control strategies, different attitudes towards malaria control, and different socio-economic factors.

## 1.6 Theoretical Framework

### 1.6.1 Systems thinking

The study was guided by systems thinking. According to Systems Academy (SA) (2019), system thinking is a paradigm (school of thought). A paradigm is a world view underlying theories and methodology of particular scientific subjects (Webster Dictionary, 2019). Thus, we can understand the paradigm to be a foundation that shapes our world view, the underlying assumptions and methods out of which we build our theories. There are two types of paradigms in science; the analysis and synthesis (Ackof, 2018). Analysis is the process whereby we want to gain knowledge of an entity by breaking it into constituent basic units and take them apart (Senge, 2014). From this process follows a scientific reasoning called reductionism, which has three main phases.

Firstly, the entity under consideration is taken apart. Secondly, each elementary constituent component of the entity is studied in isolation. Thirdly, the elements of entity are recombined to make the original entity, and the understanding of the properties and function of each component are applied to the understanding of the whole entity (Jenkins, 2008). This, reductionistic approach has been successfully applied in science and has led

to discovery of atom, DNA, quantum, quarks, and has proceeded to be a general method of gaining knowledge in the scientific and social world about different phenomena (AS, 2019).

Although reductionism has been successful, it has its own intrinsic and inherent limitations. Because it focuses on understanding of properties of each component of entity in isolation, the understanding of the entity is no more than the sum of the parts of the entity. Thus, it systematically and inherently leaves out the relation, interaction, and interdependence of these elements. Consequently, the entity loses its essential property (Ackof, 2018). Therefore, reductionism can only be useful for entities that have low connectivity and hardly any interdependence between and among elements of the given entity (Boaler, 2016).

On the other hand, synthesis, which is the foundation of systems thinking, acts in a reverse direction. In this reasoning, we strive to understand an entity through the context of its relation within a whole of which it is a part (AS, 2019). Synthesis means combination of elements to form a connected whole (Senge, 2014). It follows then that the focus of systems thinking is the relation, and interconnectedness of elements that are inherent and inexorable to the whole, and how each part or group of parts can have an effect of the whole (Ackof, 2018). The basic argument of this essay can be sketched with the help of the following quotation from WHO (2013):

> "*Malaria control strategies, be they to prevent mosquitos from feeding on humans, to prevent or reduce the breeding of mosquitos, to destroy mosquito larvae, to eliminate malarial parasites in the human host, or to protect susceptible hosts by way of chemoprophylaxis; must be coordinated by integrating various strategies, available technologies, with the understanding of the epidemiology of*

*the local malarial situation, which include a consideration of knowledge, attitudes, and socio-economic factors and the vector so as to be able to make the most appropriate and effective interventions"*. This demands system thinking.

The study on which this thesis is based was about knowledge, attitudes and socio-economic factors on receptivity of malaria control strategies. Since knowledge has more than one basic unit contained in it such as facts, information, understanding and wisdom of applying the strategies (Arbab, 1998), and since knowledge is intimately linked to attitude and perceptions as well as socio-economic factors, then it was conceived of as a subsystem of the study. Further, because malaria affects individuals, communities, and involves a number of methods and approaches to control it, a systems thinking approach was used to synthesize theories and explain the linkage between elements of each main concept and their interdependence. While the principal concepts were knowledge, attitude and socio-economic factors, this study was also underpinned by the following theories: neo-cortex and limbic brain, mental models, the theory of planned behaviour, and growth and fixed mind-sets.

### 1.6.2 Neo-cortex and limbic brain

According to Schmidt (2019), the limbic brain is an interactive collection of brain structures formed on both sides of the thalamus, which is immediately underneath the middle temporal lobe of the cerebrum in the midbrain. This systemic part of the brain controls and generates emotion, beliefs, motivation, long term memory and olfaction. By contrast, neo-cortex is the newest evolved part of the brain. It plays an important role for sensory perceptions, cognition, and generation of motor commands, spatial reasoning and language. Sineck (2016) further explains that whereas the neo-cortex is responsible for rational and analytical thinking as well as language, the limbic brain is responsible for our

feelings such as trust and loyalty and has no capacity for language, which is the medium of reasoning, rational thinking, logic and critical thinking.

As regards this study, neo-cortex brain theory was used to gauge members' knowledge about malaria control strategies. This enabled this study to distinguish people knowledge but not mere information about these strategies. Hardly, had been able to rationalize, reflect on the thinking and decisions making and analyse their traditional methods in the fight against malaria, they could have had knowledge according to this theory. This theory acted as a stick yard against which knowledge about malaria strategies were measured. While the neo-cortex brain theory was utilized in knowledge, its counterparts the limbic brain theory was employed in examining attitude of members of communities towards malaria control strategies. This explained that people may know that malaria is a threat to their lives, and might be aware of control strategies but still feel not using them. Hence negative attitude towards malaria control strategies.

Furthermore, this explains why knowledge about malaria control strategies by itself is necessary but not sufficient. Moreover, it helps us gain insight as to why although people had knowledge about these strategies, they would not implement them because they did not feel like using them, did not trust them, and why they would cling to their antiquated beliefs despite having high knowledge about malaria. Moreover, we could infer from this theory that attitude emanates from the limbic brain while perceptions originate from the neo-cortex brain; they do not necessarily always interact. And because knowledge and higher learning are connected to cognition, and since cognition is change of person's perceptions of malaria control strategies, and since implementation of these strategies is largely dependent on motivation, drive and feelings rather than knowledge *per se*, then

the level of education of an individual is not a sufficient factor to translate the strategies into practice.

In addition, by implication, attitudes and perceptions can be changed by engaging people and involving people who trust each other via Pygmalion effect. Pygmalion effect entails a small action, as small as a mouth word, under appropriate conditions, can cause larger change or effect. Thus, if some influencers in communities had started or initiated positive statements about malaria control strategies, this process would gain momentum and amplify positive attitude and accurate perceptions about the strategies.

### 1.6.3 Mental models

As regards this study, neo-cortex brain theory was used to gauge members' knowledge about malaria control strategies. This enabled this study to distinguish people’s knowledge from mere information about these strategies. Little had they been able to rationalize, reflect on their thinking and decisions making even analyse their traditional methods in the fight against malaria. Had they knowledge they could, according to this theory, they have been able to do the aforementioned. This theory acted as a stick yard against which knowledge about malaria strategies were measured. While the neo-cortex brain theory was utilized in knowledge, its counterpart the limbic brain theory was employed in examining attitude of members of communities towards malaria control strategies. This explained that although people knew that malaria was a threat to their lives, and might be aware of control strategies still they would feel not willing to use them Hence negative attitude towards malaria control strategies.

The subjective part of reality can either be accessible or inaccessible to any human consciousness. Subjective reality is that part of reality made up of all internal human

states such as self-awareness or consciousness. This state helps a human make of him a self-conscious, self-aware subject or observer (Morril, 1978). Our experience of objective phenomena and our interaction with them are crucial in allowing us to develop one or another internal picture of external reality. These external pictures of the objective reality, which we internalise, are called mental models. But, once formed, the mental models become, for the time being, an important thing. In particular, it will significantly influence the nature of our future interaction and experiences. It does not itself change objective reality, but it changes the way we perceive the reality, and this perception is what will largely determine our behaviour in the immediate future (Sernge, 2014).

In addition, Senge argues that mental models are ingrained generalization, assumption about the world and how the world works. They unwittingly influence people to take certain action unless they rare examined. Since malaria is a systematic disease that involve people and those infected or at risk make decisions, and since people can make their decisions based on knowledge consciously , or on attitude unconsciously, then this theory was employed in this study to determine peoples' ( members of communities), attitudes, especially, at an individual level.

At social level, in this connection could be understood through social construction of reality as explained by Berger and Luckman (1966). Accordingly, to Berger and Luckman, society is created by people (collection of individuals relating to each other) through interaction and relating to each other. Those individuals, through sharing some of mental models, form collective mental models by the process called habituation. Once, this reality is constructed, it is passed on from one generation to the next through the process called conformity (Psychology Today, 2020). Conformity is the tendency for an individual to align his/her attitudes, belief and behaviour with those people around them.

This is a powerful force that can influence people to change or not. With regard to this study, mental models of an individual's interact with those of others to produce a new social reality through habituation, which leads to conformity. Conformity may either heighten receptivity of malaria control strategies or may diminish it, depending upon the attitudes and mind-sets being largely shared.

This conception shaded light on what determines behaviour. Behaviour is not determined by the reality but rather by our perception of reality. So, if some adults of particular community had perception that bed nets were for children, then they would have acted accordingly, and, would have developed negative attitude towards the use of bed nets. This theory explains, in this study, why some members of communities said that although they did not want to use mosquito bed nets, they had no any objection to their family members using them. Moreover, this led this study to recommend that mental models should be examined for effective malaria control strategies.

### 1.6.4 The Theory of Planned Behaviour

While mental models enable us to interact with objective reality and experience, it is through perceptions that we behave in certain ways, and our external expression of subjective reality forms our attitude (Hatcher, 1990). Attitude is an element of unconscious subjective reality, which is abstract and none observable by a subject that acts as a receptacle of that attitude. Accordingly, we can deal or strive to make accurate representation of it through some theories (Boyles, 1999).

In this study, the Theory of Planned Behaviour (TPB) was employed to try to understand the attitude of people towards malaria control strategies, and the relation of attitude to receptivity of people of these strategies. According to Boston University School of Public

Health (BUSPH) (2018), the TPB is an extended and refined version of the Theory of Reasoned Acton (TRA). TRA attempts to explain the relationship between attitude and behaviour about human action. It can be used to tell how an individual will behave with respect to preconceived attitude and intention of behaviour. It explains that an individual's decision to get involved in certain behaviour is dependent upon expected consequences or results embedded in the expression of the behaviour (Aikins *at el*., 1994). However, because of dynamic interplay between attitude and behaviour, critics contend that the theory cannot correctly predict behaviour (Eiser, 2015). Despite the criticism of TRA, it can be used to understand individuals' volitional behaviour, on the basis of primal basis motivation to engage in an activity.

The TPB, which is an extended and refined version of TRA, is used to predict an individual's intent to perform a particular behaviour at a given time and within a specific context. It intends to explain all behaviours about which people are capable of having control over (BUSPH, 2018). In a sense, this theory can predict people's behaviour related to things or activities they are able to make choices about. It follows that the hall mark of TPB is intent of behaviour. Intentions are influenced by attitude to the likelihood of the corresponding results expected to be yielded by the behaviour performed including the subjective evaluation of the risks involved as well as the benefits of the outcome of that behaviour (Boyles, 1999). This suggests that people are needful creatures; they have some needs to be met or satisfied.

These needs are either tangible like food, shelter and clothes or intangible such as security, self-worth, value, respect and sense of purpose. Thus, people engage in some behaviour with intention to satisfy some needs they have. TPB has been applied successfully to explain and also predict a wide range of health behaviour such as

smoking, drinking, health services utilization, substance use, and breast feeding (Boyles, 1999). In this study, the theory was used to explain people's attitude in terms of their intent of receiving ITNs even when some of them knew from the start that they were not going to use them.

### 1.6.5 Fixed mind sets and growth mind-set

The genesis and source of intentions, motivations, attitudes and sense of a human is belief (Hatcher, 2014; Sineck, 2016). From belief follow emotions, drive, and energy, which may be progressive or pernicious, constructive or destructive, useful or harmful (Danesh, 1998). Moreover, scientists who study children's and adults' brains working on mathematics have discovered that beliefs have impacts on brain. Certain sets of beliefs can initiate growth of brain while others can trigger degeneration of brain (Maguire *et al.*, 2006; Abiola and Dhindsa, 2011; Woollat and Maguire, 2011). Therefore, beliefs can either act as a bridge between limbic brain and neo-cortex brain, between attitude and perceptions, among attitude, perceptions and knowledge; or punctuate and isolate them even leave the brain inactive. There are mainly two types of these beliefs namely: fixed mind-sets and growth mind-sets.

These terms, fixed mind-set and growth mind-set were coined by Carol Dweck. She studied human motivation, which is an element of belief; she also bridged development psychology, social psychology and examined self-conceptions (self-beliefs), which are called mind-sets. Her research delved into genesis of these mind-sets, their role of motivation and self-regulation, and their impact on achievement and interpersonal processes (Dweck, 2015).

Growth mind-set and fixed mind-set are two aspects of our underlying belief system. Whether consciously or subconsciously, aware or unaware, wittingly or unwittingly, they affect what we want, how we behave, and lead to certain behaviour (Farnam, 2019). Growth mind-set is a belief that persons including ourselves, traits and qualities such as intelligence, behaviour, personality, creativity, and status-quo can change and improve. These kinds of belief prompt synapses to fire and cause the brain to make neurons to connect hence change in ability (Boaler, 2016). Conversely, fixed mind-set is a belief that person s' or ourselves' traits and attributes are not malleable nor are they changeable. By virtue of this belief, a person may accept that his/her current condition, however dire it may be, is a reality of life. Consequently, this person may endure the situation and fail to take action to improve his/her condition (Dweck, 2015).

This conception has successfully been applied to education, conflict resolution, management and science (Boaler, 2016). Growth mind-set and fixed mind-set can explain the key to achieve our goals or how to succeed in them. To the contrary, fixed mind-sets reveal how we cannot reach our goals or succeed in whatever we deem to be important. Moreover, growth mind-set generates persistence in difficulties, resilience in pursuit of goals, learning out of mistakes and failure, and making relentless effort on what is important for us or community (Dweck, 2015) while, in addition, fixed mind-set prompts pessimism, apathy, defensive mechanisms, excuses and pretexts, complaints and helplessness as well as dependence syndrome (Blackwell *et al*., 2007).

Accordingly, growth mind-set and fixed mind-set, by inference, can predict people who can succeed or fail in pursuit of their goals. They can explain which programmes are likely to succeed or foredoomed by assessing the mind-sets of the people involved in the undertaking. Furthermore, they provide viable and scientific methods for connecting and

interacting information, knowledge, attitude, and perceptions in order to have required behaviour. On the basis of this conceptual understanding, growth mind-set and fixed mind-set were used in this study to explain the relation between positive attitude in connection with knowledge and implementation of the strategies. Additionally, they were utilized to depict the interconnectivity between fixed mind-set and negative attitude towards malaria control strategies with respect to parsimony with efforts to implement or learn more about malaria control strategies.

## 1.7 Conceptual Framework

Malaria is unique among diseases because it is complex and systemic in nature. Moreover, its roots lie deep within individuals and all fabrics that hold communities in a state of interdependence. In the conceptual framework in Figure 1.1 demographic characteristics and socio-economic factors were among the explanatory variables for receptivity of malaria control strategies, in particular at the household level. The entry point is a within the household consideration. An individual within a particular household forms a basic unit of a community, and communities compose a society. Ranging from the Western conception of what a household is to the African understanding of an extended family, the concept of the household, actually varies widely (Grinard, 2000). The study adopted United Republic of Tanzania (URT), (2010) conceptual definition of a household, which states that a household is a person or a group of people, related or unrelated, who live together and share common needs. This concept was applied in this study because individuals of certain age, sex, economic status, education level and marital status would interact as household members and influence one another's unconsciously, or unwittingly (systems thinking) and tend to behave more or less in similar ways (Senge, 2014). As these individuals share their ways of seeing the world, they develop common ways of thinking about the world (mental models) and hence conform to their unstated rules.

Consequently, they share certain attitudes and knowledge which lead to either higher level of receptivity or lower level of it.

As some individuals within the “household” pursue education they gain deeper knowledge about malaria. This knowledge transforms the attitudes towards some malaria strategies. Thus, these start to behave in new ways that subtly influence other members' behaviour or through habituation others are also inspired to gain more knowledge, and so conformity generates and perpetuates by itself. In this way, they seek further knowledge, and the deeper they change their attitudes, the higher they raise the quality of their well-being and welfare. This leads to higher level of receptivity and so is development. Sing (2010) asserts that malaria has been eradicated in most of the developed countries because of economic development. It follows then that malaria is inextricably connected to living and working conditions such as family income, educational level, attitudes, and knowledge which, in turn, affects receptivity of malaria control strategies.

In addition, malaria is closely related to occupation. For instance, people who eke their living by cultivation, who are dependent upon small scale agriculture, and those who, by the nature of their activities, are impelled to work late hours at night are immensely exposed to mosquitos. It requires then that those people become creative and use strategies that are viable and suitable to their environment like utilizing mosquito repellents. Creativity and resourcefulness are intimately linked to receptivity of malaria control strategies.

Furthermore, education level, which varies directly as knowledge, determines people’s capacity or incapability to utilize and manage resources within their environment to resolve vexing and intransigent problems. It enables their knowledge bearers to acquire

knowledge and integrate it, refine, and extend it, and more importantly use it meaningfully in the battle against malaria. It also enables people plan, make decisions and implement them with an attitude of learning. As they learn how to learn so they develop growth mind-sets in dealing with challenges, difficulties and setbacks in relation to controlling this disease. This leads to optimal receptivity. Moreover, this empowers people to develop confidence, creativity, innovation, tenacity and courage to try new things in order to generate better conditions for living and integrating malaria control strategies.

Socio-economic factors influence malaria control strategies. The adoption and utilization, which are important elements in receptivity of these strategies, depend on knowledge, awareness and attitude of the target communities. Ellissen (1991) argues that knowledge and attitude have major influence on the pattern of health and disease control strategies in any community. Attitude, as an internal state, affects an individual's choice of action towards an object, be it a person, strategy or event, in this situation malaria control strategies. Attitude is a subjective norm that prompts an individual or community to evaluate some strategies with some degree of favour or disfavour, generally expressed in cognitive, affective, and behavioural responses (Gagness and Briggs, 1974).

Knowledge about malaria control strategies, which was determined by using a 23-point index summated scale which comprised 23 statements. One would score 0 for a wrong answer and 1 for a correct answer. Some statements were wrong; for these, the alternative scores (0 and 1) were interchanged. For example, to the wrong statement "*Malaria can be caused by some people who are able to bewitch others*", respondents who answered Yes scored 0 and those who answered No scored 1. The overall points scored on the scale were further expressed as percentages, for easy interpretation of the extent to which the

respondents understood malaria prevention and its control, and hence the knowledge of malaria control strategies. Therefore, knowledge about malaria control strategies was operationally defined as points scored on an index of summated scale which was used to determine the understanding of malaria prevention and its control.

Another variable was attitude; it was measured using an 80-point Likert scale made up of 16 statements connoting liking and disliking malaria control strategies. For each of the statements the respondents would score 1 point (strongly disagree), 2 points (disagree), 3 points (undecided), 4 points (agree) or 5 points strongly agree. The most unfavourable attitude in this study, based on the 16 statements, was 16 points (i.e. 1 x 16 = 16); the undecided attitude was 48 points (i.e. 3 x 16 = 48) and the most favourable attitude was 80 points (i.e. 5 x 16 = 80). Therefore, the range of points for unfavourable attitude was 16-47 while 48 was the cut point for undecided while the range for favourable attitude was 49 to 80 points towards malaria control strategies. Therefore, attitude towards malaria control strategies was defined operationally as points scored on a Likert scale.

Receptivity of malaria control strategies was measured in terms of points scored on the malaria control strategies that had been disseminated in the study areas. The strategies were five, namely insecticides treated bed nets (ITNs), indoor residual spraying (IRS), use of untreated mosquito nets, use of mosquito repellents, and environmental strategy that includes vegetation clearance and removal of water logged surrounding the household. One who had not adopted any of the strategies scored 0, while one who had scored all the strategies scored 5 points. The number of points scored was the same as the number of malaria control strategies that had been in practice by the respondents in the study areas, that is 5. Furthermore, the points were used in the categorization of the household

surveyed into those with lower receptivity (0-2 points), and those with higher receptivity (3-5 points).

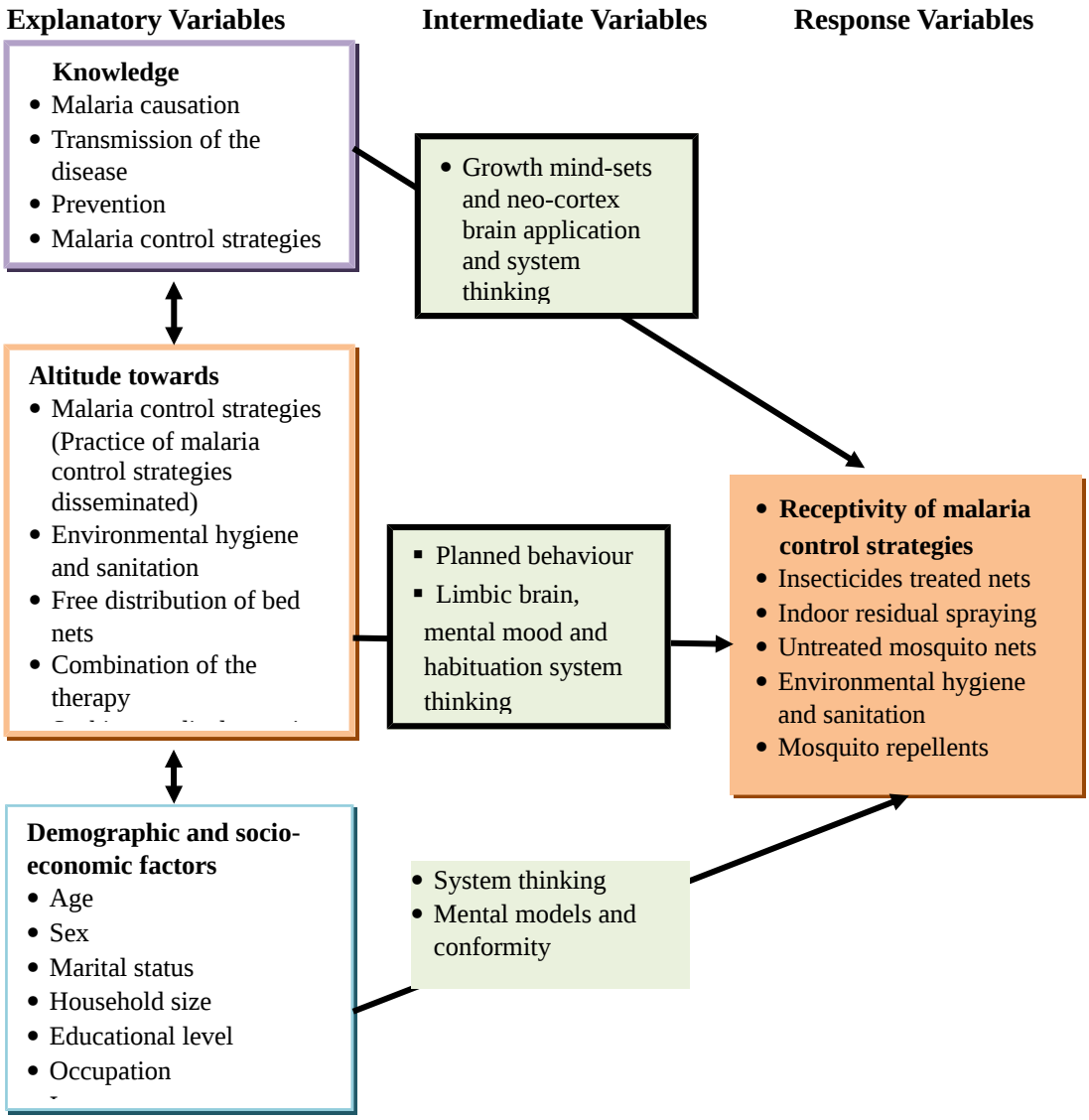


**Figure 1. 1: Conceptual framework for analysis of household composition and receptivity of malaria control strategies**

The socio-economic and demographic variables that were included in the study were: age of respondents, education level, main occupation, income, marital status and household size. In short, knowledge, attitude, and socio-economic factors lead to rejection or adoption of malaria control strategies. Knowledge enables to understand strategies. The understanding affects attitude towards the strategies; hence communities become receptive to the strategies and own some of them.

## 1.8 General Methodology

The study was conducted in Lindi and Mtwara Regions, specifically in Urban Lindi which is in Lindi Region and Mikindani District which is in Mtwara Region. Lindi Region has six districts while Mtwara is divided into five districts. These regions have favourable environments for mosquitos to thrive and are prone to mosquito infestation. In addition, the regions have been among the targets by the Government of Tanzania for supply of free-of-charge long-lasting ITN and other preventive strategies. However, in terms of malaria prevalence, Mtwara and Lindi Regions had the second and third prevalence with 35.5% and 33.6% respectively; Kagera had the highest prevalence in Tanzania (41.1%) (NBS, 2016). The inhabitants of both Mtwara and Lindi Regions are small scale farmers mainly producing maize, cassava, sorghum, paddy, and cashew nuts. Malaria has been showing a decrease into population recently. In 2017 Mtwara had 27.4% of which Lindi accounted for 24%. This decrease was attributed to maternal education provided to mothers who attend health centre (NBS, 2017). However, malaria has a fluctuating characteristic of bouncing between decrease and resurgence over time (WHO, 2018).

The study employed a cross-sectional research design whereby data were collected once and were only suitable to describe the situation at the period when the research was being done. Based on the nature of the study and absence of longitudinal data, the above design was best suited (Chaudhuri *et al*., 2002). Moreover, literature by Bailey (1998) shows that cross sectional design can provide information that is useful for descriptive purposes as well as for determination of association between and among variables. Furthermore, a cross-sectional research design is cost effective and allows inclusion of respondents or groups of people from who comparisons of variables is made. The sampling unit for this

study was a household since malaria control strategies are ultimately utilized, tested and implemented at the household level (Maxwell, 1996).

Random and convenience methods were jointly and systemically used. First, sampling frames of the households were obtained from the district officials and a list, by average, of people as well as patients who attended district hospitals was also acquired. Second, randomly generated numbers were used to select households to be visited. In addition, every second groups from different villages who visited or attended the hospitals were considered as part of this study. This was important to maintain equally likelihood among participants, optimize the representation of the population and be able to draw valid conclusions from these data. Additionally, this enabled the study to avoid classification of errors because there was minimum advance knowledge of the population apart from the sampling frames which could easily be accessed.

Once a household or a group was chosen randomly and visited or was to be involved, then the household or an adult member of it would be requested consent to participate in the study. The same applied to groups of respondents who visited the hospitals. Convenience sampling method was utilized in soliciting information from respondents when they showed willingness and consented to participate in the study. The succinct explanation about the study was introduced to the willing respondent and some few seconds were used to build mutual trust with the respondent in order to maximize the potential of the informant to give the required information and respond to questions asked.

The minimum number of study participants was estimated by using a sample size formula by Kish and Leslie for cross-sectional studies This is suitable and useful for cross-sectional studies (Cochran, 1977 as cited by Bartlet *et al*., 2001). Accordingly, a sample of

306 house members was determined. The sample size was justified on the fact that "too large a sample implies a waste of resources, and too small a sample diminishes the utility of the results" (Cochran, 1977, cited by Bartlett *et al.* 2001). Therefore, the following formula was used to determine the reasonable sample size:

$n = \frac{Z^2 * p\,(1 - p)}{d^2}$ (Cochran, 1977, cited by Bartlett *et al.* (2001), where:

n = sample size;

Z = a value on the abscissa of a standard normal distribution (from an assumption that the sample elements are normally distributed), which is 1.96 or approximately 2.0 and corresponds to 95% confidence interval;

p = estimated variance in the population from which the sample is drawn, which is normally 0.5 for a population whose size is not known;

*d* = acceptable margin of error (or precision), whereby the general rule is that in social research *d* should be 5% for categorical data and 3% for continuous data (Krejcie and Morgan, 1970, cited by Bartlett *et al*., 2001). In this research, 5% was used since substantial categorical data were collected.

*q*= Values given to adjusted p- values, optimized using characteristics of p- values distribution which is normally equal to p- value.

Using a Z-value of 1.96, a p-value of 0.5, a q-value of 0.5, and a *d*-value of 0.5%, the sample size (n) was determined to be 384.

$n = \frac{1.96^2 * 0.5\,(1 - 0.5)}{0.05^2} = (3.8416 \times 0.25)/0.0025 = 0.9604/0.0025 = 384$

However, during data collection, 78 of the 384 households which had been selected were not timely available, and it was not possible logistically to replace them. Roscoe's rule of thumb which proposes a sample size to be between 30 and 500 was considered (Roscoe, 1975). And, due to homogeneity of the study population, a sample of 306 respondents was

considered to be able to give representation of the study population (Kadam and Bhalerayo, 2010).

Two papers in this study employed triangulation methods: Paper I in Chapter Two and Paper II in Chapter Three. The aim was to find knowledge and attitude and their association with demographic variable and socio-economic factors. To achieve this purpose, a quantitative survey and qualitative Focus Groups Discussion (FGDs) were conducted. FGDs were mainly used to complement the findings of the questionnaire. It was able to provide valuable additional information, especially on the reasons, rationalization and arguments behind communities' understanding and attitudes towards malaria control strategies.

In order to collect pertinent information from respondents, purposive, convenience and simple random sampling methods were utilized for this aim. Districts were purposively selected based on the number of incidents of malaria as indicated by national survey documents and the number of bed nets distributed to school children. Districts that had highest incidents or that had received the greatest number of mosquito nets were deliberately selected. This enabled the research to be manageable within time and financial constraints as well as to get the intended data that would satisfy the purpose of the study.

Moreover, study employed a triangulation of quantitative and qualitative data collection methods. While qualitative information was obtained through face to face interviews and focus group discussion, quantitative data were garnered via structured interview questionnaires. The interviews were moderated by the researcher where by responses were transcribed and recorded by an audio-recorder. The collected pieces of information

were managed, organized and analyzed by using content analysis. The transcribed and recorded responses were categorized into themes to suit the explanatory variables of the study. The key information was attached to each particular theme until when they were saturated. Those qualitative data supplemented quantitative data in a sense that the numerical information is prone to open interpretations by researcher, so the triangulated generated data and their implications could be closely interpreted as intended by the informants, and in the way that results reflected closely to what it was in the field. Copies of a structured questionnaire were used for quantitative data collection. This was used to garner information on knowledge, socio-economic factors, and attitudes as well as receptivity of malaria control strategies. The questionnaire was administered by the researcher and two trained assistants.

Analysis of data was achieved by using Statistical Package of Social Sciences (SPSS) version 26. Descriptive statistics; which involved frequency distribution, averages, modes, medians, and standard deviations; were used to structure data, describe and summarize findings. In addition, inferential statistics were used to determine relationships among variables involved. Chi-square tests were used determine associations between knowledge about malaria control strategies and demographic and socio-economic variables, and between attitude towards malaria control strategies and demographic and socio-economic variables. Mann-Whitney U test was used to compare receptivity of malaria control strategies between people who had lower knowledge and those who had higher knowledge about malaria control strategies. Mann-Whitney U test was also used to compare receptivity of malaria control strategies between people who were young and those who were old, and between male and female respondents. Kruskal-Wallis-Test was used to compare receptivity of malaria control strategies among people who had unfavourable, undecided and favourable attitudes towards malaria control strategies.

Kruskal-Wallis-Test was also used to compare receptivity of malaria control strategies among people who had different education levels, those who had different incomes, those who had different household sizes, and those who had different occupations. Moreover, Dunn's procedure within Bonferroni correction for multiple comparisons was performed to analyse attitudes pairwise.

## 1.9 Limitations and Delimitations of the Study

### 1.9.1 Constraints to the study and how they were mitigated

Firstly, the respondents in study communities demanded payment in order to give information. This limitation was solved by telling the respondents through their leaders that the research was for PhD studies and that it was not funded by any project from which money could be obtained to pay the respondents. They understood, and they agreed to respond to the questionnaire without being paid. Secondly, the respondents thought that the researcher was a spy agent for the purpose of finding out those who were misusing the mosquito nets. This was explained by showing them a copy of the letter from the University for data collection in the study communities, and the issue was solved without any problem.

In addition, there were inherent potential limitation in research design, and data collection methods employed in this study. The research design cross-section, thus it could only enable the study to describe the situation of malaria in the sites accurately at the point when the study was conducted. This constraint could not be overcome in the field but could only be dealt with by replicating the study by deploying the longitudinal research design. Furthermore, simple random sampling method, which was used in this study has intrinsic weakness. It may render weak sample that is not a good representation; bias in selection is innately common, and create a possibility of the samples to be either over or

under represented. The limitations were minimized by triangulating this method with convenience and focus group discussion.

### 1.9.2 What the study was about and what it was not about

This study was about receptivity of malaria control strategies. Accordingly, the focus was on the elements of receptivity, which by and large, means acceptance, sense of ownership, sense of agency of malaria control strategies, and intrinsic willingness to implement them. These elements were knowledge, attitude, and socio-economic and demographic variables, as linked to malaria control strategies. Although a substantial number of studies have been conducted on knowledge, awareness and practices in malaria control strategies in Tanzania (Mathania *et al*., 2016; Nyahoge and Bookhawa, 2018); these studies have focused mainly on one level of knowledge, which cardinally consists of retrieval, remembering, recognition and identification of information related to knowledge about malaria. By contrast, this study regarded knowledge as a comprehensive and holistic entity that has four essential levels (Anderson and Krathwohl, 2001). These levels are factual, conceptual, procedural and metacognitive knowledge.

In this perspective, factual knowledge entails basic elements of malaria control strategies that an individual must know. The members of community, at this level, can remember causes of malaria, retrieval of information about types of malaria control strategies, and may be able to recognize some symptoms, mention types of bed nets, and identify some illness associated with malaria. At this level the individual can barely utilize knowledge and, thus, can hardly use this knowledge meaningfully. Knowledge at this level, therefore, is mental and only intellectual. For this level of knowledge to be useful, it must be connected with conceptual level of knowledge. This is interrelationships among the basic elements as mentioned above. At this stage, an individual is able to discern or gain insight

on how different malaria basic elements such as mosquitos as vectors, surroundings, family welfare and wellbeing, and malaria control strategies, interact with each other and function together as a system.

These levels by themselves are inadequate. It is necessary, in addition, that individuals gain procedural level of knowledge. This is actualized capacity and skills to do something like executing some preferred malaria control strategies. Finally, individuals must scale up to the metacognitive level of knowledge, so that they are able to understand, to be aware, and reflect on the existence of malaria, their living with it, plans and goals set to control it, thinking of the availability of alternative control strategies, and ultimately making their own decision to implement them by taking on board all levels of knowledge.

Although these levels are necessary, they are not sufficient. The amount of knowledge at all levels must be inextricably linked to three cognitive and affective systems, namely self-system, metacognitive, and cognitive systems. These describe how human beings decide whether to engage in some task at some point in the time, but also, they explain how information is processed once a decision to engage has been made (Marzano and Kendall, 2007). The detail of each component has been discussed in Chapter two of this study. Moreover, knowledge, including the above-mentioned systems, is closely connected and linked to the attitude and socio-economic factors. These coherently and dynamically affect each other.

The study was not about biological aspects of malaria. It follows then that it is not about knowledge as retrieval of facts, remembering or recognition of information about malaria. Nor is it about perceptions *per se* though these are components of cognitive and effective systems. Nor does it concern the issue of awareness of malaria strategies although these

are embedded in the knowledge with its all levels. Moreover, this study does not dwell by itself on practices but rather the genesis of practices in terms of receptivity of malaria control strategies and understandings of dynamic elements that render control strategies implementable intrinsically by repositories and bearers of these malaria control strategies. This is why it is guided by the theory of systems thinking.

### 1.10 Organization of the Thesis

This thesis comprises three publishable manuscripts organized in chapters. The whole thesis is organized into five chapters. It commences with chapter one, which gives background information of the thesis. Manuscript one is in Chapter Two which focuses on knowledge and its association with socio-economic factors. This is followed by Chapter Three, which presents manuscript two, dealing with attitude and its association to socio-economic variables. Chapter Four presents manuscript three, which concentrates on the receptivity of malaria control strategies. Chapter Five gives a summary of the results and discussions from the three manuscripts including conclusions as well as recommendations.

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# CHAPTER TWO

## 2.0 KNOWLEDGE ABOUT MALARIA CONTROL STRATEGIES AND ITS ASSOCIATION WITH DEMOGRAPHIC AND SOCIO-ECONOMIC VARIABLES OF THE TARGET COMMUNITIES IN LINDI AND MTWARA REGIONS, TANZANIA

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### 2.1 Abstract

Despite the efforts made to minimize malaria infection in Tanzania, its prevalence persists. To what factors is the persistence attributed? Do people's lack of knowledge impact negatively on their receptivity of malarial prevention and control strategies? This paper examines knowledge, socio-economic factors and practice about control strategies of malaria, both curative and preventive, among communities in Lindi and Mtwara Regions, in Tanzania. The specific objectives were to determine people's knowledge about malaria control strategies and association between the knowledge and demographic and socio-economic variables. Both qualitative and quantitative data were collected from 306 respondents. Focus group discussions were employed to elicit qualitative information whereas a structured questionnaire was used to collect quantitative data. Both descriptive

and inferential statistics were used in the analysis of the data. Descriptive analysis involved computation of frequencies and percentages. The findings showed that there was moderate knowledge about malaria; the overall score on the index summated scale that was used to determine the knowledge level was 53%, and 40.5% of the respondents had moderate knowledge. Knowledge about malaria was significantly associated ($p < 0.05$) with demographic and socio-economic factors with $\chi^2$-values of 7.393, 9.617, 28.537, and 80.789 with respect to sex, education level, main occupation and income respectively. It was observed that the higher the level of education, the higher was the knowledge about malaria control strategies. The same applied to households that had higher income; farmers and self-employed people had lower knowledge than those who had careers or were formerly employed.

Conclusively, community members in Lindi and Mtwara regions have information about malaria prevention strategies, but they hardly have knowledge about the causes of malaria, importance of using mosquito nets consistently in protecting themselves from the disease, and have no knowledge about how to integrate as well as implement various malaria preventation measures. Additionally, they have misconceptions about cure of malaria, its symptoms, and mosquito bed nets. Thus, it is recommended that knowledge should be promoted through training, non-formal and informal education by community development officers, health officers, and teachers found within the local communities. Furthermore, health workers and local governments should engage household members in acquiring, integrating, extending and using meaningfully knowledge about malaria control strategies.

**Key words**: Knowledge, malaria control strategies and Lindi and Mtwara regions.

## 2.2 Introduction

Africa has the highest incidence of malaria and accounts for about 90% of malaria cases in the world (Kimbi *et al*., 2014). Malaria remains the leading cause of death, despite the fact that mortality rates to it have fallen by 47% globally between 2000 and 2013, with a decrease of 54% in Africa (WHO, 2014). However, the estimates of the true burden of malaria have been difficult to get due to many malaria cases and deaths going unreported predominantly in third world countries (Lynch and Hewitt, 2012). Notwithstanding this, it has been estimated that one person in Africa dies of malaria in every ten seconds, claiming 91% of a million lives annually while 300 million people being infected by the disease at any one time, and a third of them develop clinical complications (WHO, 2003; 2005; 2008).

Malaria is an immutable disease and has roots deep within human communities. It follows that knowledge and practices of malaria control are usually embedded within culture, which in turn, can influence the efficacy of control strategies within communities. Thus, local knowledge, socio-economic factors and practices related to the disease are key to implementation of any strategies in communities for sustainable and effective interventions (Adera, 2003). Community knowledge, socio-economic situations and practice about receptivity of malaria control strategies, symptom identification, treatment, and prevention influence efforts to address malaria but are often overlooked in control efforts while they are interlinked and interwoven, and vary from one region to other regions and among individual households (Vijayakumar *et al*., 2015).

Failure to consider community's knowledge, socio-economic status and practice (KSP), that are rooted within the communities about malaria may contribute to inability of strategy and hence failure to eliminate or eradicate the disease. Therefore, KSP

identification is of paramount importance in the process of implementation of any strategies in the communities for controlling malaria. The frequency of malaria occurrence in Tanzania is different from one region to another, with the high frequencies being recorded in Western Lake and Southern zone areas while it is low in Northern, Central, and South West areas of Tanzania.

Malaria is communicated by six *Anopheles* species of mosquitos which are primary vectors of malaria (WHO, 2018). There are some other mosquito species playing a limited role in malaria transmission and recognized as secondary vectors of malaria. The control of malaria and other vector-borne diseases mainly depends on application of insecticides, Indoor Residual Spray (IRS) and use of Insecticide-Treated bed Nets (ITN) or Long-Lasting Insecticidal Nets (LLIN) and environmental sanitation. Most of the malaria control strategies entail control of the vector and parasite. However, there is little attention that is paid to knowledge, socio-economic factors and practice about these strategies within the communities. Most of the strategies have been taken in isolation (Wangombe *et al*., 1993) and noted to concentrate on biological aspects of the parasite, while negating the man influence that can be a barrier to the receptivity of the strategies.

The study on which this paper is based was carried out in Lindi and Mtwara Regions where malaria has been a serious public health problem, with incidence rate above national average. Additionally, scanty information is available from the study area about knowledge, socio-economic status and practice, with its association with the receptivity of malaria control strategies. This study was planned to find out the knowledge, socio-economic situation and practices of malaria control strategies in the selected area.

## 2.3 Methodology

### 2.3.1 Study area and design

The study was conducted in Lindi and Mtwara Regions which are located in the Southern part of Tanzania. The area is one of the areas where the Tanzanian government implements malaria strategic plan by distributing long-lasting insecticidal nets to families which have schoolchildren (TDHS-MIS, 2016). Lindi Region consists of six districts, which are Kilwa, Lindi Rural, Nachingwea, Liwale, Ruangwa and Lindi Urban. It is situated between latitudes 7°55' and 10 °50' South of the Equator and between longitudes 36°51' to 40° East of the Prime Meridian.

The region borders Coast Region to the North, Indian Ocean to the East and Mtwara Region to the South, while Morogoro Region is located to the West. Ruvuma Region is to the South-West of Lindi Region**.** The climatic conditions of Lindi are characterised by mean temperature of 27°C with humidity that ranges between 51% in March and 63% in October and rainfall of 780 mm to 1200 mm per year. The region comprises at least 78306 inhabitants whose main economic activity is farming. Principally, they produce maize, cassava, sorghum, paddy, cashew nuts, and simsim.

In contrast, Mtwara Region lies between longitudes 38° and 40°30' East of the Prime Meridian and between 10°05' and 11°25' South of the Equator. The region borders with Lindi Region to the North, Indian Ocean to the East, and in between this region and Mozambique runs Ruvuma River. Mtwara borders with Ruvuma Region to the West. Mtwara Region comprises five districts, namely Masasi, Mikindani, Tandahimba Newala and Nanyumbu. The smallest district among the five districts is the Urban District called Mtwara Mikindani. The mean temperature is 27°C with humidity that ranges between 87% in March and 79% in October and rainfall of 800 mm to 1024 mm per year. As applied to Lindi, Mtwara has farming as its principal economic activities.

The only distinguishing features between these regions from other regions of Tanzania, in this context, are that Mtwara and Lindi have natural gas deposits. While Lindi produces natural gas at a location called Songo Songo Island, discovered in 1974, Mtwara has natural gas reservoir at Mnazi Bay, discovered in 1982.

The study on which this paper is based involved 306 respondents and employed a cross-sectional research design. The study utilized one measurement time to describe what existed at that particular time. The cross-sectional survey aimed at collecting information from respondents on the knowledge, socio- economic factors and practices about malaria control and preventive strategies and data sources to help ensure more accuracy and stronger research outcome by triangulating data from different methods. The design was used because it was generally quick and relatively cheap. The methods utilized in the initial identification were purposive, convenient and randomized. This allowed purposive selection of the two regions in Southern part of Tanzania. Purposive, convenience and random methods were utilized for this aim. Districts were purposively selected based on the number of incidents of malaria as indicated by national survey documents and the number of bed nets distributed to school children. Districts that had highest incidents or that had received the greatest number of mosquito nets were deliberately selected. This enabled the research to be manageable within time and financial constraints as well as to get the intended data that would satisfy the purpose of the study.

Random and convenience methods were jointly and systemically used. Firstly, sampling frames of the households were obtained from the district officials and a list, by average, of people as well as patients who attended district hospitals was acquired. Secondly, randomly generated numbers were used to select households to be visited. In addition, every second groups from different villages who visited or attended the hospitals were

considered as part of this study. This was important to maintain equally likelihood among participants, optimize the representation of the population and be able to draw valid conclusions from these data. Additionally, this enabled the study to avoid classification of error because there was minimum advance knowledge of the population apart from the sampling frames which could be easily accessed. Once a household or a group was chosen randomly and visited or was to be involved, then the household or an adult member would be conveniently requested to participate in the study. The same applied to groups of respondents who visited hospitals. Convenience sampling method was utilized to engage the willingness of respondents, develop the mutual trust between the respondents and data seekers, and maximize the availability of respondents.

A structured questionnaire was employed to collect quantitative data while qualitative data were obtained via semi-structured interviews and Focus Group Discussions (FGD). Ten FGDs sessions were conducted in the five villages (two per village) with six to eight participants. The reasons for that number are that if participants are too many, some of them may just sit idle without contributing, and if they are too few, they may not be able to discuss effectively (Barbour, 2011). The FGD participants were in heterogeneous of old and adult farmers, women and men, and the local healers (herbalist).

The FGDs helped the researcher to clarify complex phenomena like practices, the use of mosquito nets (behaviour) and understanding, which is the research setting that would elaborate the topic under study. A heterogeneous group of eight participants formed the unit of analysis of this paper. This unit for focused group discussions comprised opinion leaders, such as religious leaders, a community health officer, drug shop attendant, the District Health Educator Officer and herbalist (because they shape opinion and act as change agents in communities), a local councillor (because they influence the receptivity

of malaria control strategies) and some heath workers i.e. nurses or clinical officers (because there are the centre for health services in the communities). The researcher with assistance of village leaders did the recruitment of participants. The participants were requested for convenient time and place to hold the discussions. Each discussion meeting took about 90 minutes.

### 2.3.2 Data collection procedures

Data included qualitative and quantitative. Qualitative data were collected using group discussions, in which notes were taken and discussions were tape-recorded by the researcher. Regarding quantitative values, data were collected by means of a survey through a structured questionnaire. Using these tools, information was gathered about people's knowledge on how one contracts malaria, knowledge about causes of malaria and knowledge about recognition of illness caused by malaria. In addition, the instrument was used to collect information on symptoms, perception about symptoms of malaria and malaria control practices. These involved data of respondents' knowledge on methods of prevention, measures used in households and the preferred methods and socio-economic factors. This questionnaire was administered in Kiswahili, which is the national language that is spoken everywhere in Tanzania.

### 2.3.3 Data processing and analysis

Qualitative data obtained through FGDs were analysed using content analysis in which the main themes were identified which reflected the intended meaning by respondents, and the contents were classified in accordance with the themes. Analysis of quantitative data was achieved by using Statistical Package for Social Science (SPSS) Version 26. Descriptive statistics including frequency distribution, which resulted into percentages, were used to describe and summarize the findings. Chi-square test was used for

inferential statistics to determine associations between respondents' malarial knowledge and their demographic characteristics and socio-economic factors such as educational level, sex, location, marital status, and age of respondents.

The determination of knowledge about malaria control strategies was done using of a 23-point index summated scale which comprised 23 statements. One would score 0 for a wrong answer and 1 for a correct answer. Some statements were wrong; for the wrong statements, one was given a score of 0 if one agreed with them. One of such wrong statement was "*Malaria can be caused by some people who are able to bewitch others*". The overall points scored on the index summated scale were further expressed as percentages for easy interpretation of the extent to which the respondents had the understanding of malaria prevention and its control, and hence the knowledge of malaria control strategies.

### 2.3.4 Ethical considerations

Clearance and approval to undertake the research were obtained from Sokoine University of Agriculture. The study also sought and received approval from the district and communities' leaders where the study was conducted. At an individual level, verbal consent was received from each participant before data collection. A detailed explanation of the research purpose was given to the participants. They were told that the information they give will be kept confidential, their participation was voluntary and that they could withdraw if they so deemed.

## 2.4 Results

This section of the paper provides a detailed description of the results obtained from analysis of the study. Variables in this section are described as simple percentages, means,

chi-square test results, depending on their nature. It provides a summary of demographic data, knowledge, socio-economic factors and practice towards malaria control strategies.

### 2.4.1 Socio-demographic characteristics

The socio-demographic characteristics of the sample are summarized in Table 2.1. The quantitative part of this study involved 306 respondents, representing all the households that were involved in the study from Mtwara and Lindi regions. The majority of the respondents were women (56.2%) while men were 43.8%. One of conceivable explanations for high number of female respondents is that the areas in which this study was conducted was rural and characterized by little migration among women compared with men. Therefore, women were most likely to be found at home.

In terms of education level, 9.8% of the respondents reported to have no formal education; 36.6% had attended primary education level; 33.3% had secondary education level and 20.3% had tertiary education level. Therefore, these results show that, within these communities, the level of literacy was high. This can be attributed to free education under the government of Tanzania. Farming was disproportionately accounted as the main occupation (46.4%). This is fathomable given that the majority of respondents came from villages or wards whose predominantly activities were agricultural in nature. This is part of 70.0% who make a labour force in Tanzania.

Results from the study revealed that 64.1% of the respondents in the study area were married, 30.1% were single, 4.9% widowed and 1.0% divorced. Marital status has implication on social organization and economic activities such as crop production and resource management, but also can influence the receptivity of malaria control strategies as explained in this paper.

**Table 2.1: Demographic characteristics of the respondents (n = 306)**

| Sex of respondents | Frequency | Per cent |
|---|---|---|
| Female | 172 | 56.2 |
| Male | 134 | 43.8 |
| **Education level** | | |
| No formal education | 30 | 9.8 |
| Primary school | 112 | 36.6 |
| Secondary school | 102 | 33.3 |
| Tertiary education | 62 | 20.3 |
| **Marital status** | | |
| Single | 92 | 30.1 |
| Married | 196 | 64.1 |
| Widowed | 15 | 4.9 |
| Divorced | 3 | 1.0 |
| **Main occupation** | | |
| Farming | 142 | 46.4 |
| Business | 56 | 18.3 |
| Employed | 98 | 32.0 |
| Others | 10 | 3.3 |

### 2.4.2 Knowledge about malaria causation

Table 2.2 shows that, of the 306 respondents, 289 gave 765 responses on how malaria is transmitted. The Table shows that, 14.6% of the responses were correct, which were given by 38.8% of the respondents. The findings show awareness but less knowledge about malaria causation in the study communities. Majority of the respondents attached the causes of malaria to something else than what it actually is. With respect to the results in Table 2.2, 54.7% of the respondents thought that any mosquitos were the cause of malaria; 45.7% of the respondents identified using mosquito nets with big holes or torn ones as exposing one to malaria, and 58.8% of the respondents believed that any water that circumscribed a house was responsible for malaria.

**Table 2.2:** *Knowledge about malaria causation (n = 289)*

| Malaria causation | Responses | | Per cent of Cases |
|---|---|---|---|
| | n | Per cent | |
| Through malaria vectors | 112 | 14.6 | 38.8 |
| Through a bite with any mosquito | 158 | 20.7 | 54.7 |
| Using mosquito nets with big holes or torn ones | 132 | 17.3 | 45.7 |
| Through water logged around dwelling house | 170 | 22.2 | 58.8 |
| Sleeping without a mosquito net | 193 | 25.2 | 66.8 |
| **Total** | **765*** | **100.0** | **264.7** |

*289 respondents gave 765 responses.

Malaria is identified by communities using their local names as shown in the Table 2.3. There were five local names used to denote malaria. Their names were "*Chipinda homa*" which was mentioned by 66.0% of the respondents, "*Ichinsoma*" which was mentioned by 5.2% of the respondents, "*Kingungunda*" which was mentioned by 21.9% of the respondents, "*Maurakamari*" which was mentioned by 0.30% of the respondents and "*Chindumba*" which was mentioned by 5.9% of the respondents. This finding shows that most of respondents had adopted the name malaria in their biomedical vocabulary, therefore confirming the fact that wherever professional, popular and folk health systems co-exist they enable community members to have some knowledge on malaria to the extent of creating linguistics for it (Lipowsky *et al*., 1994).

**Table 2. 3:** *Local names for malaria*

| Local names | Frequency | Per cent |
|---|---|---|
| *Chipinda homa* | 202 | 66.0 |
| *Ichinsoma* | 16 | 5.2 |
| *Kingunguda* | 67 | 21.9 |
| *Maurakamari* | 1 | 0.3 |
| No other name | 2 | 0.7 |
| *Chidumba* | 18 | 5.9 |

### 2.4.3 Knowledge on symptoms of malaria

Recognition of symptoms is often the start of actions to counter an illness. Patients and unprofessional people learn to identify and categorize illness on the basis of the symptoms they can witness. The clarification of these symptoms may vary from one person to another and from one group of people to the next or from one community to another. Lay people, therefore, use a number of signs to identify malaria illness in their communities. These symptoms can act as a trigger for them to respond to the receptivity of malaria control strategies or to start treatment. Therefore, all the 306 respondents gave 1169 responses on malaria symptoms; 67.6% of the respondents mentioned high fever and headache as the most common symptoms in their communities; 60.1% of the respondents mentioned extreme weakness while vomiting was mentioned by 43.1% of the respondents as the common symptoms (Table 2.4).

**Table 2. 4***: Knowledge on symptoms of malaria (n = 306)*

| Symptoms of malaria | Responses | | Per cent of Cases |
|---|---|---|---|
| | n | Per cent | |
| Fever | 207 | 17.7 | 67.6 |
| Headache | 207 | 17.7 | 67.6 |
| Vomiting | 132 | 11.3 | 43.1 |
| Loss of appetite | 109 | 9.3 | 35.6 |
| Joint pains | 107 | 9.2 | 35.0 |
| Chills | 71 | 6.1 | 23.2 |
| Extreme weakness | 184 | 15.7 | 60.1 |
| Diarrhoea | 75 | 6.4 | 24.5 |
| Convulsion | 77 | 6.6 | 25.2 |
| **Total** | **1169*** | **100.0** | **382.0** |

***306 respondents gave 1,169 responses.**

During FGDs whereby further probing was done during discussion on symptoms of malaria, the participants agreed that diarrhoea and vomiting did not have high response 11.3% and 6.4% respectively for malaria symptoms because they were regarded as good signs for malaria episode. According to FGDs, vomiting and diarrhoea were taken as indicators that the patient was on her/his recovery to normal and hence a good sign for

health. It is not uncommon to inquire of patient and being told that "*malaria came out in yellowish yesterday*", implying that the patient had vomited the previous day. During FGDs, the participants agreed as follows:

> "*When malaria attacks you it actually cannot heal until you vomit some yellowish things. You will vomit until malaria cleans out. When you see that, it is the sign that malaria has now cleared out from your body. If this does not happen, even if you have taken medicine, you will continue to suffer because malaria is still accumulated inside your body*". (FGD participants at Matambalale Village, 25th July 2017).

As noted from Magomeni Village in Mtwara District, there was a strong belief that vomiting makes the healing process from malaria to be faster and effective once a sick person has started taking medicine. The same belief goes for a person who had diarrhoea resulting from a malaria episode. Vomiting is thought to cause the actual removal of malaria from the body of the patient. The implication of this is that taking anti-malaria medicine after a person vomits or had diarrhoea is not in itself a defining moment in the healing process. Consequently, without vomiting or having diarrhoea, the suffering is prolonged. Most respondents, however, showed they could identify malaria by several correct symptoms, confirming the observation that people become relatively familiar with obvious symptoms of any disease after a long exposure to it. These results are not unique in Lindi and Mtwara communities. Similar results from other communities are identical with this one, like findings by Agyyepong (1992) in Ghana, Fivawo (1993) in Tanzania and Kengeya-Kayondo *et al*. (1994) in Uganda.

Knowledge about the symptoms of malaria was found to be associated with choice of malaria treatment. Most of the respondents would treat each predisposing malaria

symptom as an illness on its own. For example, respondents who experienced body aches and headache tended to take analgaestic drugs like, panadol. Furthermore, the classification of malaria symptoms into various simple illnesses like headache, fever and general body malaise made respondents to disregard malaria as a serious and often not even seek adequate treatment, or implement integrated malaria control strategies in the household. This was reported by participants in an FGD as follows:

> *"The ways in which malaria displays its symptoms and signs in various ways which are simply make the patients interpret them as other forms of illness; hence, it becomes difficult to convince those affected by this disease (malaria) of the need to seek adequate and effective treatment. The situation becomes even harder for the communities to implement the available strategies in the household"* (FGD participants at Ligula B Village, 4th August 2017.)

The interpretation of malaria symptoms, which was guided by the perceived significance in terms of seriousness and menace to life, influenced people's choice of treatment. The respondents who considered particular malaria signs as not serious or a threat to life would procure drugs from nearby pharmacy shops. However, symptoms like convulsions that were perceived as seriousness demanded one to seek the attention of medical personnel for specialized treatment. In most cases where symptoms were understood as serious, the patient was taken to a health centre, dispensary or hospital.

### 2.4.4 Knowledge about identification of malaria symptoms

Inadequate level of knowledge on identification of malaria illness was evidenced by the findings in the study areas. Figure 2.1, which is a pie chart of 694 responses, shows that out of 306 respondents, 209 gave responses on sources of knowledge about identification of malaria symptoms. The Figure indicates that 29.97% of all the responses show that

respondents based their identification of symptoms on observation. In addition, 21.33% of the responses demonstrate that the respondents based their identification of symptoms on information from health workers. Also, 17.87% of all responses overtly manifest that the respondents could identify symptoms only after training. Moreover, 12.39% of the responses reveal that respondents' identification of symptoms depended upon knowledge from media while 18.44% of the responses shed light on reading books as their main source of their ability to identify symptoms.

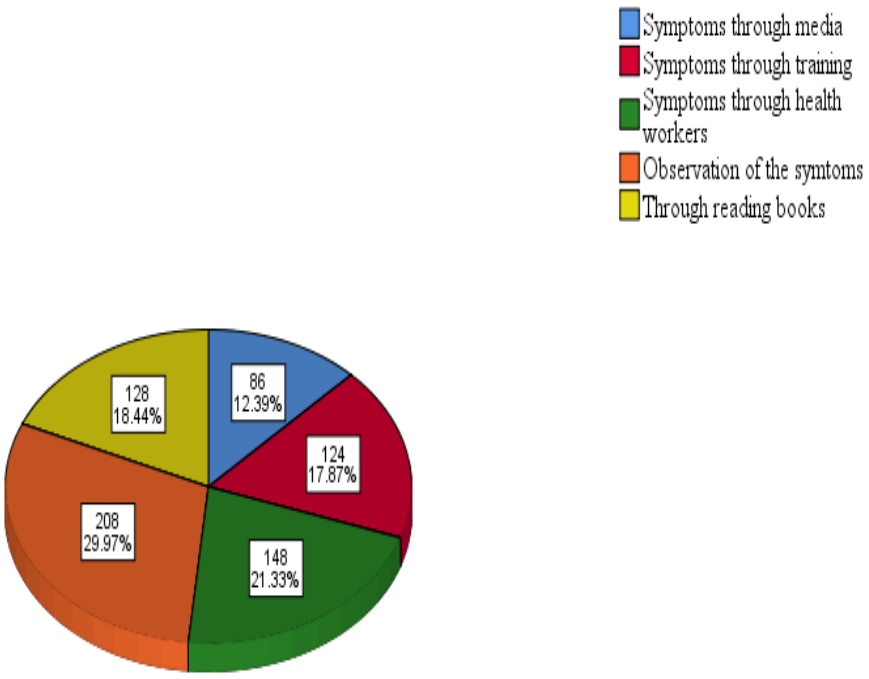


**Figure 2.1: Sources of information on how to identify malaria symptoms**

### 2.4.5 Knowledge about malaria control strategies

With regard to knowledge about malaria control strategies, the 306 respondents gave 904 responses, whose frequencies and percentages are summarised in Figure. 2.2. The findings in Figure. 2.2 indicate that 19.91% of the responses were that using mosquito

nets was a way of controlling malaria whereas 11.84% of the responses were on using mosquito repellents. Furthermore 10% (12.06%) of the responses were that house cleanliness and general sanitation were strategies for controlling mosquitos. Furthermore, 12.72% of the responses were that removing water puddles and emptying containers were malaria preventive measures. Additionally, 17.4% of the responses were that cleaning bushes and vegetation around the houses were malaria preventative measures and 13.61% of the responses were that spraying chemicals is a means of controlling malaria in the household. Finally, 12.83% of the responses were that covering oneself with long clothes is a means of malaria control. This means that the respondents had little knowledge about the effectiveness of some of the preventive measures. These results show that some respondents had over generalization on containers that are open and consist of water.

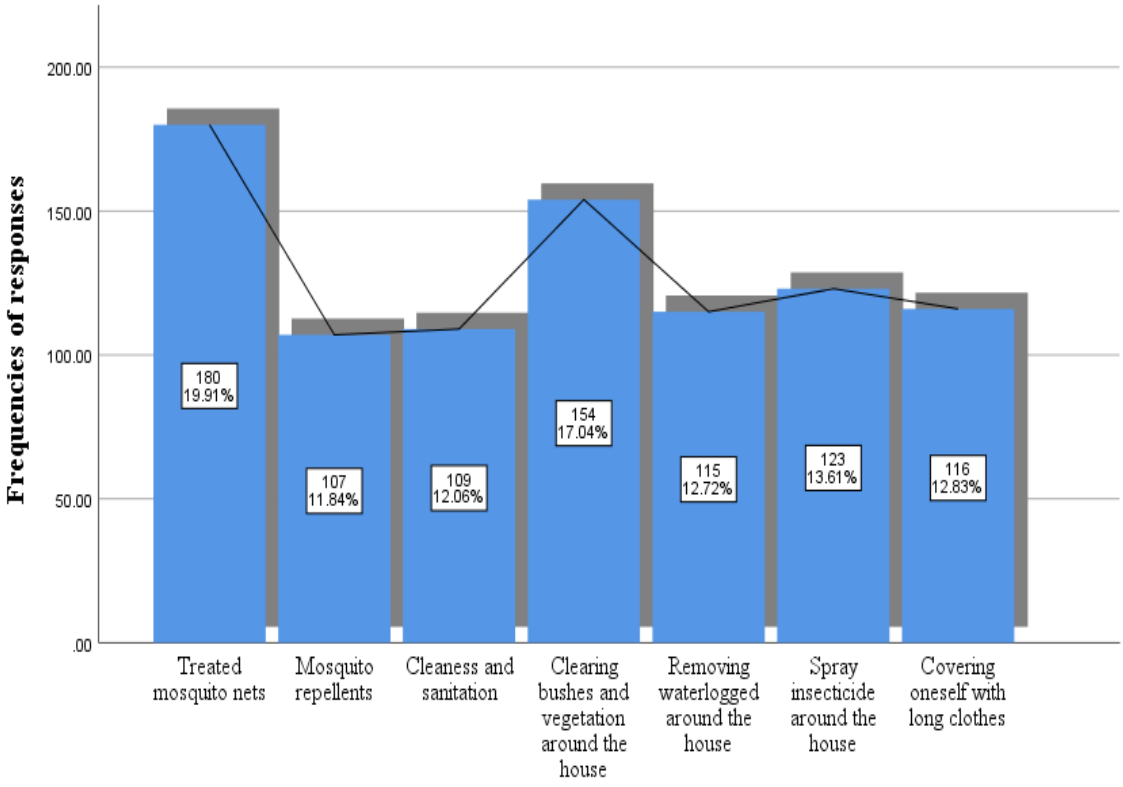


**Figure 2. 2: Responses of malaria control strategies identified by communities**

### 2.4.6 Knowledge about malaria control strategies and its association with socio-economic variables

As stated in Section 1.7, a 23-point index summated scale which comprised 23 statements was also used to determine respondents' knowledge about malaria control strategies. Based on that tool, the respondents' knowledge is presented in Table (2.5).

**Table 2. 5: General Knowledge about malaria based on the index summated scale that was used**

| Statement about malaria | Yes | | No | |
|---|---|---|---|---|
| | n | % | n | % |
| Mosquito stinging at night causes malaria | 283 | 92.5 | 23 | 7.5 |
| Reducing bushes is one way to control mosquito multiplication | 151 | 49.3 | 155 | 50.7 |
| People who are able to bewitch others cause malaria | 16 | 5.2 | 290 | 94.8 |
| Malaria is more dangerous in tropical areas | 266 | 86.9 | 40 | 13.1 |
| Mosquitos like to bite the black skins more than white skins | 136 | 44.4 | 170 | 55.6 |
| Malaria is more dangerous during the rainy season | 224 | 73.2 | 82 | 26.8 |
| Mosquitos multiply when temperatures are high | 101 | 33.0 | 205 | 67.0 |
| Mosquitos bite more when temperatures are high | 97 | 31.7 | 209 | 68.3 |
| There are many causes for someone to suffer from malaria | 79 | 25.8 | 227 | 74.2 |
| Some people produce mosquitoes that affect other people with malaria | 89 | 29.1 | 217 | 70.9 |
| Mosquitos cause malaria when people do not use treated nets | 167 | 54.6 | 139 | 45.4 |
| Malaria can be controlled using mosquito nets | 258 | 84.3 | 48 | 15.7 |
| Malaria can be controlled by clearing bushes | 204 | 66.7 | 102 | 33.3 |
| Malaria can be controlled by draining logged water around households | 134 | 43.8 | 172 | 56.2 |
| Malaria affects black people and does not affect white people | 188 | 61.4 | 118 | 38.6 |
| Mosquito multiplication can be reduced by clearing bushes | 114 | 37.3 | 192 | 62.7 |
| Mosquito multiplication can be reduced by draining logged water around households | 125 | 40.8 | 181 | 59.2 |
| One strategy to prevent malaria is to eliminate people who bewitch others | 135 | 44.1 | 171 | 55.9 |
| Prayers and worshiping prevent people from becoming sick of malaria | 146 | 47.7 | 160 | 52.3 |
| Herbs are more potent to control malaria than modern medicine | 123 | 40.2 | 183 | 59.8 |
| Malaria is caused by rain and water logging | 103 | 33.7 | 203 | 66.3 |
| Mosquitos cause malaria when people do not use treated mosquito nets | 105 | 34.3 | 201 | 65.7 |
| Witch doctors can control malaria | 171 | 55.9 | 135 | 44.1 |

The total points scored on the 23 statements were expressed as percentages over 23, the percentages showing the extent of knowledge about malaria. The minimum and maximum

per cents obtained were 0.0% and 100.0% respectively. The average was 53.0%, which means that, overall, the respondents had moderate knowledge about malaria. The per cents were grouped into three categories of low understanding (0.0 to 39.13%), moderate understanding (39.13 to 56.52%) and high understanding of malaria (56.53 to 100.0%). The cut-off points were based on their ability to divide the respondents into three approximately equal groups. On the basis of that categorisation, those with low, moderate and high knowledge were 28.4% (n = 87), 40.5% (n = 124) and 31.0% (n = 95) respectively. The three categories were cross-tabulated with demographic and socio-economic variables to determine whether they were significantly associated (Table 2.5).

### 2.4.7 Knowledge about malaria control strategies and its association with demographic variables

A chi-square test for association was conducted between sex of the respondents (male/female) and knowledge about malaria control strategies and between age (younger/older) of the respondents and the same strategies. The findings are presented in Table 2.6 and show that all expected cell frequencies were greater than five. There was a statistically significant association ($\chi^2_{(2)} = 7.393$, $p = 0.025$) between sex and knowledge about malaria control strategies, and there was also a moderate association between sex and knowledge for malaria control strategies, $\varphi = 0.155$, $p = 0.025$. Furthermore, the analysis revealed that there was no statistically significant association ($\chi^2_{(2)} = 3.772$, $p = 0.152$) between age and knowledge about malaria control strategies. This means that male respondents were more likely to have poor knowledge about malaria control strategies as compared to female respondents.

Table 2.6 also shows that older respondents were more likely to have higher knowledge about malaria control strategies than younger ones.

**Table 2.6:** *Knowledge towards malaria control strategies and its association with demographic variables*

| Explanatory variables | | Knowledge | | | Chi-Square | p-Value |
|---|---|---|---|---|---|---|
| | | Low understanding (%) | Moderate understanding (%) | Higher level of understanding (%) | | |
| Sex | Female | 36.0 | 27.3 | 36.6 | 7.393 | 0.025 |
| | Male | 36.6 | 39.6 | 23.9 | | |
| Age | Younger | 35.4 | 36.5 | 28.1 | 3.772 | 0.152 |
| | Older | 37.7 | 26.3 | 36.0 | | |

Respondents aged 50 and above seemed to have a lot misinformation about malaria control strategies. During an FGD a 70-year old man, for example, felt so much offended when one health worker told him that their new strategies included electric mosquito repellent liquid for killing mosquitoes that could be used in households. The discussants said this to the health worker:

> *"Young lady! Your ability to speak English does not make you wise. I have seen that there is no strategy which is as effective as the use of mosquito nets. So, there is nothing new you can tell us. Since our fathers 'era and even before that, nothing works like mosquito nets. What you are telling us about electric mosquito repellent liquid is absolutely not true*". (FGD participants at Ligula B village, 4th August 2017).

**Table 2.7***: Knowledge about malaria control strategies and its association with socio-economic variables*

| Explanatory variable | | Knowledge | | | Chi-Square | p-Value |
|---|---|---|---|---|---|---|
| | | Low understanding (%) | Moderate understanding (%) | Higher level of understanding (%) | | |
| Household income | Lower | 31.8 | 14.9 | 53.2 | 80.789 | 0.001 |
| | Higher | 40.8 | 50.7 | 8.6 | | |
| Household size | Small | 43.4 | 28.9 | 27.6 | 7.599 | 0.269 |
| | Ideal | 39.1 | 31.8 | 29.1 | | |
| | Medium | 26.7 | 36.2 | 37.1 | | |
| | Larger | 50.0 | 28.6 | 21.4 | | |
| Marital status | Married | 43.5 | 27.2 | 29.3 | 3.224 | 0.199 |
| | Unmarried | 33.2 | 35.0 | 31.8 | | |
| Main occupation | Farming | 33.8 | 31.9 | 34.5 | 28.537 | 0.001 |
| | Business | 17.9 | 44.6 | 37.5 | | |
| | Employment | 52.0 | 29.6 | 18.4 | | |
| | Casual labour | 20.0 | 10.0 | 70.0 | | |
| Education level | No formal | 40.0 | 20.0 | 40.0 | 9.617 | 0.041 |
| | Primary | 31.3 | 30.4 | 38.0 | | |
| | Secondary | 36.3 | 38.2 | 25.5 | | |
| | Tertiary | 43.5 | 33.9 | 22.6 | | |

The results presented in Table 2.7 show that all expected cell frequencies were greater than five. There were statistically significant associations ($\chi^2_{(3)} = 80.789$, $p = 0.001$; $\chi^2_{(3)} = 28.537$, $p = 0.001$ and $\chi^2_{(3)} = 9.617$, $p = 0.041$) between income, main occupation and education level respectively and knowledge for malaria control strategies. There was moderate association ( $\varphi = 0.514$, $p = 0.001$; $\varphi = 0.305$, $p = 0.001$ and $\varphi = 0.177$, $p = 0.041$) between income, main occupation, education level respectively and knowledge for malaria control strategies. This was based to the recommendation by (Healey, 2013). which states that $\leq 0.10$ is weak association; 0.11 to 0.30 is moderate association and 0.31 $\leq$ is strong association. Furthermore, the analysis revealed that there was no statistically significant association ($\chi^2_{(3)} = 7.599$, $p = 0.269$ and $\chi^2_{(3)} = 3.224$, $p = 0.199$) between household size and marital status respectively for malaria control strategies.

### 2.4.8 Getting malaria while using insecticidal mosquito nets

The 306 respondents were asked if they thought that people would get malaria while using insecticidal mosquito nets; 296 of them responded by giving 961 responses on why people get malaria illness while they have adopted to use insecticidal mosquito nets as a strategy for protection against malaria.

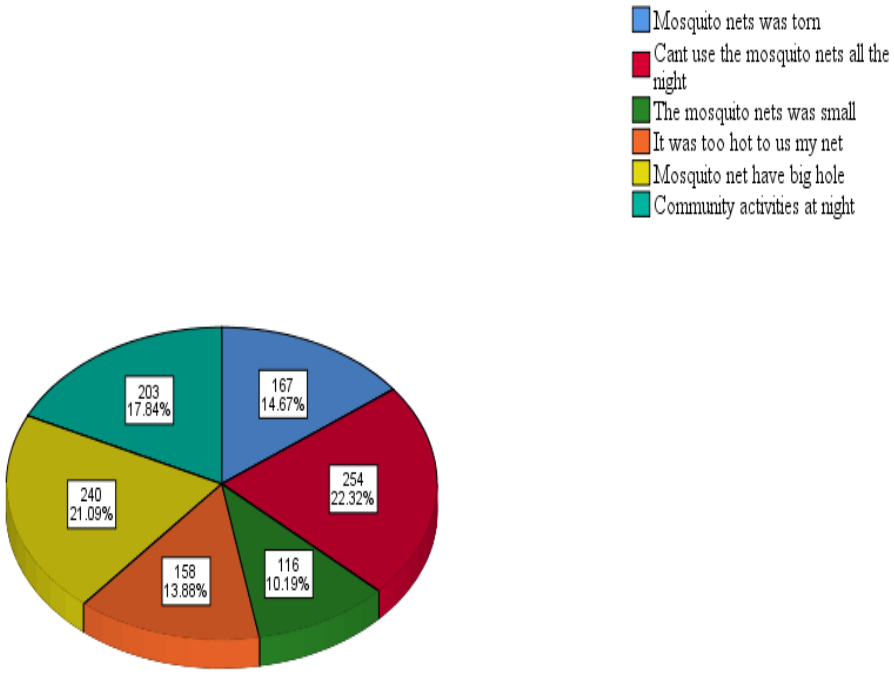


**Figure 2.3: Multiple responses on getting malaria while using insecticidal mosquito nets**

The results from FDGs participants underscored various themes that highlight respondents' perception about malaria preventive measures Figure 2.3. These included people's knowledge about preventive methods, medication and the relationship with socio-economic factors in controlling malaria. It was learnt that there was misconception

about malaria preventive measures. It was noted throughout discussions that participants in the discussions and community members in general believed that malaria could not be prevented using mosquito nets or any other methods that left mosquito infest their household members. Members of a focus group of elder discussants contended thus:

> "*Truly, based on our experience and what people say in our area, here in Lindi, malaria cannot be prevented by using mosquito nets because no one can sleep the whole night without going to ease one's at night. And toilets are infested with mosquitos. Not only about going to toilet, but also people go to bed late, some go to worship at night and others to party at night. And it is impossible to do all these while covering yourself with a mosquito net*" FGD participant at Mitengo Village, 30th July 2017).

It was further noted that there was a pervasive belief among the participants that malaria had no cure and seeking medical attention from hospital would exacerbate the condition. They agreed as follows:

> "*We know there is no medicine for malaria. This is because when you go to the hospital a doctor will ask you the medicine you usually use and then the doctor will write for you the medicine you told him. It is clear here that even the doctors do not know the medicine for malaria. That is why they keep trying different types of malaria medication*" FGD participant at Matambalale Village, 25th July 2017.)

Moreover, group discussion revealed that people in the study area possibly believed that malaria mainly affects poor people and some educated ones, on the basis that rich people have money to buy residual sprays, which are more potent and effective whereas educated people have knowledge but no means to access such facilities. As regards this, focus group participants in Lindi agreed:

> *"Educated people, especially who completed form four and form six, are as affected by malaria as the poor ones because both groups have no money to buy strong and efficient spraying chemicals that kill each mosquito in a house. But well-off people can afford buying and spraying such chemicals, and so malaria is only for some groups of people"* ((FGD participant at Magomeni village 1st August 2017.)

### 2.4.9 Innovative ways of using mosquito nets for other purposes

Furthermore, the findings in Figure 2.4 reveal that, in spite of the fact that the respondents had reported that they preferred using mosquito nets to other malaria control methods, they used them for ulterior purpose as indicated by the results; 38.8% of the respondents indicated that mosquito nets were used for fishing activities, fencing and other activities instead of using them for malaria prevention and control. This signalizes insidious and subtle motive for receiving and accepting mosquito nets distributed by the government in Lindi and Mtwara Regions. Additionally, these findings connote low level of understanding of the importance of the use of mosquito nets in malaria prevention. Generally, the dominant economic activities in the research area determine the innovative ways of using mosquito nets.

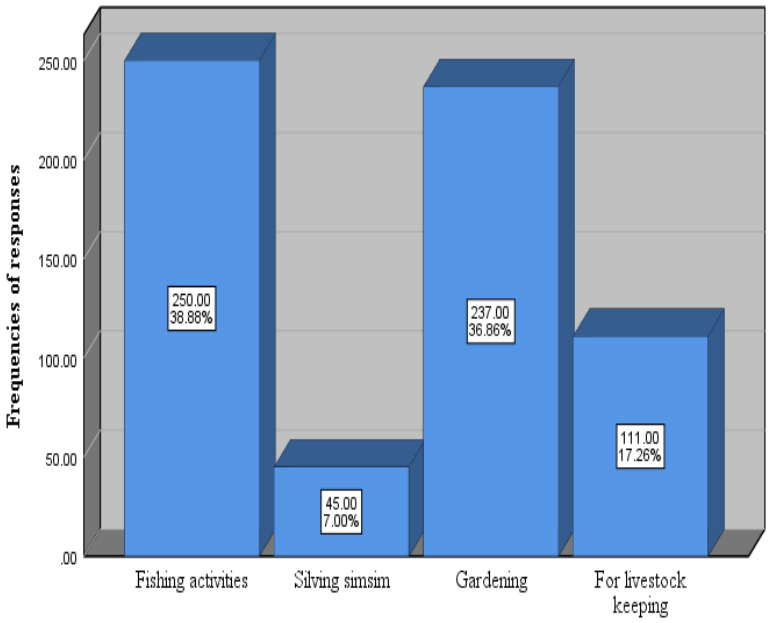


**Figure 2. 4: Innovation ways of using the mosquito nets for other purposes**

## 2.5 Discussion

This paper is about investigation of people's knowledge about malaria control strategies and its associations with demographic and socio-economic variables. Knowledge in this paper also means the capability of an individual to acquire and integrate information and facts, expand and filter them through to gain insight and understanding about malaria, including its control strategies, and use them proficiently. Therefore, in this case, knowledge is a process of actualizing capacity, through experience or education as well as media, to attain capability to make positive decisions about malaria and implement them. Accordingly, the constituent parts of knowledge are information, awareness, insight and wisdom.

Following this line of reasoning, the general findings show low level of knowledge. This is compounded by some misconceptions. However, the results indicate relatively high

awareness in some aspects of knowledge about malaria. Although most of the respondents claimed to know the causes of malaria, they attributed the causes to mosquitos, other pathogens, using untreated nets and houses encircled by puddles of water. They did not have good understanding of causation of malaria or they confused between transmission and causality. These findings corroborate the results found in Kenya where respondents showed similar results (Rosana, 2011) such as attributing the cause of malaria to witchcraft, demons, mosquitos and puddles of water. The misunderstanding that malaria is caused by other factors other than mosquito vector could be an obstacle to knowledge and effectiveness of control strategies of the disease. Those who lack knowledge about the causation of the disease through the mosquito vector are likely to feel so overwhelmed by causes of malaria that they cannot take any preventive measures or they may adopt wrong methods. Presumably, they tend to protect themselves when using mosquito nets against the nuisance of stinging of mosquitos rather than against malaria because of the perception that mosquitos are not the only cause.

Furthermore, low level of knowledge is not unique to this paper. Other researchers in Tanzania, Nigeria and Zimbabwe observed low knowledge and awareness of causes of malaria and its prevention in communities (Midz *et al.*, 2011; Sigh *et al*. 2014; Mayala *et al.*, 2015). Consequently, communities do not understand and distinguish among causes and transmission of malaria, including the environment in which mosquitos thrive. This could help members of the communities to build their own capacities and take initiatives to combat the disease.

However, other studies have shown high level of awareness and knowledge about malaria in Tanzania, Iran and Cameroon, in spite of the steadiness of morbidity due to the disease (Mboera *et al*., 2007; Mazigo *et al*., 2010; Hanafi-Bojd *et el.*, 2011). These researchers

advanced the argument for morbidity on the following reasons: unstrained availability of antimalarial medicines to the public, delayed health seeking tendencies, and prescription of antimalarial medication that are symptoms dependent.

Although these findings appear to contradict the results of this study, they confirm, by the virtue of the definition of knowledge of this paper, that there was least knowledge in communities about malaria causes. If these people had such knowledge, they would have developed early seeking behaviour: they would have established legal and judicious use of antimalarial drugs, and confirmatory laboratory tests would have been a requirement before any further medical attention. Additionally, a study conducted by Vundule and Mharakurwa (1996) confirmed that high level of awareness of malaria is not adequate to enable people to employ malaria control strategies. Consequently, it would be plausible, with respect to the results in this paper, to develop a mechanism for acquiring knowledge about malaria that should be established from the grassroots.

As regards knowledge about the identification of malaria illness, it can be noted that there was a reliance on symptoms to identify illness by the respondents. Early and correct detection of malaria is a reliable determinant for early health seeking behaviour. Otherwise it may lead to unwitting delay and, accordingly, perpetual morbidity and mortality. The findings of this paper showed that few respondents used confirmatory laboratory tests as a basis to recognize the illness. This could be attributed to low level of education among the respondents because it was significantly associated with malaria control strategies. These findings are in line with Kimbi *et al.* (2014), who also found that knowledge of malaria was strongly associated with the level of formal education.

Those who had got education at primary level, secondary level, and post-secondary level could gain some understanding of the importance of the laboratory tests in classes through reading books and malaria campaigns through radio, television, newspapers and scientific magazines. Due to this habit of listening to radio and attaining information about malaria through other media, they have a staunch belief in what they know, and they are somewhat rigid in their comprehension. As established in this paper, aged people had so strong reliance on their experience that they felt “were more knowledgeable” in all aspects of malaria disease and control than any one below them. They attributed this status to their living longer than others. Experience can be delusive as much as confidence can breed ignorance. In their proportional measure, this can affect receptivity about malaria control strategies. On other extreme, young people do not listen to radio nor do they read newspapers. So do not read books. These factors are responsible for low level of understanding among young and middle-aged members of these communities. Also, they have the perception that knowledge gained through formal education was sufficient and so they presumed that there was nothing they could learn from aged members. This kind of perception indicates fixed mindsets, and hence affecting receptivity adversely.

Furthermore, education is a force which enables one to acquire knowledge and integrate it, compare and contrast between similar symptoms, classify them, and then make proper decision on how to deal with illness. Education is a powerful force that advances communities and can enable people to plan, make decisions, and implement them. In this regard, Hanafi-Bojd *et al*. (2011) found that the higher the level of education of respondents the higher the degree of willingness was in participating and engaging in malaria control programmes.

Despite the fact that the respondents showed high level of awareness of malaria symptoms such as fever, headache, vomiting, lack of appetite, joint pain and convulsions, they had some misconceptions about some of these symptoms. For example, some attributed the initial symptoms to witchcraft or fever. This can be explained by the fact that lay men/women tend to confuse coincidence with causality and have propensity for inexperience. In addition, people with no formal education may make judgement based on events rather than inter-relationship processes.

Studies from Kenya and Tanzania like ones by Rosana (2011) and Sumari *et al*. (2016) found that some respondents associated transmission of malaria with eating unclean food, being in contact with malaria patients, and going to toilets barefooted. Nevertheless, most respondents would seek medical attention from local health centres once they realized that it was malaria. Nonetheless, this contradicts the information obtained through FGDs that some people believed that there was no cure for malaria and then it was no use to go to hospital. This contradiction can be explained by the fact that some respondents were somewhat affected by halo effect that the researcher was a secret agent whose motive was to identify those who misused the provided mosquito nets. The researcher discerned this when in one focus group discussion the discussants said inadvertently that the researcher was a government agent.

Interviewed participants indicated a high level of conglomerate of information (to have information that cannot be used meaningfully) of preventive measures like using ITNs, clearing bushes and draining water puddles and sleeping under bed nets as the prevalent methods of malaria control strategies. While Amusan *at al*. (2017) found, in Nigeria, that the majority of respondents owned and used mosquito nets appropriately, this study noted misuse of the distributed nets. More than three-quarters (77.7%) of the respondents said

that bed nets were being used for other activities such as fishing and extracting salt from the nearby Indian Ocean in the study area. This could explain the difference between the results of these two studies. While a study which was conducted in Nigeria had 94.6% of respondents having formal education, only 39.7% of participants in this study had gone to school. As Knies (2014) asserts that education is a reliable predictor of health outcomes in comparison with marital status, age, sex and occupation, it follows then from this paper that the respondents could not structure information of preventive measures and put it into meaningful use.

In addition, with regards, with sex, low knowledge of women has far more devastating effects than men. This is because most women take care of members of household, take care and raise children, and get pregnant. Pregnant women and children are at terrific risk of malaria (Appiah-Darkwan and BaduNyarko, 2011). It follows that knowledge of malaria and malaria control strategies is crucial for the endeavor in eradicating malaria and heightening receptivity by members of communities. Accordingly, gender roles can play an important part in maintaining a homestead, household and family, hence influence the receptivity of malaria control strategies within communities. Therefore, intervention towards malaria prevention and control should accommodate different roles that exist in recipient communities.

Moreover, in this study, misconceptions were observed about the use of mosquito nets in preventing malaria. This indicates a huge knowledge gap between malaria prevention programmes mobilizers and consumers. While government and Non-Government Organizations (NGOs) are striving to distribute bed nets through campaigns in order to control malaria (TDHS-MIS (2016), the programme bearers believe and act somewhat otherwise.

This tendency may emanate from the fact that people become ill of malaria even when they use bed nets. Since people might stay in their living rooms talking to each other and since some wake up early in the morning to go to mosques, churches or farms, there is high probability that they can contract malaria. If these conditions occur too many of them, then, due to least knowledge about malaria which is compounded by low level of formal education, they can overgeneralize that mosquito nets are ineffective. Consequently, it is plausible to educate or train people in their communities to employ multi-preventive measures in controlling malaria. A study by Zangpo *et al.* (2019) conducted in Bhutan found similar results.

In addition, the respondents perceived malaria as a disease of the poor and educated people. They believed that rich people could control malaria easily. This implies that attitude of residents in this region towards malaria control strategies should be investigated. Due to such indicators of negative attitudes and misconceptions about the relation of malaria, some categories of members of the community may disregard training and seminars about malaria, given that people have negative perception about preventing malaria by community. Ultimately, this may have a debilitating effect to these communities, if unchecked.

There was association between household income, occupation and education level. This, therefore, indicates that any malaria control programme must always consider individual socio-economic variables during initiation and implementation of the programme. Many studies that proved that improved community knowledge of malaria control strategies are necessary for receptivity of the strategies among the affected communities (Ahorlu et al., 2006; Tatem *et al*., 2010). This is the prospect for any malaria control strategies and effective intervention they can utilize.

## 2.7 Conclusions and Recommendations

The findings showed that the overall knowledge about malaria was moderate (53.0% score on an index summated scale that was used to measure it) while 28.4%, 40.5% and 31.0% of the respondents had low, moderate and high knowledge respectively. Therefore, it is concluded that general knowledge about malaria is moderate in the research area. Accordingly, it is recommended that more awareness campaigns about malaria should be conducted in the research area.

It was also found that sex of household head, household income, main occupation and education level were positively and significantly associated with knowledge about malaria. From these findings, is concluded that these are big factors which explain knowledge about malaria. Therefore, In order to increase knowledge about malaria, the government and other stakeholders should give priority to these factors. Furthermore, this study highlights that one aspect of knowledge like awareness or information is not enough and sufficient to bring about drastic change in combating malaria. For good progress to be made, all aspects of knowledge which can be achieved through education and training are to be considered. Among these are raising awareness about the disease and its associated preventive measures, deepening on the understanding of the coherent dynamic relations of awareness and wisdom (which is application of skills required according to exigencies of time) and keeping on refining the acquired conception or information through the mechanisms founded within localities.

Moreover, this paper sheds light on the need to create local mechanisms that can ensure proper use of mosquito nets provided to members of communities. These must be accompanied with creating a sense of ownership and pride, which can be attained by introduction of some meagre contribution or attached price to each mosquito net given.

Above all, it is suggested that the level of socio-economic status about malaria control strategies before introduced to any community must be assessed in advance. The communities should be empowered by local governments to hold local training on multivariate malaria preventive measures. This can be achieved using local school teachers and some volunteers from the same communities.

Based on the findings of this study, respondents hence members of the communities have information of malaria preventive strategies. However, they have moderate knowledge about malaria causes, how to utilize the preventive measures, and the importance of using bed nets for malaria prevention. Thus, it is recommended that knowledge should be promoted through training, non-formal and informal education by community development officers, health officers, and teachers found within the local communities. Further, local governments should empower members of communities by engaging the members of local communities, holding training sessions, workshops and seminars on multivariate malaria preventive measures.

Finally, malaria prevention and control efforts should aim at creating local examples of excellence to promote good practices towards malaria control strategies for prevention and control. These may be in the form of model households to provide concrete examples of how to translate what people are taught into good disease prevention practices. The model houses should show exactly how certain things ought to be done if you have high receptivity of malaria control strategies, while also creating local champions that can show others what should be done. Intervention in these local communities should integrate information on income generating activities to enable members of the communities to fight poverty and its effects on receptivity of malaria control strategies.

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# CHAPTER THREE

## 3.0 ATTITUDE TOWARDS MALARIA CONTROL STRATEGIES AND ITS ASSOCIATION WITH DEMOGRAPHIC AND SOCIO-ECONOMIC VARIABLES IN LINDI AND MTWARA REGIONS, TANZANIA

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### 3.1 Abstract

Malaria perpetuates morbidity and mortality despite concerted efforts on utilizing modern malaria control strategies which are in place. Could there be a missing link between strategies and implementation? Are attitudes part of the contributing factors in the persistence and recalcitrance of this pernicious disease? This paper answers these questions with respect to community members' attitudes towards the methods of malaria control in Lindi and Mtwara, particularly towards modern malaria control strategies in comparison to traditional approaches; distribution of insecticide treated mosquito nets, and appropriate utilization of the distributed mosquito nets. The study on which this manuscript is based was quantitative and involved 306 respondents from both study areas. A Likert scale eliciting alternative responses of strongly agree, agree, neutral, disagree and strongly disagree was employed to collect primary data as part of a questionnaire. Both descriptive and inferential statistics were computed for the analysis of the data.

Descriptive statistics yielded frequency distribution and percentages while inferential statistics involved Chi-square test. Overall, the attitude towards malaria control strategies was positive, the average points scored on the Likert scale that was used to gauge the attitude being 54.5, which was above the undecided score point which was 48.0. The proportions of respondents with unfavourable, undecided and favourable attitudes were 18.63%, 6.86% and 74.51 respectively. Sex of respondent (Chi-Square = 8.569, p = 0.014), marital status (Chi-Square = 14.803, p = 0.022), education level (Chi-Square = 21.690, p = 0.001), main occupation (Chi-Square = 24.940, p = 0.001) and household income (Chi-Square = 51.707, p = 0.001) were significantly associated with attitude towards malaria control strategies. However, there was no significant association between household size and attitude and between sex of respondent and attitude. It is concluded that, although community members have positive attitude towards malaria control approaches, they have negative attitude towards using mosquito nets. Although this paper found that overall respondents had favourable overall attitude towards malaria control strategies, the variation in their level of favourability was not explained by household size and sex of respondent. Therefore, it is recommended that, for effective and efficient malaria control strategies, interaction and interrelation of attitude towards malaria control strategies, sex of respondent, marital status, education level, main occupation, household income as well as socio-cultural factors must be considered coherently.

**Key words:** Malaria, attitudes, and malaria control strategies.

## 3.2 Introduction

Malaria remains one of the most solemn global health problems and is not only a major cause of morbidity and mortality, but also a cause of many socio-economic problems (Thapar *et al*., 2019). World Health Organization (WHO) World Malaria Report (2018)

indicated that there were 219 million cases of the disease in 2017 and the estimated global tally of malaria deaths reached 435,000. Approximately 70% of the world's malaria burden is concentrated in just 11 countries—10 in sub-Saharan Africa and one in Asia which is India. These high-burden nations are home to an estimated 151 million cases of malaria and 275000 deaths. The Global Technical Strategy (GTS) for Malaria 2016-2030 calls for reducing malaria cases and deaths by at least 40% by 2020, 75% by 2025 and 90% by 2030 (Thapar *et al.*, 2019). In 2017, of all the 11 highest burden countries globally, African countries reported increases in malaria cases over the previous year. According to the (WHO) and the United Nations Children and Education Fund (UNICEF) (2018), an estimate of a person dies in every ten seconds, devouring 91% of multiple millions of peoples' lives per annum. In addition, three million members of communities are infected with malaria parasites at one time while at least a third of the population develops health complications (WHO, 2015). Furthermore, an approximate of 2018 million cases were reported all over the world in 2017, and among these 80% were contributed by fifteen countries of Africa (WHO, 2017), Tanzania being one of them. The report indicates that at least three billion people remain at risk of malaria infection with a great proportion of these vulnerable people residing in endemic areas, sub-Saharan Africa in particular.

Because of the debilitating effects of malaria to individuals and with its associated corrosion to communities, the Tanzanian Government has been taking preventive, interventional and curative measures against it. Among the approaches employed for malaria eradication and prevention include uses of insecticide-treated mosquito nets (ITNs). These are utilized as a shield against mosquito stinging and thus preventing mosquitos from transferring vector parasites to a victim when sleeping at night.

Also, in-door residual spraying (IRS) of dwellings and intermittent preventive medical attention with sulphadoxine-pyrimethamine (Onyebuchi *et al.*, 2014) are employed. Additionally, rapid diagnostic tests and treatments with effective anti-malaria medicines like artequin and proqural (Mabrone) are also applied (Lee, *et al*., 2005)). Nevertheless, utilizing ITNs is the most common and favourable preventive strategy of all methods by the Government of Tanzania. This is conceived of being the most-cost-effective method in malaria preventive strategies in highly endemic regions, especially in coastal regions of Tanzania (Makundi *et al*., 2007). Since free of charge community-based distribution of long-lasting insecticides nets (LLNS) is implemented by the government of Tanzania through various campaigns and nongovernmental organizations (NGOs), this method is the most affordable and accessible by the majority of members of Tanzanian communities.

The provision of long-lasting mosquito nets is ineffective and at least meaningless unless they are used by the recipients meaningfully. This is dependent upon several factors, among them being knowledge with understanding, traditions, habits and practices as well as perceptions and attitudes. Knowledge is a necessary condition for a recipient to be able to utilize malaria preventive strategies, but it is not sufficient. Proper execution of these strategies ought to involve positive attitudes towards the strategies and knowledge thereof. According to Marzano (1992), attitudes embody and shape our experiences and act as sieves through which our acts are sorted. Furthermore, Eiser (2015) succinctly explains that attitudes entail feelings or thoughts of like or dislike, approval or disapproval, attraction or repulsion, trust or distrust manifested through what we say and do or how we react to what other people say and do or urge us to do. This may be for our own good or for a certain purpose.

Because of the gravity of malaria and its recalcitrance despite the concerted efforts exerted by the Tanzanian Government and NGOs to combat it, and since, according to Agbeyang *et al.* (2017), the disease was the global challenge in the 20th century and now is only a formidable challenge for merely 40% of the earth so far, this paper assesses people`s attitudes towards malaria control strategies. Because attitude is presumed to be among the missing links between the availability of malaria control strategies and their being implemented, this paper determines community members' attitudes towards the methods of malaria control and its association with demographic and socio-economic variables**,** in the study areas.

## 3.3 Methodology

### 3.3.1 Study area and design

The study was conducted in Lindi and Mtwara Regions which are located in the Southern part of Tanzania. The area is one of the areas where the Tanzanian government implements malaria strategic plan by distributing long-lasting insecticidal nets to families which have schoolchildren (TDHS-MIS, 2016). Lindi Region consists of six districts, which are Kilwa, Lindi Rural, Nachingwea, Liwale, Ruangwa and Lindi Urban. It is situated between latitudes 7º55' and 10º50' South of the Equator and between longitudes 36o51' to 40o East of the Prime Meridian.

The region borders Coast Region to the North, Indian Ocean to the East and Mtwara Region to the South, while Morogoro Region is located to the West. Ruvuma Region is to the South-West of Lindi Region. The climatic conditions of Lindi are characterised by mean temperature of 27ºC and rainfall of 780 mm to 1200 mm per year. The region comprises at least 78306 inhabitants whose main economic activity is farming. Principally, they produce maize, cassava, sorghum, paddy, cashew nuts, and simsim.

In contrast, Mtwara Region lies between longitudes 38° and 40°30’ East of the Prime Meridian and between 10°05’ and 11°25’ South of the Equator. The region borders with Lindi Region to the North, Indian Ocean to the East, and in between this region and Mozambique runs Ruvuma River. Mtwara borders with Ruvuma Region to the West. Mtwara Region comprises five districts, namely Masasi, Mikindani, Tandahimba, Newala and Nanyumbu. The smallest district among the five districts is the Urban District called Mtwara Mikindani. The mean temperature is 27°C with humidity that ranges between 87% in March and 79% in October. As applied to Lindi, Mtwara has farming as its principal economic activities.

The only distinguishing features between these regions from other regions of Tanzania, in this context, are that Mtwara and Lindi have natural gas deposits. While Lindi produces natural gas at a location called Songo Songo Island, discovered in 1974, Mtwara has natural gas reservoir at Mnazi Bay, discovered in 1982.

This research on which this paper is based employed a cross-sectional research design whereby data were collected once and therefore are suitable to describe the situation at the period in which the study was conducted, but not how things would always be in the study area. This means time could not be a variable as it would have been for a longitudinal study. Consequently, time was assumed be constant in this paper. With an intention of collecting information from respondents, a cross-sectional survey was deployed to assess the attitudes of community members towards malaria control measures and other related endeavours. In order to collect pertinent information from respondents, purposive, convenience, and simple random sampling techniques were utilized. The districts were purposively selected on the basis of having high prevalence of malaria. Convenience sampling was used to select respondents for focus group discussions, while

simple random sampling was used to select the households. Copies of a structured questionnaire were administered to the respondents by the researcher and his two assistants.

### 3.3.2 Data collection procedures and sample size

A Likert scale as part of a questionnaire was to collect data. The scale employed the familiar pattern of statements followed by a series of options, which were strongly agree, agree, neutral, and disagree and strongly disagree. According to Vogt *et al*. (2012), Likert scales are suitably good for examining the degree of agreement with or support for the beliefs, policy, practice or attitude. Accordingly, this paper put this method into use in order to assess attitudes of residents from the study areas towards malaria control strategies. Moreover, this tool was specifically used to collect information on attitude towards the actual use of mosquito nets, modern malaria control strategies and traditional malarial control strategies. This information was collected in Kiswahili, which is the national language for Tanzania and is fluently spoken in the study areas. Thereafter, the data that were collected were translated into English by the researcher. The whole process of collecting data involved 306 respondents from Lindi and Mtwara Regions.

### 3.3.3 Data processing and analysis

Quantitative data which were obtained through a structured questionnaire were analysed by the use of Statistical Package for Social Science (SPSS) Version 26. Descriptive statistics such as frequency distribution and percentages as well as inferential statistics were utilized in the description and making sense of the findings. Moreover, a chi- square test of homogeneity was run for analysis of data tailored to assess attitude towards malaria control strategies by socio-demographic characteristics of the households that were sampled.

### 3.3.4 Unit of analysis

The sampling unit for this study was the household while the unit of analysis was an adult member of the household. A household is regarded as a consumer as well as a producer of health amenities. This is because in the incident of infection household members can treat themselves in their homes or seek help from health workers outside their homes. Alternatively, household members can decide to do nothing or reject any strategies about health problems engulfing the household. That is, they can decide not to respond to any malaria strategies developed from outside (Mwabu, 1995). The justification for the choice of adult members of the household as the unit of analysis was based on a household being intricate in decision-making. Apart from parents, other members of the household aged 18 years and above were also considered, when the parents were not available because by the virtue of their ages, they were likely to have share in the process of decision making.

## 3.4 Results

This subsection presents the findings from the study area. Findings from the structured data of attitudes towards traditional, and modern malaria control strategies, and towards the distribution as well as the use of mosquito nets are presented.

### 3.4.1 Attitude towards malaria control strategies and its association with demographic variables

**Table 3.1***: Strategies used by communities for controlling malaria illness*

| Strategies recommended | Frequency | Per cent |
|---|---|---|
| Use of chemical by spraying | 2 | 0.7 |
| Using treated mosquito nets | 172 | 56.2 |
| Nothing can reduce malaria | 35 | 11.4 |
| Using mosquito repellent | 97 | 31.7 |

In the communities surveyed, there were mainly five strategies that were used for malaria control, namely residual spraying, use of bed nets, use of ITNs, environmental clearness and sanitation and mosquito repellents. Table 3.1 reveals that barely over a half of the respondents employed mosquito treated nets. In addition, the results in the Table show that while only at most one per cent of these respondents utilized residual spraying, at most 31.7% of the respondents used mosquito repellents. To the contrary, 11% did believe that there was no method that could control malaria. These, by implications, would not consider learning about malaria control strategies introduced to them. They had negative attitude towards any malaria control strategies, hence hardly any receptive of the strategies.

**Table 3.2: Respondents' attitude** *towards malaria control strategies and its association with demographic variables*

| Explanatory variables | | Overall attitude | | | Chi-Square | p-Value |
|---|---|---|---|---|---|---|
| | | Unfavourable | Undecided | Favourable | | |
| Sex | Female | 16.9 | 3.5 | 79.7 | 8.569 | 0.014 |
| | Male | 20.9 | 11.2 | 67.9 | | |
| Age | Younger | 20.8 | 8.9 | 70.3 | 5.543 | 0.063 |
| | Older | 14.9 | 3.5 | 81.6 | | |

Table 3.2 indicates a Chi-square test for association that was conducted between sex and attitude towards malaria control strategies. All expected cell frequencies were greater than five, which means that the sample size was adequate to run the chi-square test for these variables. There was a statistically significant association ($\chi^2_{(2)} = 8.569$, $p = 0.014$), between sex and attitude about malaria control strategies, but there was no significant association between age and attitude about malaria control strategies ($\chi^2_{(2)} = 5.543$, $p = 0.063$).

### 3.5 Attitude towards malaria control strategies

An 80-point attitudinal scale made up of 16 statements connoting liking and disliking malaria control strategies was constructed. For each of the statements the respondents would score 1 point (strongly disagree), 2 points (disagree), 3 points (undecided), 4 points (agree) and 5 points strongly agree. The most unfavourable attitude in this study based on the 16 statements was 16 points (i.e. 1 x 16 = 16); undecided attitude was denoted by 48 points (i.e. 3 x 16 = 48); and the most favourable attitude was denoted by 80 points (i.e. 5 x 16 = 80) scored on the Likert scale. Therefore, the range of points for unfavourable attitude was 16 - 47 while 48 was the cut-off point for undecided while the range for favourable attitude was 49 to 80 points towards malaria control strategies.

The average overall points scored by all the 306 respondents from Lindi and Mtwara regions was 54.5 which is above the undecided score points which was 48.0. This indicates that, overall, the respondents had a positive attitude towards malaria control strategies. The minimum and maximum points scored by all the respondents on all the 16 statements were 16.0 and 76.0. For simplicity of presentation of the points scored on each of the statements, the five alternative answers were collapsed into three answers whereby strongly disagree and disagree were collapsed into disagree, but undecided was left intact, and strongly agree and agree were collapsed into agree. The results are presented in the Table 3.3.

Table 3.3 shows a summary of an attitudinal test in which attitude towards malaria control strategies was assessed using 16 statements. The five scales were summarized to make three categories of scales. Half of the statements in the Likert scale had unfavourable connotations while the other half had favourable connotation. The most unfavourable attitudinal statement was represented by score of 50.6%; the neutral attitude was

presented by the statements by 15.6%, and the most favourable statements was presented by score of 84.7%.

**Table 3.3**: *Attitude towards malaria control strategies*

| Attitudinal statement | Agreement and disagreement in (%) | | |
|---|---|---|---|
| | Disagree | Neutral | Agree |
| I always feel like using mosquito nets when I sleep at night | 8.4 | 6.9 | 84.7 |
| I never use mosquito nets | 50.6 | 9.5 | 39.9 |
| I love using insecticidal mosquito nets | 18.3 | 7.5 | 74.2 |
| I hate using insecticidal mosquito nets | 19.6 | 7.9 | 72.5 |
| Insecticide nets protect people from suffering from malaria | 18.3 | 7.5 | 74.2 |
| Mosquito treated nets cause people to suffer from malaria | 35.3 | 13.7 | 51.0 |
| Mosquito treated nets are effective means of controlling malaria when each member in household use them always. | 40.5 | 15.7 | 43.8 |
| Mosquito treated nets are useless when each member in a household use them always | 35.0 | 1.6 | 63.4 |
| Other insects but not mosquitos die when you spray insecticide inside the houses and their surroundings | 36.9 | 6.3 | 56.8 |
| Mosquitos die out because of treated nets | 26.8 | 6.5 | 66.7 |
| Malaria control strategies like mosquito repellent save people's lives | 31.0 | 2.7 | 66.3 |
| Malaria control strategies like mosquito repellent lose people's lives | 37.5 | 7.6 | 54.9 |
| Malaria control strategies like mosquito repellent are useful for some people not us | 29.5 | 15.6 | 54.9 |
| Malaria control strategies like environmental cleanness are important for everyone | 17.0 | 19.0 | 64.0 |
| Malaria control strategies like environmental cleanness are means for some people to get some money from donors | 35.4 | 4.2 | 60.4 |
| Malaria control strategies are useful for everyone in the household | 47.1 | 13.1 | 39.8 |

### 3.5.1 Association between sex and attitudes towards malaria control strategies

As seen in Table 3.4, there was a significant association between sex and attitude towards malaria control strategies in which female respondents had more favourable attitude than male 79.7% ($\chi^2_{(2)} = 8.569$, $p = 0.014$).

### 3.5.2 Association between age and attitudes towards malaria control strategies

From the results in Table 3.2, there was no significant association between age and attitude towards malaria control strategies, but by percentage older people had more favourable attitude than younger people 81% ($\chi^2_{(2)} = 5.543$, $p = 0.063$).

The results in Table 3.4 show association between socio-economic variables (education, marital status, main occupation, household income and size) and attitude towards malaria control strategies. All expected cell frequencies were greater than five, which means that the sample size was adequate to run the chi-square test for these variables. There were statistically significant associations ($\chi^2_{(3)}$ = 21.690, p = 0.001; $\chi^2_{(3)}$ = 14.803, p = 0.022; $\chi^2_{(3)}$ = 24.940, p = 0.001 and $\chi^2_{(3)}$ = 51.707, p = 0.001) between education, marital status, main occupation and household income respectively and attitude towards malaria control strategies. Furthermore, the analysis revealed that there was no statistically significant association ($\chi^2_{(3)}$ = 10.272, p = 0.114 between household size and attitude towards malaria control strategies.

**Table 3.4: Attitude towards malaria control strategies and its associa***tion with socio economic variables*

| **Explanatory variables** | | **Overall attitude (%)** | | | **Chi-Square** | **p-Value** |
|---|---|---|---|---|---|---|
| | | **Unfavourable** | **Undecided** | **Favourable** | | |
| Education | No formal | 13.3 | 13.3 | 73.3 | 21.690 | 0.001 |
| | Primary | 12.5 | 3.6 | 83.9 | | |
| | Secondary | 25.5 | 2.9 | 71.6 | | |
| | Tertiary | 21.0 | 16.1 | 62.9 | | |
| Marital status | Single | 23.9 | 9.8 | 66.3 | 14.803 | 0.022 |
| | Married | 14.8 | 5.6 | 79.6 | | |
| | Widowed | 40.0 | 0.0 | 60.0 | | |
| | Divorced | 0.0 | 33.3 | 66.7 | | |
| Main occupation | Farming | 17.6 | 4.2 | 78.2 | 24.940 | 0.001 |
| | Business | 12.5 | 14.3 | 73.2 | | |
| | Employment | 18.4 | 7.1 | 74.5 | | |
| | Casual labour | 70.0 | 0.0 | 30.0 | | |
| Household income | Low | 22.2 | 6.3 | 71.5 | 51.707 | 0.001 |
| | Moderate | 2.9 | 0.0 | 97.1 | | |
| | Middle | 29.7 | 4.7 | 65.6 | | |
| | Higher | 13.8 | 31.0 | 55.2 | | |
| Household size | Smaller | 28.9 | 7.9 | 63.2 | 10.272 | 0.114 |
| | Ideal | 18.2 | 6.4 | 75.5 | | |
| | Medium | 12.4 | 5.7 | 81.9 | | |
| | Larger | 14.3 | 14.3 | 71.4 | | |

### 3.5.3 Association between education level and attitudes towards malaria control strategies

This paper was set out to examine, among other things, types of attitude of the respondents in the study areas on the basis of their levels of education. As indicated in Table 3.4, 83.9% of respondents had completed primary education level, followed by 73.3.% who had no formal education, 71.6% who reported had secondary level of education and only 62.9% who had tertiary education. The results in this table show that there was a significant association between level of education and attitude towards malaria control strategies ($\chi^2_{(3)} = 21.690$, $p = 0.001$). Intriguingly, the findings indicated that those who had either informal or non-formal education expressed higher favourable preference for malaria control strategies than those who had attained formal education from secondary school to tertiary level.

### 3.5.4 Association between marital status and attitudes towards malaria control strategies

The findings showed that married respondents had favourable attitudes towards malaria control strategies, 14.8% of married people had negative attitude (Table 3.4), whereas widowed respondents had higher (40.0%) unfavourable attitude towards malaria control strategies. Divorced respondents had high proportion of undecided (33.7%).

### 3.5.5 Association between occupation and attitudes towards malaria control strategies

The findings showed that 70.0% casual labourers had unfavourable attitude towards malaria control strategies and 78.2% of peasants had favourable attitude (Table 3.4). The business people had favourable attitude (73.2%), while employees (74.3%) had also favourable attitude towards malaria control strategies. This shows a high proportion of

casual labourers as the only group of respondents that expressed unfavourable attitude towards malaria control strategies.

### 3.5.6 Association between income and attitudes towards malaria control strategies

Furthermore, the findings showed that respondents who had moderate level of income had favourable attitude towards malaria control strategies (97.0%). Table 3.4 manifests a subtle pattern that those who had at most middle income had unfavourable attitude towards malaria control strategies unlike those who had at least moderate income ($\chi^2 = 51.707$, $p = 0.001$) than those who had higher and moderate incomes.

The results in Figure 3.1 show that 228 (74.15%) of the respondents had favourable attitude towards malaria control strategies and 57 (18.63%) had unfavourable attitude and 21 (6.86%) were undecided.

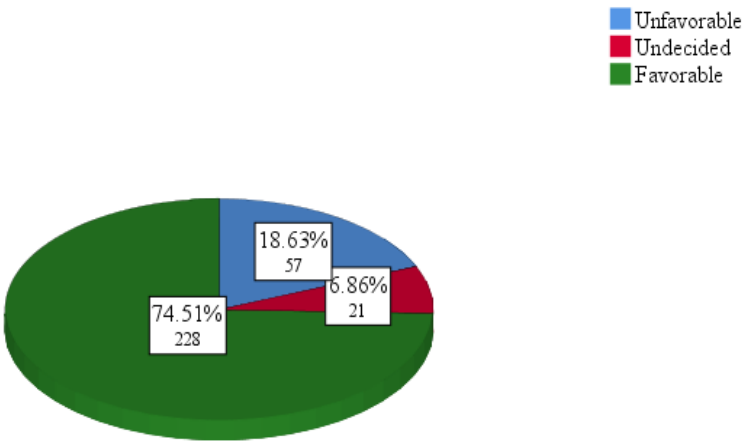


**Figure 3.1: Proportions of respondents with different attitudes towards malaria control strategies**

In addition, participants in one FDG reported that people who lacked money to buy mosquito nets were not using this strategy to protect themselves against mosquito bites. This explained their attitude towards mosquito nets of good quality, acceptability of services and contributed to negative attitudes:

> "*We do not get mosquito nets for free and we don't have money to buy them, because money is required and we do not have money to buy even food, but if you do not have the money, you cannot buy mosquito nets. If you have less money, then you will be given a free mosquito net of poor quality*". (FGD participants at Likombe Village, 28th July 2017).

> "*If you do not have enough money, you can't buy mosquito repellents, maybe you can get one from your neighbour but that cannot protect you. But where is the money? It is hard to find. So, this strategy is suitable for people with higher income*". (FGD participant at Ligula A Village, 26th July 2017).

### 3.5.7 Association between household size and attitudes towards malaria control strategies

From the results in Table 3.4, all households' members had favourable attitude towards malaria control strategies. Members from medium size household had the highest predisposition towards malaria control strategies (81.9%), and relatively, in comparison with those who come from smaller size household, had indicated the least disposition to malaria control strategies (63.2%). However, the association among various household sizes was not significant $\chi^2 = 10.222$, $p = 0.144$. Smaller household sizes (28.0%) had unfavourable attitude towards malaria control strategies

### 3.6 Discussion

This paper sets out to examine attitude towards malaria control strategies. Attitude, as defined in this paper, refers to feelings or thoughts of like or dislike, repulsion or attraction, approval or disapproval of some malaria control strategies. Attitudes are conceived of being a salient component in successful and consistent malaria control methods. They may contribute to success or failure of the malaria strategies, to either progressive achievement or pernicious development of habits. According to Eiser (1980a), attitudes are inextricably associated with beliefs. Consequently, they may either positively or negatively influence people's decisions, acts, and practices.

The potency of attitudes in shaping and colouring our daily lives can be explained by the biological point of view. In this line of argument, Sinek (2018) cogently explains that the brain is of two main and cardinal parts, the neo-cortex and the limbic brains. The neo-cortex brain is responsible for language, logic, reasoning and rationalization. In contrast, the limbic brain deals with beliefs, decision making, evaluation and attitudes but cannot access any elements of the neo-cortex. In his own words he writes: "*The power of the limbic brain is astounding. It not only controls our gut decisions, but it can influence us to do things that seem illogical or irrational….. It is not logic or facts but our attitudes, hopes and dreams, our beliefs and guts that drive us to try new things"*.

On the basic of the finding of this paper, respondents had, in general favourable attitudes towards malaria control strategies although some would not willing to put some into practice. The respondents used mosquito nets despite the fact that they did not like them as revealed in a statement *"I hate using insecticide mosquito nets but I use them though"*. It follows then that, it would be important for health officers, NGO's and local government officers to help members of these communities to like and love the utilization

of malaria control strategies by education and engaging them as well as accompanying them conceptually. This kind of attitude, if unchecked, can decrease the effectiveness of the strategies.

The differences in attitudes may be attributed to the distinctive nature of these areas of the study, which would contribute to respondents to develop somewhat different and subtle beliefs, hence distinctive attitudes. Further, because attitudes can be associated with the limbic brain, and since no two brains are congruent, then different people from different cultural and environmental areas would have distinctive attitudes. Moreover, because attitudes are intrinsically subjective, diversity of people's feelings about the same entity or activity should be natural and anticipated, and extrapolation cannot be conceived of.

These results corroborate those of a study conducted in Eastern India by Sabin *at el.* (2010) who found that most respondents showed favourable attitude towards malaria control strategies but that they equally expressed unfavourable attitude towards them. In that study, while half of the participants were attracted to the use of various strategies, 50% of them were not in favour of using the malaria control strategies in their communities. The compatibility of these results between this study and the study by Sabin *et al.* (2010) may be due to ubiquitous cultural and beliefs about the efficacy of strategies that are developed in their communities, religious influence and promotion of alternative medicine (Green, 1999). This implies that culture and environment may influence development of diverse attitudes with regard to malaria control strategies and approaches.

Moreover, attitudinal dispositions of all respondents varied across socio-economic factors, such as education, marital status, main occupation, household income and household size. With reference to education level, this paper found that there was

significant association $\chi^2$ = 21.690, p = 0.001) whereby participants who had completed basic education had favourable attitudinal dispositions towards malaria control strategies as well as those who had non-formal education (73.3%) as well as those who had attained primary education (83.9%) .Also, marital status $\chi^2$ = 14.803, p = 0.022) which was not significant but married respondents (79.6%) were in favour of malaria control strategies in comparison with widowed (40.0%) who were not in favour of malaria control strategies.

In addition, main occupation $\chi^2$ = 24.940, p = 0.001), peasants (78.2%) had favourable attitudinal dispositions towards malaria control strategies but casual labourers (70.0%) had unfavourable attitudinal dispositions. Furthermore, household income association $\chi^2$ = 51.707, p = 0.001) was significant, in which respondents with moderate income (97.1%) were highly in favour of malaria control strategies. Lastly, but not least household size $\chi^2$ = 10.272, p = 0.114) was not significant, but medium households were highly in favour of malaria control strategies (81.9%), but smaller households (28.9%) showed negative attitude towards malaria control strategies (Table 3.4).

The observed association may partly be attributed to the people's inability to fully represent their feelings through verbal expression. On the perspective of the limbic brain conception, one can say something different from what one genuinely believes and partly because of education, marital status, main occupation, income and household size differences among respondents respectively. Since those who had attained basic education were young people, we would suggest that they were somewhat adventurous in their responses compared to the rest of different ages. Corroboratively, Bulter *at el*. (2005) assert that in many ways youths frequently display problem solving skills, getting in touch with their beliefs and being able to express them out, and overtly showing their

genuine attitude, the ability that their parents or adults do not possess. In addition, they argue that young people are more adventurous in their thinking if only they are less afraid of making mistakes. We, consequently, contend that possibly these young respondents responded according to their inner beliefs rather than in accordance with their knowledge of what ought to be.

Furthermore, favourable attitude among females can be explained in the light of gender inequality in African cultural settings in which women are dominant in caring for the sick and the need at the family level. Traditionally, women look at the wellbeing of the family and thus have more favourable attitude towards malaria control strategies than male. Clearly, it will take far more than demographic variables to achieve full equality between female and male.

For the well-being in health and family warfare, in this in this regard there are needs to be a profound transformation in social values, attitude and understanding of equality of both sexes. Gender differences are not mutually exclusive to each other they are polar, congruently and complementary. This will alter entrenched negative habits in home, engrained customs in the communities hence enhance the moral environment of decision-making levels in those communities with respects to malaria control strategies. The sad truth is that many barriers facing women still stand. The battlefront may have shifted but the war against them still rages.

As regards the attitudes towards the malaria control strategies in terms of marital status, the results showed that married respondents were more favoured of malaria control strategies than single, both widowed and divorced participants. The findings also showed that divorced respondents had repulsive feelings in relation to malaria control strategies.

With respect to attitudes towards the use of mosquito nets during sleeping at night, the findings consistently showed that the respondents did not like to sleep under the mosquito nets. "*I never use mosquito nets*", said 50.6% of the respondents. If they felt uncomfortable to use the mosquito nets, and if it would not be easy for them to substitute mosquito nets for any other strategy, then they would not use mosquito nets while asleep at night. Thus, by inference, some people in these communities would not use mosquito nets even when they had them because they had negative attitudes towards utilizing them.

However, to the contrary, the results of this study indicate that respondents were having the feelings of using the mosquito nets when sleeping at night ("*I always feel like using mosquito nets when I sleep at night*") 84.7%. Paradoxically, these results are contradictory. But, seemingly, this contradiction can be resolved by the concept of self-referent and other types of referent. The respondents might have confused the statement which asked them to agree or disagree with the statement.

These findings corroborate the results found by Alloy *et al*. (1987). They found that favourable and unfavourable constructs were differently accessible by subjects when processing information directed towards self-versus others. Consequently, the respondents had unfavourable attitudes towards using mosquito nets, although they had no eerie feelings when other people apart from themselves used the mosquito nets. This implies that they could possibly allow children or youths to use the mosquito nets, albeit they, by themselves, would not feel like using them.

### 3.7 Conclusions and Recommendations

This paper has some contribution with respect to how people view and interact with malaria control strategies within their context and environment. In particular, these results could have substantial contribution in gaining insight into peoples' attitudes towards malaria control strategies in Lindi and Mtwara. In addition, these results illuminate that launching any malaria control strategy is a necessary condition to combat aetiology, epidemic and widespread of malaria, but it is not sufficient. For any programme to yield anticipated results it is paramount that it consider, among other factors, attitudes of the recipients of the programme and people who serve as the repository of it.

Furthermore, the results of this paper imply that malaria control strategies must be systematic by approach and conception. By "systematic" we mean, in this paper, that all components of the programme, or intervention should interact and interrelate. These components are such as education, marital status, main occupation, household income, household size and attitudes.

Above all, it appears, by implication, that any one linear conceived programme perceived by cause-effect may only be efficient but not effective. In other words, it would be implausible to assume that once a problem is identified that nags people and that when the solution is delivered to these people, the problem would be solved. So, by inference, on the basis of these results, synergistic relations of each element concerned in the fight against this nagging disease is necessary, if not compulsory.

Moreover, this paper suggests that people must be engaged with respect to the importance and necessity of the use of mosquito nets and other malaria control strategies. It seems that merely telling people will not help them change their unfavourable attitudes to

favourable ones. We contend that, because the limbic brain that controls beliefs, trust, attitudes and decisions has no capacity for language, it can be accessible through engagement. This can be implemented by health community officers, community development officers, and some volunteers in the community.

Moreover, on the basis of the findings of this research, it is concluded that members of the communities surveyed have relatively more favourable preference to the use of mosquito nets as compared with other strategies. Based on this conclusion, we recommend that, for effectual and efficient malaria control strategies, the interaction, interrelation and interconnection of education, marital status, main occupation, household income, household size and attitudes must be considered as coherent dynamic elements and should not be regarded as mutually exclusive components of the programme.

With respect to these conclusions, it is recommended that community members must be engaged and involved in the use of mosquito nets rather than merely disseminating information to them. This can be implemented by health community officers, community development officers, and volunteers from within the communities. Moreover, the government and policy makers must consider attitude, knowledge, and education as coherent dynamic elements that interact, interplay, and interconnect and therefore cannot be regarded in isolation.

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# CHAPTER FOUR

## 4.0 RECEPTIVITY OF MALARIA CONTROL STRATEGIES BY COMMUNITIES AND ITS RELATIONSHIP TO KNOWLEDGE, ATTITUDE AND SOCIO-ECONOMIC FACTORS IN LINDI AND MTWARA REGIONS, TANZANIA

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### 4.1 Abstract

Why do mortality and morbidity due to malaria still persist? Why is malaria still prevalent despite continuous endeavours to control it? Could responses to malaria control strategies by the recipients have no contribution? To what can the persistence be attributed? How (In what ways) do lack of proper knowledge, attitude and prevailing socio-economic situations affect (are associate with) their receptivity of malaria prevention and control strategies? This paper answers the questions raised above and generates empirical knowledge related to the same questions, based on empirical data. It does so by determining the relationship between knowledge, attitude, and socio-economic factors with respect to receptivity of malaria control strategies. The study on which the paper is based was quantitative and involved 306 respondents in Lindi and Mtwara Regions. Both

qualitative and quantitative data were collected. However, only results based on quantitative data are presented in this paper. Non-parametric inferential analyses (Mann-Whitney U Test and Kruskal-Wallis –Test) were used to compare receptivity of malaria control strategies among households with various demographic and socio-economic variables. Respondents who had higher knowledge about malaria had higher receptivity of malaria control strategies than those who had lower knowledge ($p = 0.001$). Also, respondents who had positive attitude towards malaria control strategies had higher receptivity than those who had either neutral or negative attitude at $p = 0.001$. Moreover, so did marital status ($p = 0.007$), household size ($p = 0.001$), education ($p = 0.01$), income ($p = 0.001$) and main occupation ($p = 0.039$). Conclusively, attitude and socio-economic factors are associated with receptivity of malaria control strategies. Accordingly, it is recommended that, in order to control malaria, attitude, income, education, knowledge integrated with positive mind-sets, and mental models must be addressed including Pygmalion effects.

**Key words**: Relation, Receptivity, Malaria, Systems thinking and Pygmalion effect.

## 4.2 Introduction

Globally, malaria incidence has been declining since 2000 (Cundill *et al*., 2015; WHO, 2015; Nyahoga and Bochkareva, 2018). In view of this remarkable progress, the global rate was arrested and even reversed in some parts of the world (WHO, 2017). This reversal of the spread of this ailment signalizes that, with long time hard work, the goals of malaria control and elimination can be accomplished, particularly the emphasis being on the third world, Tanzania being one of them. It is responsible for morbidity and mortality of people from this part of Africa to be reversed. It rocks the foundation of communities; adversely affects individuals; and is destructive to these communities. It has

been debilitating to these communities for at least 136 years, posing vast public health challenges in tropical countries in particular (Sharma *et al*., 2007). This disease is transmitted by mosquitos under species of the genus *Plasmodium,* particularly *P. falciparum, P. vivax, P. ovals,* and *P. malarie* (Prethero 2001; Chowdhry, 2010; Worrall *et al*., 2005). According to the World Health Organization (WHO, 2003), UNICEF (2005) and Worrall *et al*. (2003); an approximate 300 million people were infected by malaria at any time; a third of the global population developed clinical symptoms of this disease; and 90% of cases were accounted for in sub-Saharan Africa. Malaria and socio-economic factors, attitude and knowledge have long been linked together and are believed to be related to malaria. Therefore, understanding and improvement in both of these elements can contribute to control and elimination of the disease in many developing countries.

The Tanzanian government has been striving to curb the corrosion and debilitation of this disease through preventive, interventional, curative and control measures. Among the strategies employed in malaria eradication, alleviation and prevention include utilizing insecticide-treated mosquito nets (ITNS). This method is effective at the individual level because bed nets act as a screen that protects an individual from being stung by vector mosquitos. Further, other methods employed are such as indoor residual spraying (IRS) of dwellings, rapid diagnostic tests and treatment with efficacious antimalarial medicines and draining of stagnant water as well as hygiene and sanitation (Makundi *et al*., 2007; Mboma *et al*., 2018).

Moreover, the Government complements these strategies with health systems strengthening and capacity building under President’s Malaria Initiatives (PMI), which was launched in 2015 and ends in 2020, to ensure malaria control efforts are sustainable country-wide, owned and integrated into overall health systems. These endeavours are

being supported by United States of America (USA). Alongside these initiatives are efforts on social and behavioural change of communities whose main objective is to develop and disseminate key messages tailored towards firstly testing and treatment, secondly prevention and treatment of pregnancy malaria, thirdly introduction of a school net programme, fourthly health facility based ITNs distribution, and fifthly engaging private companies in promoting malaria prevention and control for their employees and communities (USAID, 2018).

Despite these laudable efforts exerted by the Tanzanian Government to eliminate malaria, the disease is prevalent country-wide, being more concentrated in Coastal regions than in Mainland regions. It is still one of the ten main causes of morbidity and fatalities. An estimated 11.5 million cases occur in Tanzania with at least 93% being at risk of infection (Makundi *et al*., 2007; Mboera *et al*., 2007). Ackof (2016) once said: "*When a system is functioning properly, none of its parts maybe, because the efficient and effective functioning of the system does not derive from each part taken separately, but it is determined by how the parts interact and fit together*". It follows then that the substance of these strategies does not lie in their implementation of one after another or in a sequential form but in employment of these approaches in an integrated and systematic way.

These strategies may be ineffective and hardly yield any results unless they are connected and linked, between and among them by knowledge, attitude and socio-economic factors of the people who are recipients and bearers of these malaria control strategies. In 2019, WHO emphasized those new strategies for malaria control should integrate approaches by linking both health and environment. Instead of depending on a single method of vector control, WHO (2019) stresses on the importance of understanding the local habitats of

mosquitos responsible for malaria and patterns of malaria of a particular locality so as to select effective malaria control approaches for that particular area. In this light, this paper, therefore, examines the relationships between knowledge, attitudes and socio-economic factors and their relationship with responses to malaria control strategies by protagonists.

## 4.3 Methodology

### 4.3.1 Study area and design

The study on which this paper is based was conducted in Lindi and Mtwara regions. The environment of these regions is conducive for thriving and infestation of malaria vectors, the mosquitoes. During the commencement of this study malaria infestation in the regions was above nation average and the regions are still among the regions with high infestation in the country. Lindi Region comprises six districts namely Kilwa, Lindi Rural, Nachingwea, Liwale, Ruagwa and Lindi Urban. Geographically, the region is located between latitudes $7^0 55^i$ and $10^0 50^i$ South of the Equator. It is also situated between longitudes $36^0 51^i$ to $40^0$ East of the Greenwich Meridian. The region boarders with the Coastal Region to the North, with the Indian Ocean to the East and with Mtwara Region to the South whereas Morogoro Region is located to the West of the region. Further, Ruvuma Region is located to the South-West of this region, Lindi. In terms of climatic conditions, Lindi Region is characterised by temperate humidity of an average of $27^0$C. The range of rainfall, in this Region, is between 780 mm and 1200 mm per annum. The region accommodates at least 781,306 residents whose cardinal economic enterprise is agriculture. They mainly produce maize, cassava, sorghum, paddy, cashew nuts and simsim. The region borders with the Coast Region to the North, Indian Ocean to the East and Mtwara Region to the South, while Morogoro Region is located to the West. Ruvuma Region is to the South-West of Lindi Region. The climatic conditions of Lindi are characterised by mean temperature of $27^0$C and rainfall of 780 mm to 1200 mm per year.

The region comprises at least 78306 inhabitants whose main economic activity is farming. Principally, they produce maize, cassava, sorghum, paddy, cashew nuts, and simsim.

In contrast, Mtwara Region lies between longitudes $38^0$ and $40^030'$ East of the Prime Meridian and between $10^005'$ and 11o25' South of the Equator. The region borders with Lindi Region to the North, Indian Ocean to the East, and in between this region and Mozambique runs Ruvuma River. Mtwara Region borders with Ruvuma Region to the West. The region comprises five districts, namely Masasi, Mikindani, Tandahimba Newala and Nanyumbu. The smallest district among the five districts is the Urban District called Mtwara Mikindani. The mean temperature is $27^0$C with humidity that ranges between 87% in March and 79% in October. As Lindi, Mtwara has farming as its principal economic activities.

The only distinguishing features between these regions from other regions of Tanzania, in this context, are that Mtwara and Lindi have natural gas deposits. While Lindi produces natural gas at a location called Songo Songo Island, discovered in 1974, Mtwara has natural gas reservoir at Mnazi Bay, discovered in 1982.

The study on which this paper is based deployed a cross-sectional research design. Data were collected once like a snap-shot, which means that structured data were suitable for description of the situation only for the period in which the research was conducted. This implies that these data cannot explain how things would always be in the study areas; the situation and condition of the study areas may have changed over time, consequently affecting the results of this study with time. So, they cannot be kept constant for this research. In collecting information from respondents, purposive, convenience and randomized methods were employed. While districts were purposively selected,

convenience and systematic sampling methods were utilized to collect data from the respondents. A structured questionnaire was administered to the respondents by the researcher and his two assistants. Interviews were conducted with heads of households or with elderly family members (in the absence of the head of the household) using a structured questionnaire by the researcher and his two assistants.

### 4.3.2 Data collecting procedures

Data were collected on socio-economic factors, knowledge and attitudes towards malaria control strategies. Both qualitative and quantitative data were considered. Qualitative data were exclusively collected to obtain information about knowledge of communities of Lindi and Mtwara. Qualitative data were collected using FGDs, whereby notes were taken and conversations were tape-recorded. Informed consent was obtained before conducting the interviews. Back-checks and spot-checks were done regularly in the field to assure completeness and identify inappropriate or illogical responses, which were recorded and edited before leaving the field site

As regards quantitative data, a survey using a structured questionnaire was done. The questionnaire copies were deployed to garner information on knowledge and socio-economic factors. Further, the study included a Likert Scale as a component of the questionnaire intended to collect data on attitudes towards malaria control strategies. According to Vogt *et al.* (2012), Likert Scales are suitable for examining, determining, and exploring attitudes. By and large, the study utilized all the collected data to structure the data in order to absorb information and use the information gained to determine relationships of knowledge, attitudes, socio-economic factors and with respect to responses to malaria control strategies.

### 4.3.3 Data analysis

For the purpose of clarity, avoiding ambiguity and exploration of the relationship of cardinal elements involved in this study, only quantitative data are presented in this paper. These were analysed using Statistical Package for Social Science (SPSS) Version 26. Inferential statistics were used to make sense of the relationship of variables involved in this study.

Further, in this study, receptivity of malaria control strategies was measured in terms of points scored on practice of the malaria control strategies that had been disseminated in the study areas. The strategies were five, namely Insecticide-Treated Mosquito Nets (ITNs), In-door Residual Spraying (IRS), usage of untreated mosquito nets, mosquito repellents and environmental strategies that included vegetation clearance around homes and removal of water logging near homes. One who had not adopted any of the strategies scored 0, while one who had adopted all the strategies scored 5 points. The number of points scored was the same as the number of malaria control strategies that were being practised by the respondents in the study areas. Furthermore, the points scored were used to categorize the households surveyed into those with lower receptivity (0-2 points), and those with higher receptivity (3-5 points).

The determination of knowledge was done using an index summated scale which comprised 23 statements. One would score 0 for a wrong answer and 1 for a correct answer. Some statements were wrong; for the wrong statements, one was given a score of 0 if one agreed with them. One of such wrong statement was "*Malaria can be caused by some people who are able to bewitch others*". The overall points scored on the index summated scale were further expressed as percentages over 23, for easy interpretation of the extent to which the respondents had the understanding of malaria prevention and its

control, and hence the knowledge of malaria control strategies. The percentages were used to group the respondents into those with low understanding (0.0 to 39.13%), moderate understanding (39.13 to 56.52%) and high understanding (56.53 to 100.0%) of malaria control strategies.

Attitude was measured using an 80-point Likert scale made up of 16 statements connoting liking and disliking malaria control strategies. For each of the statements the respondents would score 1 point (strongly disagree), 2 points (disagree), 3 points (undecided), 4 points (agree) or 5 points strongly agree. The most unfavourable attitude in this study, based on the 16 statements, was 16 points (i.e. 1 x 16 = 16); the undecided attitude was 48 points (i.e. 3 x 16 = 48) and the most favourable attitude was 80 points (i.e. 5 x 16 = 80). Therefore, the range of points for unfavourable attitude was 16-47 while 48 was the cut point for undecided while the range for favourable attitude was 49 to 80 points towards malaria control strategies. Therefore, attitude towards malaria control strategies was defined operationally as points scored on a Likert scale.

Mann-Whitney U test was used to compare receptivity of malaria control strategies between people who had lower knowledge and those who had higher knowledge about malaria control strategies. It was also used to compare receptivity of malaria control strategies between people who were young and those who were old, and between male and female respondents. Kruskal-Wallis-Test was used to compare receptivity of malaria control strategies among people who had unfavourable, undecided and favourable attitudes towards malaria control strategies. It was also used to compare receptivity of malaria control strategies among people who had different education levels, those who had different incomes, those who had different household sizes, and those who had different occupations. The two non-parametric tests, Mann-Whitney U test and Kruskal-

Wallis test, were used because of the ordinal nature of the response variable (receptivity) which was not suitable for parametric analysis. Also, using Kruskal-Wallis test does neither require normality of the distribution of data nor homogeneity of various for groups under study and is less likely to yield a statistically result than would be the case if ANOVA (equivalent parametric analysis) was employed (Finson *et al*., 2006). In addition, Dunn's procedure within Bonferroni correction for multiple comparisons was performed to find whether receptivity of malaria control strategies was significantly different by these elements. This was used to test whether there existed equivalence of null hypothesis between these elements in respect to receptivity of malaria control strategies.

## 4.4 Results

This part presents and explains the results from the study area. The results are described on the basis of analysis with regard to differences in receptivity of malaria control strategies by knowledge about malaria, attitude towards malaria control strategies, marital status, level of understanding of malaria control strategies, education level, main occupation, household size, income, age and sex. However, the presentation is not necessarily in that order.

### 4.4.1 Levels of receptivity of malaria control strategies

On the basis of the five-point scale that was used to measure receptivity of malaria control strategies, the minimum, median and maximum scores were 126.72 and 198 respectively. Based on the categorisation of the points scored whereby 0-2 points represented lower receptivity while 3-5 points represented higher receptivity, 20% and 80% respectively, of the respondents had lower and higher receptivity of malaria control strategies respectively.

### 4.4.2 Responses to malaria control strategies and marital status

Table 4.1 and Table 4.2 indicate the results of group comparison with respect to responses to malaria control strategies.

**Table 4.1: Receptivity of malaria control strategies in terms of mean ranks scored by marital status among respondents**

| Response variable | Marital status | n | Mean Rank | Chi-Square | Sig. |
|---|---|---|---|---|---|
| Responses to malaria strategy | Single | 90 | 126.72 | 6.841 | 0.007 |
| | Married | 187 | 152.76 | | |
| | Widowed | 10 | 162.95 | | |
| | Divorced | 3 | 198.00 | | |

**Table 4.2: Pairwise Comparisons between marital status and its relationship to malaria control strategies**

| Explanatory variables | Test Statistic | Std. Error | Sig. |
|---|---|---|---|
| Single-Married | -26.048 | 10.411 | 0.012 |
| Single-Widowed | -36.233 | 27.051 | 0.180 |
| Single-Divorced | -71.283 | 47.628 | 0.134 |
| Married-Widowed | -10.185 | 26.340 | 0.699 |
| Married-Divorced | -45.235 | 47.228 | 0.338 |
| Widowed-Divorced | -35.050 | 53.422 | 0.512 |

$H_{(3)} = 8.038$ p=0.045

As shown in Tables 4.1 and Table 4.2, a Kruskal-Wallis H test was conducted to determine if there were differences in receptivity to malaria control strategies among groups that differed in marital status: single (n = 90), married (n = 187), widowed (n = 10) and divorced (n = 3). Distributions of receptivity of malaria control strategy scores were similar for all groups, as assessed by visual inspection of a boxplot. Median responses to malaria control strategies were not significantly different among groups, $\chi^2_{(3)} = 6.841$, $p = 0.077$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure. A Bonferroni correction for multiple comparisons was made with statistical significance accepted at the $p < 0.05$ level. This post hoc analysis revealed statistically significant differences in receptivity of malaria control strategies between single and married respondents (mean rank = 279.48) ($p = 0.012$) and between widowed (mean rank = 162.95) and marital status ($p = 0.045$).

Figures 4.1 and 4.2 comprise the results for testing non-directional alternative hypothesis and so its null hypothesis. The null hypothesis was that there is no difference in receptivity of malaria control strategies among respondents with different demographic and socio-economic factors.

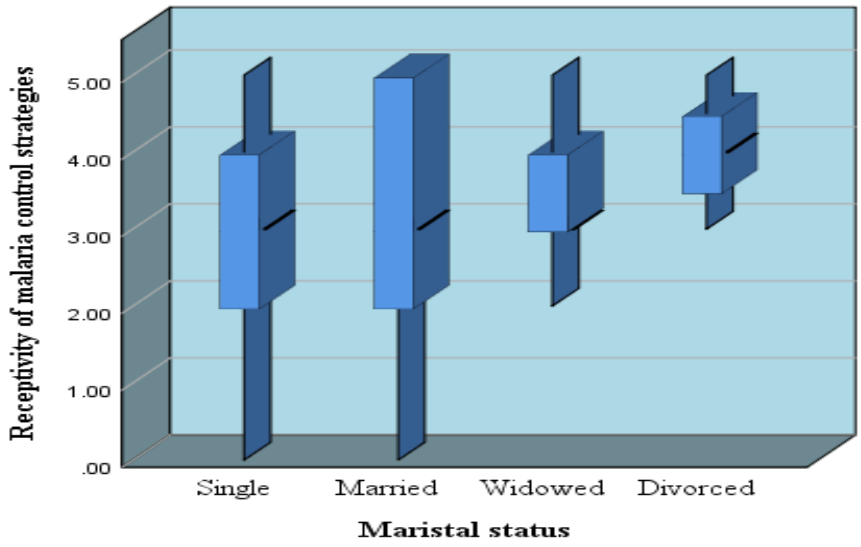


**Figure 4.1: Relationship between marital status and receptivity of malaria control strategies**

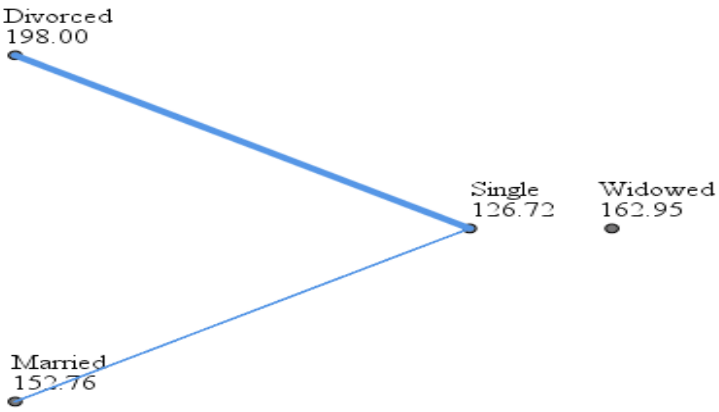


**Figure 4. 2: Pairwise comparisons of marital status and receptivity of malaria control strategies**

### 4.4.3 Receptivity of malaria control strategies by knowledge

Figures 4.3 and 4.4 comprise results for testing non-directional alternative hypothesis so its null hypothesis. The null hypothesis was that there is no difference in receptivity of malaria control strategies among those who had the highest knowledge about malaria control strategies, those who had moderate knowledge and those who had low knowledge.

**Table 4.3: Understanding of malaria control strategies among the respondents**

| Response variables | Groups of knowledge | n | Mean Rank | Chi-Square | Sig. |
|---|---|---|---|---|---|
| Responses to malaria strategy | Low understanding | 111 | 136.97 | 20.692 | 0.001 |
| | Moderate understanding | 84 | 166.65 | | |
| | High level of understanding | 95 | 136.76 | | |

**Table 4. 4: Pairwise Comparisons of level understanding and its relationship to malaria control strategies**

| Explanatory variables | Test Statistic | Std. Error | Std. Test Statistic | Sig. |
|---|---|---|---|---|
| Higher level of understanding-Low understanding | 0.205 | 11.343 | 0.018 | 0.986 |
| Higher level of understanding-Moderate understanding | 29.892 | 12.154 | 2.459 | 0.014 |
| Low understanding-Moderate understanding | -29.686 | 11.736 | -2.529 | 0.001 |

$H_{(2)} = 8.036$ p=0.018

As shown in Table 4.3 and Table 4.4, a Kruskal-Wallis test was conducted to determine if there were differences in receptivity of malaria control strategies between groups that differed in their levels of understanding of the strategies. Those with low understanding were 111; those with moderate understanding were 84; and those with high level of understanding were 95. Distributions of receptivity of malaria control strategies scores were not similar for all the groups, as assessed by visual inspection of a boxplot. Receptivity of malaria control strategies was significantly different by different levels of understanding of malaria control strategies, $\chi^2_{(3)} = 20.692$, $p = 0.001$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure. A Bonferroni

correction for multiple comparisons was made with statistical significance accepted at the $p < 0.001$ level. This post hoc analysis revealed significant differences in receptivity of malaria control strategies scores between those with moderate understanding (mean rank = 166.65) and those with high level of understanding (mean rank = 136.76, $p = 0.001$), but not between those with low understanding (mean rank = 136.97, $p > 0.05$) and those in any other group combination of level of understanding.

Figures 4.3 and 4.4 comprise results for testing non-directional alternative hypothesis so its null hypothesis. The null hypothesis that there is no difference in receptivity of malaria control strategies among those who have high, moderate and low levels of understanding of malaria control strategies.

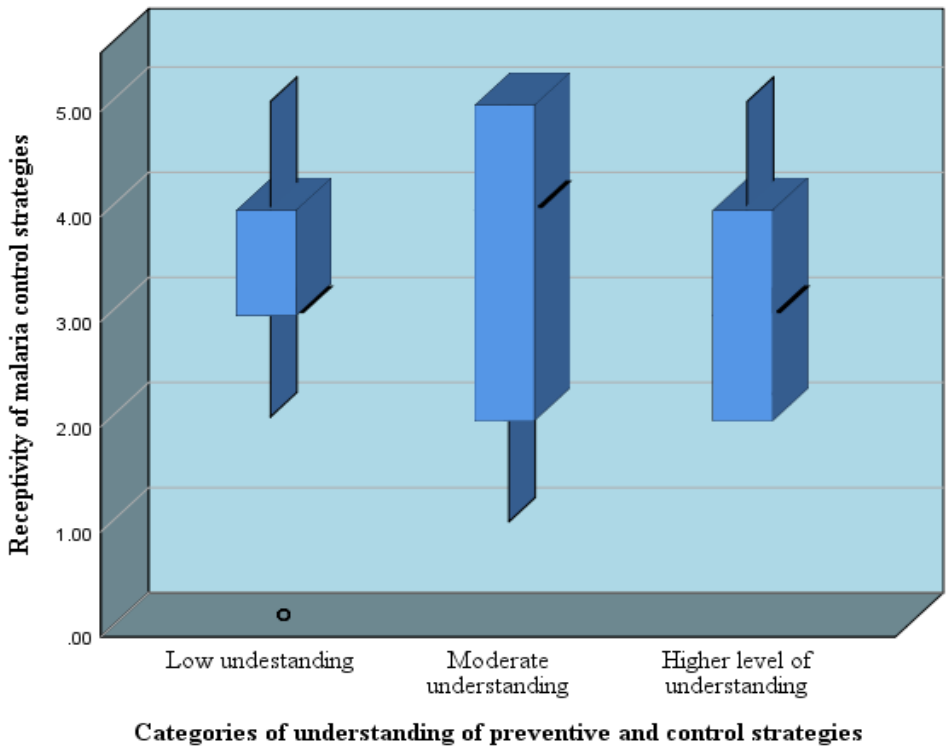


**Figure 4.3: Relationship between level of understanding and receptivity to malaria control strategies**

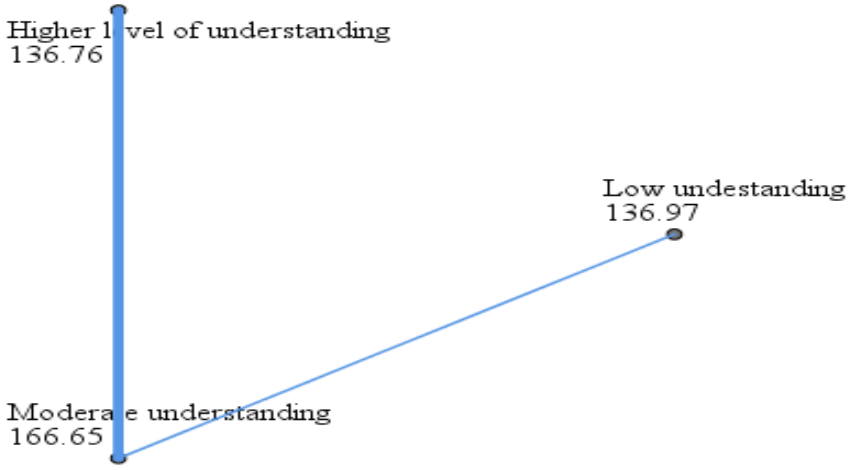


**Figure 4.4: Pairwise comparisons of extent of understanding of malaria prevention and its control**

## 4.5 Relationship between attitude and receptivity of malaria control strategies

Relationship between attitude and receptivity of malaria control strategies was determined by comparing points scored on receptivity among respondents who had unfavourable, undecided or favourable attitude towards malaria control strategies. The results are presented below.

**Table 4.5: Receptivity of malaria control strategies by** *categories of attitude*

| Response variable | Attitude | n | Mean Rank | Chi-Square | Sig. |
|---|---|---|---|---|---|
| Responses to malaria strategy | Unfavourable | 41 | 90.09 | 13.474 | 0.001 |
| | Undecided | 21 | 140.64 | | |
| | Favourable | 228 | 155.91 | | |

**Table 4. 6: Pairwise Comparisons of receptivity of malaria control strategies**

| Explanatory variables | Test Statistic | Std. Error | Std. Test Statistic | Sig. |
|---|---|---|---|---|
| Unfavourable-Undecided | -50.557 | 21.777 | -2.322 | 0.020 |
| Unfavourable-Favourable | -65.827 | 13.767 | -4.782 | 0.001 |
| Undecided-Favourable | -15.269 | 18.507 | -.825 | 0.409 |

$U_{(2)} = 22.945$, p = 0.001

As shown in Table 4.5 and Table 4.6, a Kruskal-Wallis test was conducted to determine if there were differences in receptivity of malaria control strategies among groups that differed in their attitudes towards malaria control strategies: Those with unfavourable attitude were 41, undecided was 21; and favourable were 95. Distributions of receptivity of malaria control strategies scores were dissimilar for all among these as manifested by the analysed data of groups of a boxplot. Receptivity by members of the communities of malaria control strategies was significantly different among groups by $\chi^2_{(2)} = 13.474$, $p = 0.001$, $\chi^2_{(2)} = 13.474$, $p = 0.001$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure. A Bonferroni correction for multiple comparisons was made with statistical significance accepted at the $p < 0.001$ level. This post hoc analysis revealed significant differences in receptivity of malaria control strategies between the undecided (mean rank = 140.64 and unfavourable (mean rank = 90.09) ($p = 0.001$), but not between the favourable (mean rank = 155.91) and any other group combination of the categories of attitudes. Figures 4.5 and 4.6 comprise the results for testing non-directional alternative hypothesis so its null hypothesis. The null hypothesis was that there is no difference in receptivity of malaria control strategies among respondents who had unfavourable, undecided and favourable attitudes towards malaria control strategies.

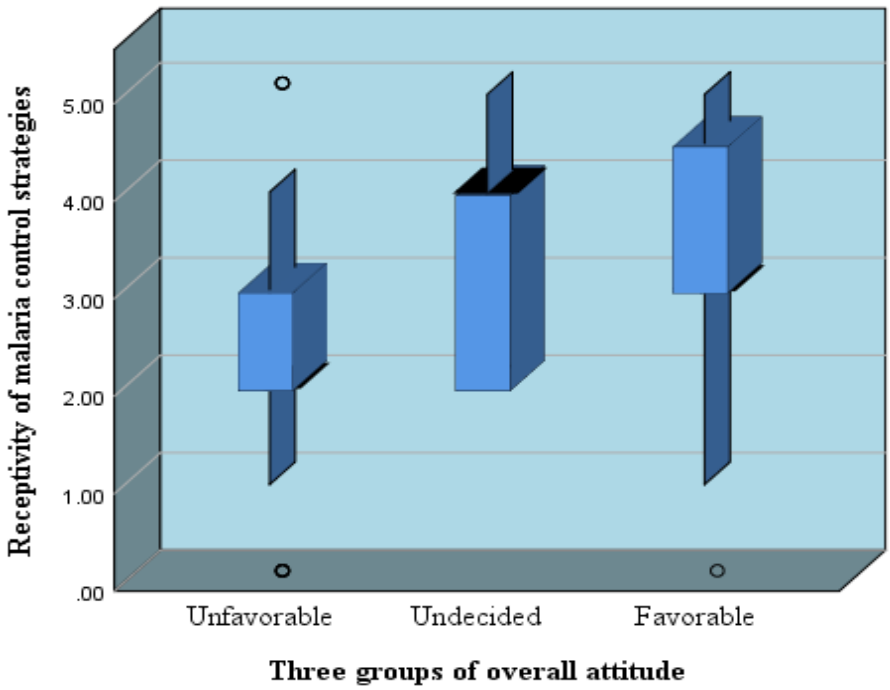


**Figure 4.5: Attitude on receptivity of malaria control strategies**

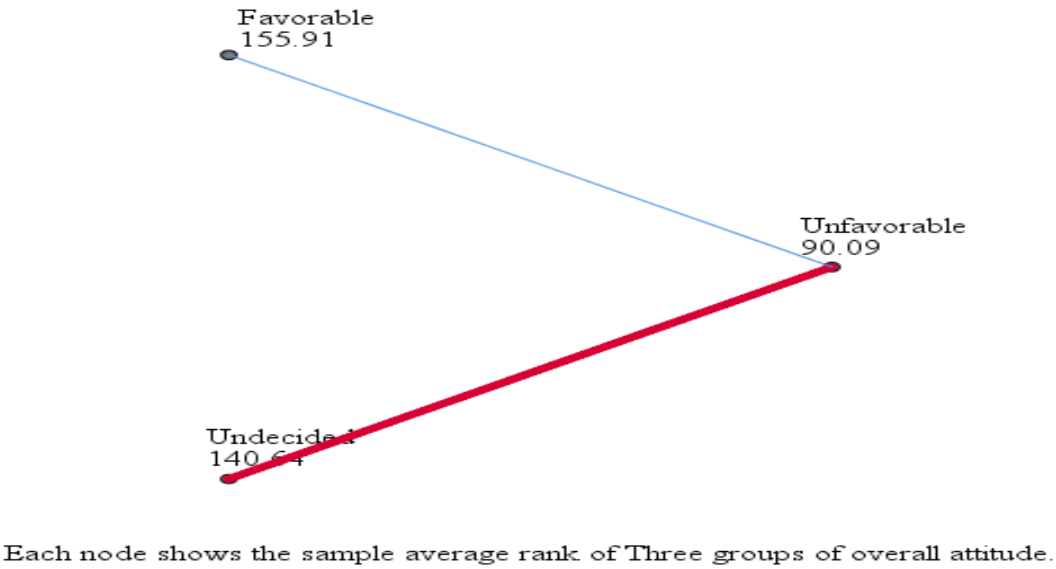


**Figure 4.6: Pairwise comparisons of categories of attitude**

## 4.6 Receptivity of malaria control strategies by sex

Receptivity was presumed to vary with sex in this paper. Figure 4.7 consists of data that present the responses of male and female respondents.

**Table 4.7***: Responses to malaria control strategies scores by sex*

| Explanatory variables | Sex | n | Mean Rank | Mann-Whitney U | Sig. (2-tailed) | Z |
|---|---|---|---|---|---|---|
| Receptivity of malaria control strategies | Female | 164 | 144.72 | 10460.00 | 0.852 | -0.187 |
| | Male | 126 | 146.52 | | | |

In Table 4.7 a Mann-Whitney U test was run to determine if there were differences in receptivity of malaria control between male and female respondents. Distributions of the receptivity of malaria control scores for males and females were not similar, as assessed by visual inspection. Receptivity of malaria control scores for males (mean rank = 146.52) and females (mean rank = 144.72) were not significantly different, $U$ = 10204.00, $z$ = -0.187, $p$ = .0.852.

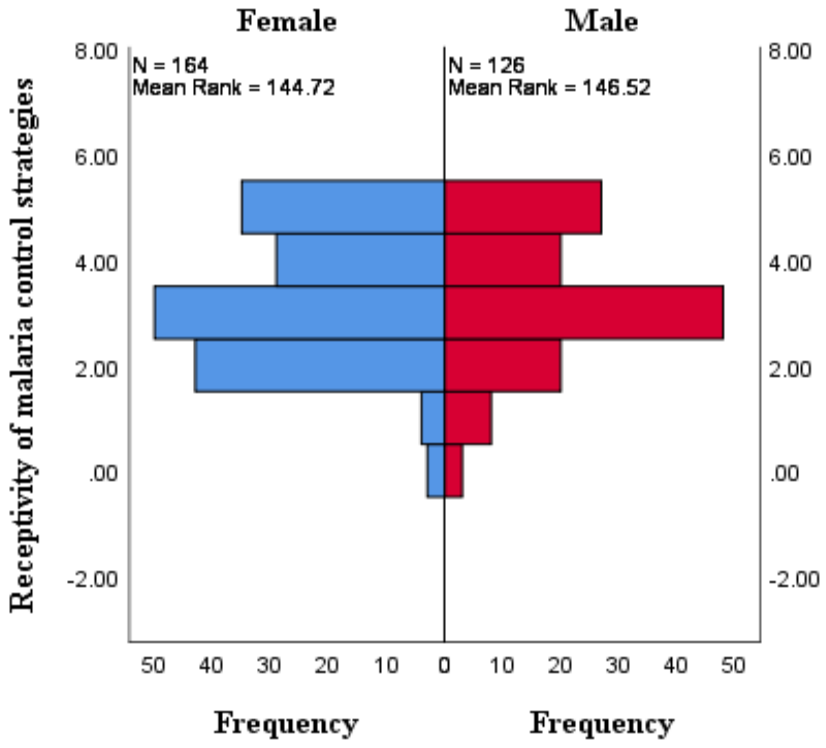


**Figure 4.7: Receptivity of malaria control strategies scores by sex**

The results in Figure 4.7 denote that the distribution of the receptivity of malaria control strategies between male and females was similar, as assessed by visual inspection. Accordingly, the null hypothesis, which was that there is no difference in receptivity of malaria control strategies between men and women was rejected.

## 4.7 Receptivity of Malaria Control Strategies Scores by Age

Receptivity was presumed to vary with age in this paper. Figure 4.8 consists of data that present the responses of younger and older respondents.

**Table 4.8**: *Responses to malaria control strategies scores by age*

| Explanatory variables | Age of respondents | n | Mean Rank | Mann-Whitney U | Sig. (2-tailed) | Z |
|---|---|---|---|---|---|---|
| Responses to malaria strategy | Younger<br>Older | 185<br>105 | 145.14<br>146.13 | 9646.500 | 0.921 | 0.099 |

In Table 4.8 and Figure 4.8, a Mann-Whitney U test was run to determine if there were differences in receptivity of malaria control strategies between young and old respondents in the study area. Distributions of scores on receptivity of malaria control strategies for young and old respondents were not similar, as assessed by visual inspection. Responses to malaria control strategies for older (mean rank = 146.13) and younger (mean rank = 145.14) were not significantly different, $U$ = 9646.50, $z$ = -0.099, $p$ = .0.921.

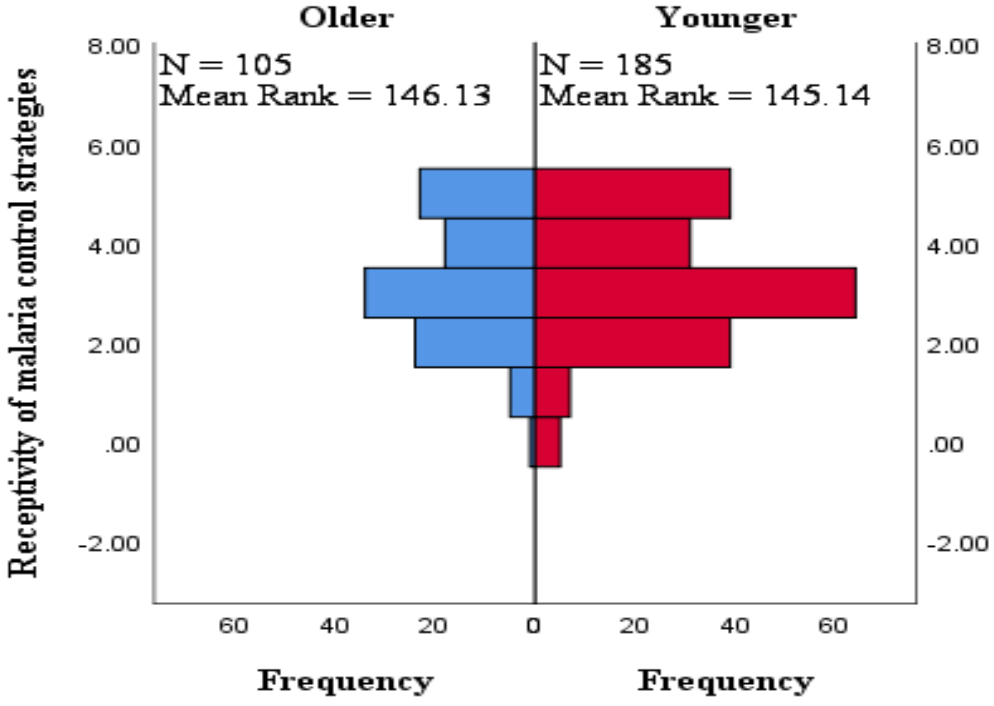


**Figure 4.8: Responses to malaria control strategies by age**

### 4.7.1 Receptivity of malaria control strategies by household size

Table 4.9 and Table 4.10 illustrate the distribution of household size categorized into four classes, namely normal (small size), moderate and large household size.

**Table 4.9: Receptivity of malaria control strategies by household size**

| Response variable | Categories of household size | n | Mean Rank | Chi-Square | Sig |
|---|---|---|---|---|---|
| Responses to malaria strategy | Small household size | 75 | 116.45 | 20.396 | 0.001 |
| | Normal household size | 103 | 158.74 | | |
| | Moderate household size | 98 | 152.34 | | |
| | Large household size | 13 | 145.50 | | |

**Table 4. 10: Receptivity of malaria control strategies by household size**

| Responses Variables | Test Statistic | Std. Error | Std. Test Statistic | Sig. |
|---|---|---|---|---|
| Small household size-Large household size | -29.053 | 24.294 | -1.196 | 0.232 |
| Small household size-Moderate household size | -35.895 | 12.406 | -2.893 | 0.004 |
| Small household size-Normal household size | -42.296 | 12.275 | -3.446 | 0.001 |
| Large household size-Moderate household size | 6.842 | 23.870 | 0.287 | 0.774 |
| Large household size-Normal household size | 13.243 | 23.802 | 0.556 | 0.578 |
| Moderate household size-Normal household size | 6.401 | 11.411 | 0.561 | 0.575 |

$U_{(3)} = 13.134$, p=0.004

Tables 4.9 and 4.10 together with Figure 4.9 and 4.10 summarize Kruskal-Wallis test results, which were obtained by determining whether there were differences in receptivity of malaria control strategies among groups that differed in their household sizes: small household (n = 75), normal size (n = 103), moderate size (n = 98) and larger household (n =13). Distributions of receptivity of malaria control strategies were not similar for all the groups, as assessed by visual inspection of a boxplot. Receptivity of malaria control strategies was significantly different among households with different sizes: $\chi^2_{(3)}= 20.396$, $p = 0.001$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure. A Bonferroni correction for multiple comparisons was made with statistical significance accepted at the $p = 0.001$ level. This post hoc analysis revealed statistically significant differences in receptivity of malaria control strategies between average

household size (mean rank = 152.34) and small household size (mean rank = 116.45) ($p$ = 0.04) and between tertiary education (mean rank = 128.55 and primary school (mean rank = 155.49) ($p$ = 0.004). Receptivity to malaria control strategies was significantly different between moderate and small households, but not between larger households (mean rank = 145.50) and any other group combination of household size.

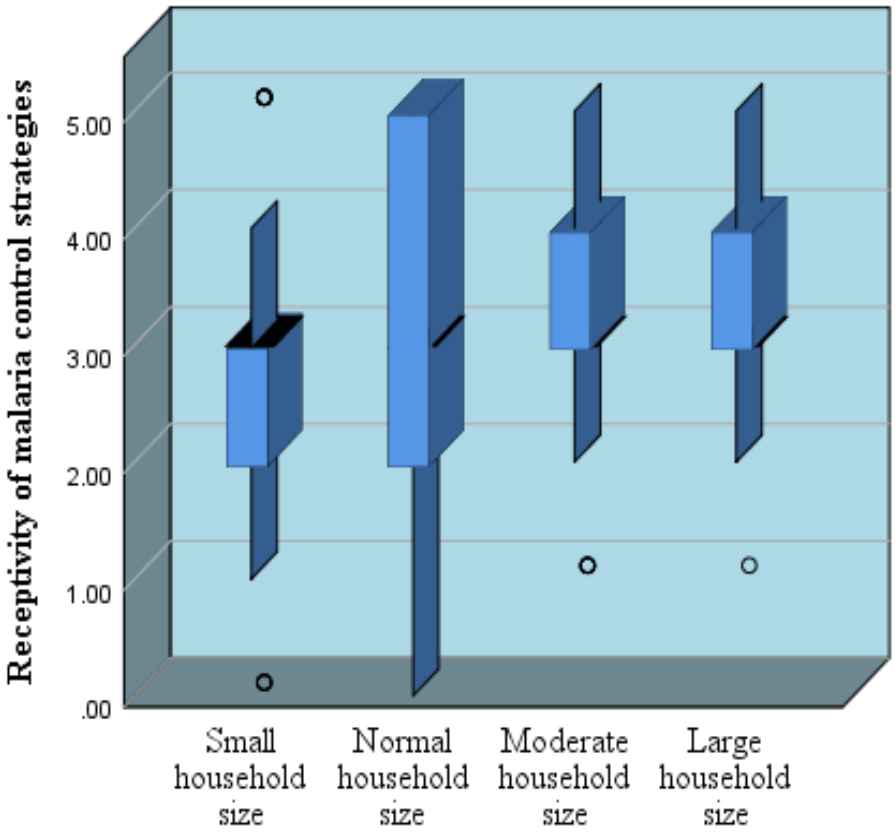


**Figure 4. 9: Receptivity of malaria control strategies by household size**

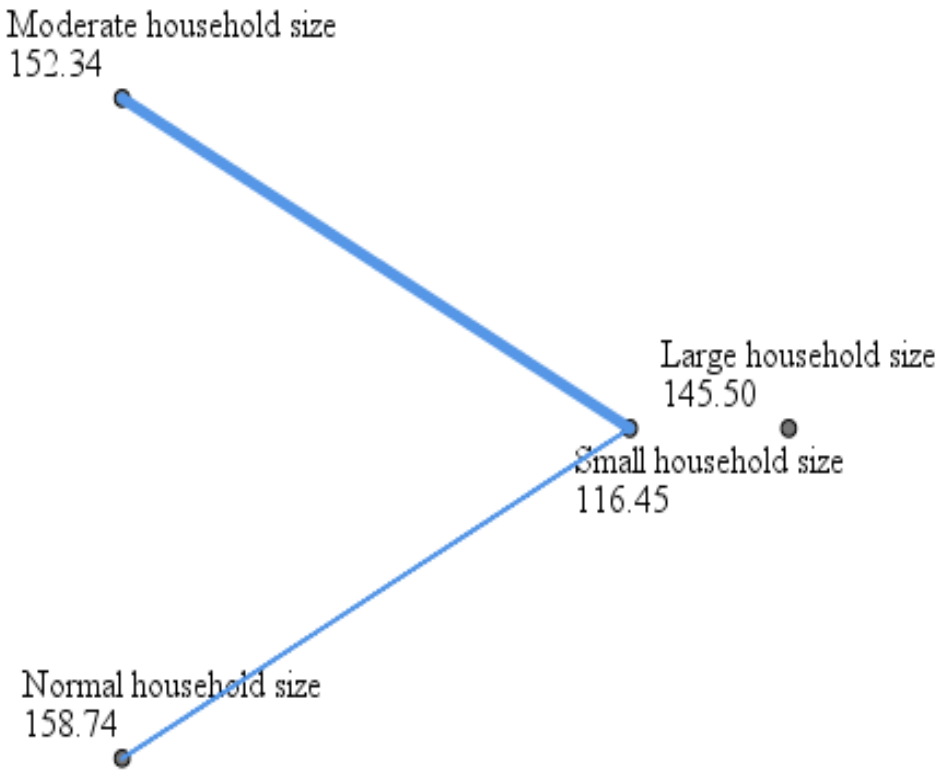


**Figure 4.10: Pairwise comparisons of malaria control strategies by household size**

### 4.7.2 Receptivity of malaria control strategies by educational level

The results as shown in Table 4.11 and Table 4.12 show that receptivity levels of respondents who had attained informal schooling, primary education, secondary education, advanced or at least college level of education were equivalent to one another.

**Table 4. 11: Responses to malaria control strategies by educational level**

| Response variable | Education level | N | Mean Rank | Chi-Square | Sig |
|---|---|---|---|---|---|
| Responses of malaria strategy | No formal education | 29 | 123.45 | 6.232 | 0.01 |
| | Primary school | 107 | 155.49 | | |
| | Secondary school | 96 | 151.27 | | |
| | Tertiary education | 58 | 128.55 | | |

**Table 4. 12***: Pairwise comparisons between groups and malaria control strategies*

| Explanatory variables | Test Statistic | Std. Error | Std. Statistic | Sig. |
|---|---|---|---|---|
| No formal education- Tertiary education | -5.103 | 18.457 | -0.277 | .782 |
| No formal education-Secondary school | -27.817 | 17.196 | -1.618 | 0.10 |
| No formal education-Primary school | -32.042 | 16.990 | -1.886 | 0.06 |
| Tertiary education-Secondary school | 22.714 | 13.496 | 1.683 | 0.10 |
| Tertiary education-Primary school | 26.939 | 13.233 | 2.036 | 0.04 |
| Secondary school-Primary school | 4.225 | 11.408 | 0.370 | 0.71 |

$U_{(3)} = 6.777$, p=0.079

Tables 4.11 and Table 4.12 together with Figure 4.11 and Figure 4.12 show results of a Kruskal-Wallis which was conducted to determine if there were differences in receptivity of malaria control strategies among groups that differed in their levels of education "no formal education (n = 29), primary school (n = 107), secondary school (n = 96) and tertiary education (n = 58). Distributions of receptivity of malaria control strategies were not similar for all the groups, as assessed by visual inspection of a boxplot. Receptivity of malaria control strategies were significantly different among respondents with different responses to malaria control strategies, $\chi^2_{(3)} = 6.232$, $p = 0.01$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure. A Bonferroni correction for multiple comparisons was made with statistical significance accepted at the $p < 0.079$ level. This post hoc analysis revealed no significant differences in receptivity of malaria control strategies between respondents with no formal education (mean rank = 123.45) and those with primary school education (mean rank = 155.49) ($p = 0.06$), but there was significant difference between respondents with tertiary (mean rank = 128.55 and those with primary school education (mean rank = 155.49) ($p = 0.04$), but not between the no formal education group (mean rank = 123.45) and any other group combination of level of education ($p > 0.05$).

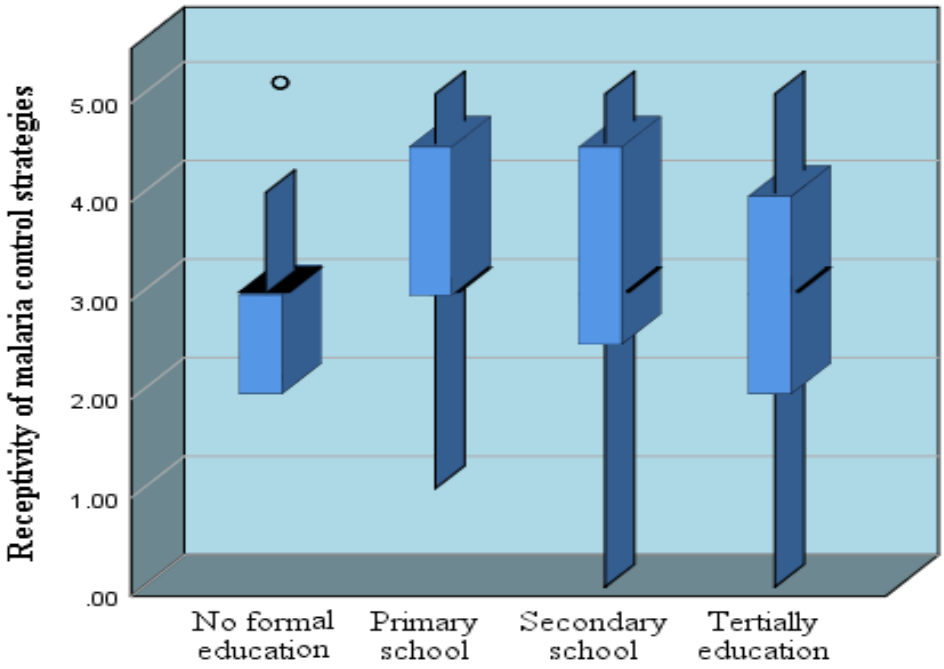


**Figure 4.11: Receptivity of malaria control strategies by the education level**

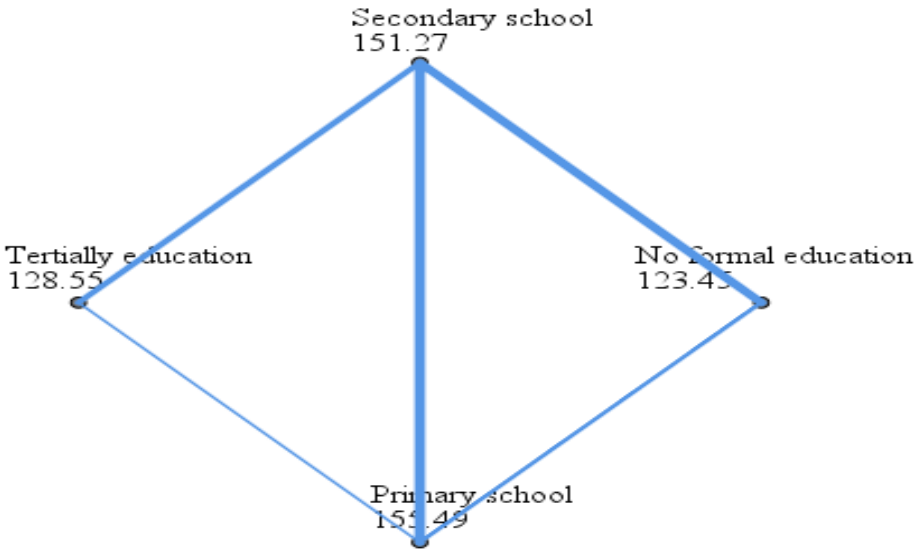


**Figure 4.12: Pairwise comparisons of education level and its relationship to receptivity of malaria control strategies**

### 4.7.3 Receptivity of malaria control strategies by level of income spent

Furthermore, the results in Table 4.12 and Table 4.13 show that receptivity of malaria control strategies for respondents who were categorized as low income, moderate, middle- and high-income earners, was significantly different among these groups.

**Table 4.13: Receptivity to malaria control strategies by level of income spent**

| Response variable | Amount spend | n | Mean Rank | Chi-Square | Sig. |
|---|---|---|---|---|---|
| Receptivity of malaria control strategies | Low income | 144 | 134.08 | 23.984 | 0.001 |
| | Moderate income | 69 | 185.71 | | |
| | Middle income | 48 | 124.60 | | |
| | Higher income | 29 | 141.10 | | |

**Table 4.14**: *Pairwise comparisons of amount spend on malaria control strategies*

| Response variables | Test Statistic | Std. Error | Std. Test Statistic | Sig. |
|---|---|---|---|---|
| Middle income-Low income household | 9.479 | 13.526 | 0.701 | 0.483 |
| Middle income-Higher income | -16.499 | 19.087 | -0.864 | 0.387 |
| Middle income-Moderate income | 61.106 | 15.253 | 4.006 | 0.001 |
| Low income household-Higher income | -7.020 | 16.518 | -0.425 | 0.671 |
| Low income household-Moderate income | -51.627 | 11.882 | -4.345 | 0.001 |
| Higher income-Moderate income | 44.607 | 17.960 | 2.484 | 0.013 |

$U_{(3)} = 23.057$, p=0.001

Table 4.13 and Table 4.14 and their associated Figure 4.13 and Figure 4.14 show results of a Kruskal-Wallis test which was conducted to determine if there were significant differences in receptivity of malaria control strategies among groups that differed in their levels of household income: low (n = 144), moderate (n = 69), middle (n = 48) and higher household income (n =29). Distributions of receptivity of malaria control strategies were not similar for all the groups, as assessed by visual inspection of a boxplot. Receptivity of malaria control strategies were significantly different between households which had different levels of income: $\chi^2_{(3)}) = 23.984$, $p = 0.001$. Subsequently, pairwise comparisons were performed using Dunn's (1964) procedure. A Bonferroni correction for

multiple comparisons was made with statistical significance accepted at the $p$ = 0.001 level. This post hoc analysis revealed significant differences in responses to malaria control strategies between households with middle income (mean rank = 124.60) and those with moderate income (mean rank = 185.71) ($p$ = 0 .001) and between low household income households (mean rank = 134.08) and those with moderate income (mean rank = 185.71) ($p$ = 0.001), but not between those with low income (mean rank = 134.08) and any other group combination of household income (p > 0.05).

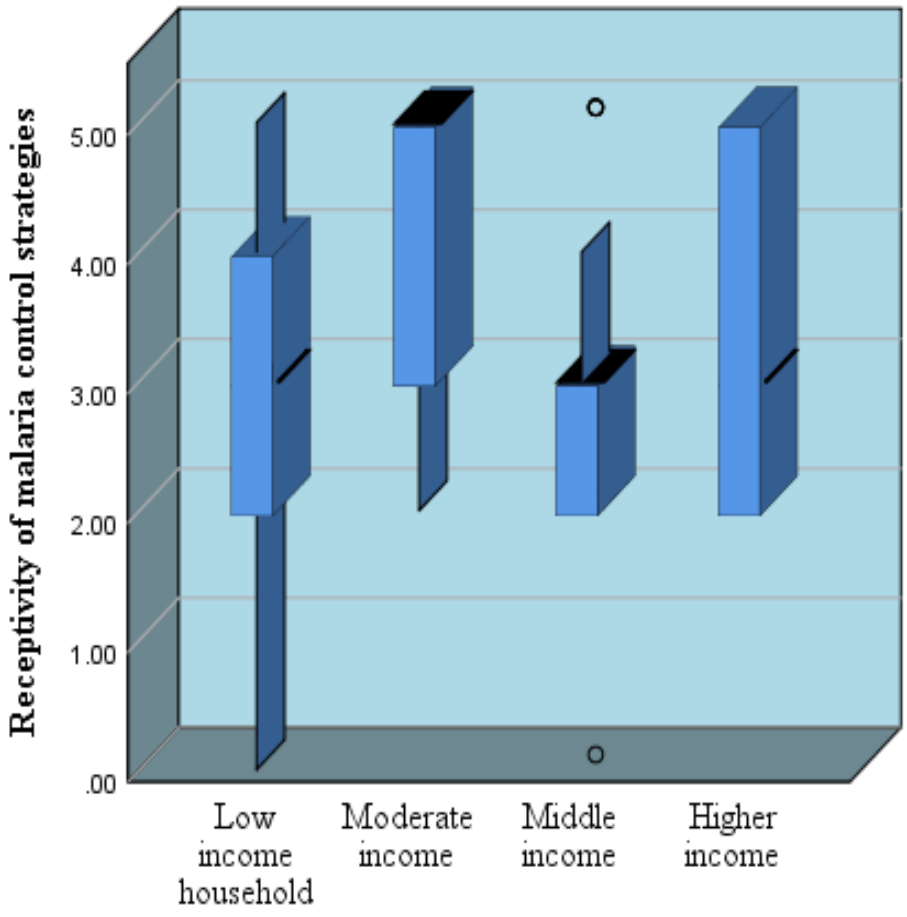


**Figure 4.13: Receptivity of malaria control strategies by income spent by respondents**

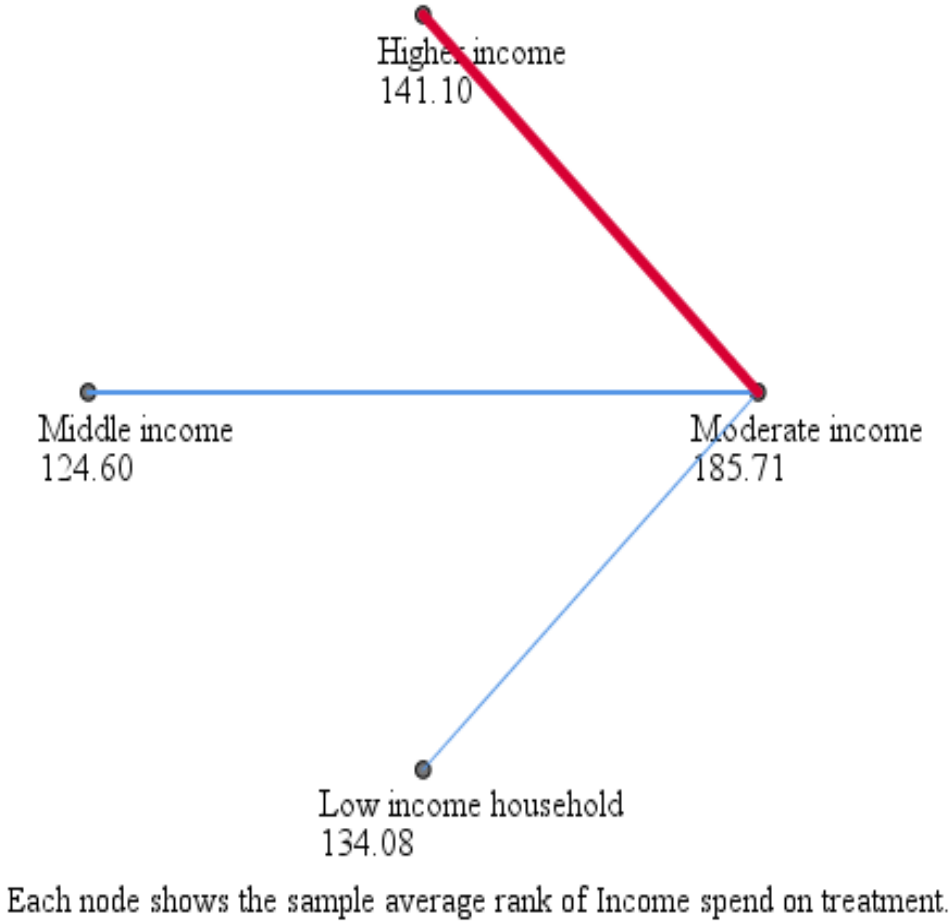


**Figure 4. 14: Pairwise comparisons of money spend on malaria control**

### 4.7.4 Receptivity of malaria control strategies by the main occupation

Results in Table 4.12 and Table 4.13 show that the main occupations done by the respondents were farming, business, employment and others. The others included casual workers and women vendors.

**Table 4. 15: Receptivity of malaria control strategies by the main occupation**

| Response variable | Main occupation | n | Mean Rank | Chi-Square | Sig. |
|---|---|---|---|---|---|
| Responses to malaria strategy | Farming | 134 | 141.98 | 8.363 | 0.039 |
| | Business | 54 | 166.11 | | |
| | Employed | 93 | 143.00 | | |
| | Others | 9 | 100.11 | | |

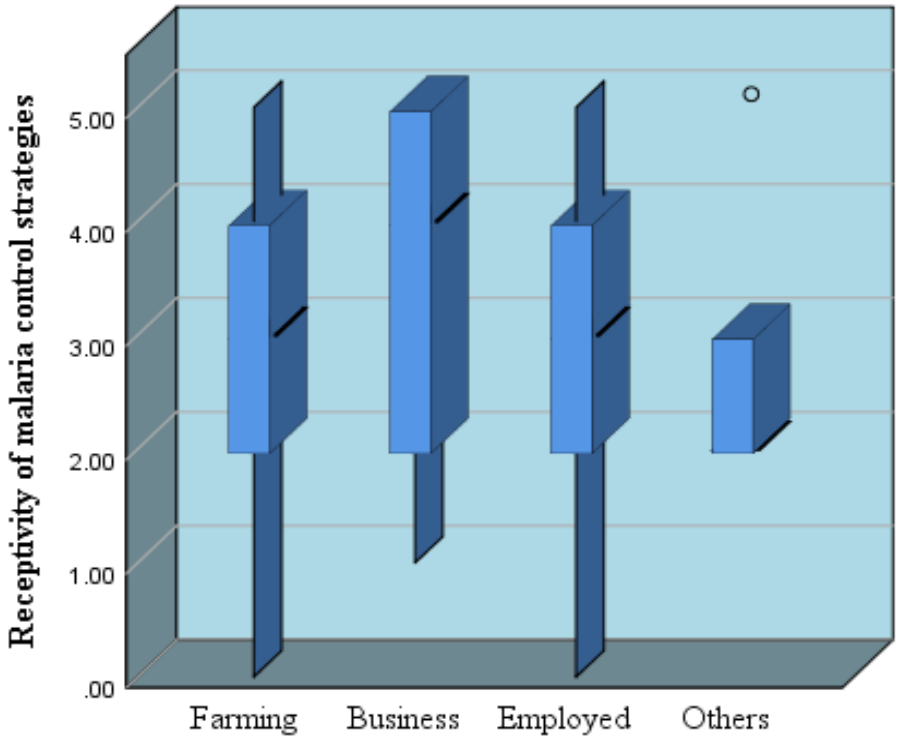


**Figure 4. 15: Receptivity of malaria control strategies by the main occupation**

Table 4.15 and Figure 4.15 show results of a Kruskal-Wallis test which was conducted to determine if there were differences in receptivity of malaria control strategies among groups that differed in their main occupations: farming (mean rank = 141.98), business (mean rank = 166.11), employment (mean rank = 143.00) and others (n = 100.11). Distributions of receptivity of malaria control strategies scores were not similar for all the groups, as assessed by visual inspection of a boxplot. Receptivity of malaria control

strategies was not significantly different among people with different occupations: $\chi^2_{(3)} = 8.363$, $p = 0.039$.

## 4.8 Discussion

This paper was intended to determine relationship and differences in responses to malaria control strategies by marital status of respondents, knowledge (level of understanding), attitudes of respondents, socio-economic factors and demographic characteristics. Relation, as used in this research, is a complex and abstract concept that connotes connection or interaction of two or more elements whose combination can affect a greater outcome or diminish the total output than the sum of each individual component. Through this connection, the elements are able to influence each other positively or inversely, exchanging matter, ideas, function, or reinforcing each other either by a virtuous or a vicious circle. It follows then that the discussion springs from systems thinking.

According to Werhane (2019), a system is a whole or entity that is made of two or more parts that interact to affect the whole. Each element, during interaction, can affect the entity but none can affect it in isolation. In this line of thinking, malaria as a disease that is inextricably linked with members of a household, and each household is an element of a society, and since controlling malaria, if not eradicating it, involves multiple methods, then it can be regarded as an archetypical system. Hence, it is important to examine the interplay of the adverse factors, which are cardinal in implementing malaria control strategies.

By and large, the findings of this study manifest that attitude, marital status, knowledge, household size, education level and income could affect response to malaria control strategies by respondents in the study area. On the basis of these results, those who had

positive attitude were more likely to be more responsive to malaria control strategies than those who had either neutral negative attitude (eerie feelings) about the strategies. This implies that the higher the degree of positive attitude, the higher the level of receptivity to malaria control strategies. Conversely, the greater the intensity of negative attitudes, the worse the receptivity of malaria control strategies. This phenomenon can be explained by Pygmalion effect and mind-set concepts. While, according to Senge (1994), Pygmalion effects entail the possibility of a small change leading to a greater change either accelerated development, or decline. Mind-sets, in accordance with Dweck (2015), are self-conceptions that people use to structure the self and guide behaviour. They play an important role in motivation and self-regulation. These are of two kinds: fixed mind-set and growth mind-set. By growth mind-set it is believed that persons' traits can change and improve. In contrast, by fixed mind-set, it is believed that a person's traits are neither changeable nor malleable. This Pygmalion effect can be as illustrated below:

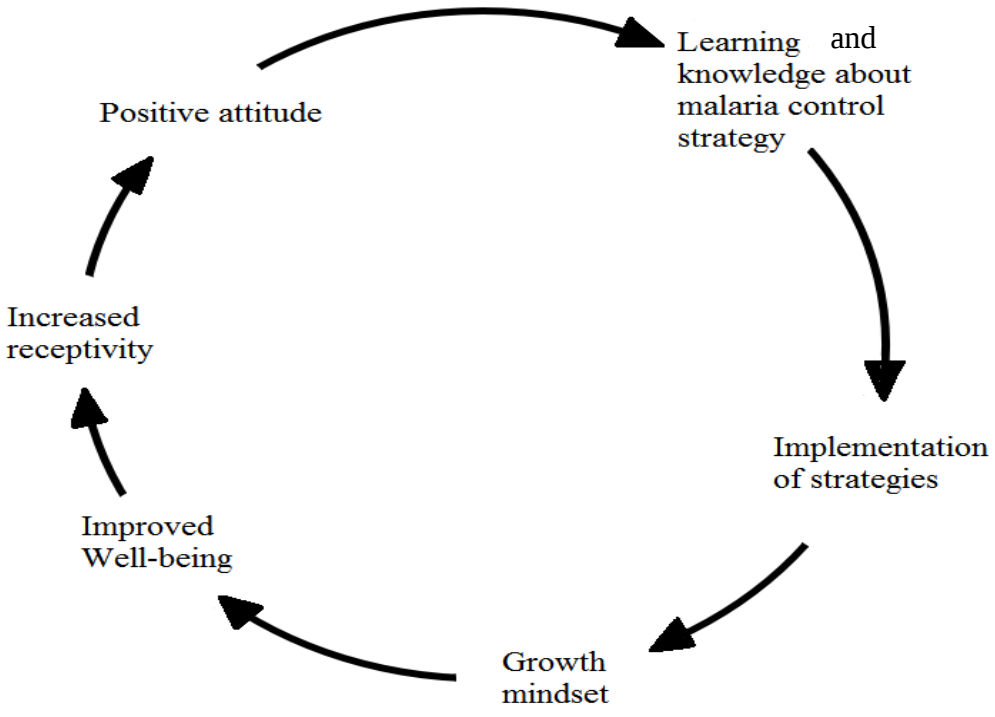


**Figure 4.16: Conceptualization of Pygmalion effects**

Figure 4.16 depicts a reinforcing process of several elements. The diagram indicates a positive feedback loop whereby elements build on each other while influencing each other in direct proportion. Given that recipients of malaria control strategies with positive attitude to them and are intrinsically willing to learn, they gain knowledge and understanding which enable them to experiment the strategies by implementing them. This, in turn, fosters the belief that the strategies can work (growth mind-set) despite the difficulty or setback that may be inherent in the strategy. This leads to a sense and experience of happiness and health (well-being), which feeds back and amplifies positive attitudes.

Moreover, in the light of the law of diffusion, any given innovative or new idea, albeit useful, only a small percentage of a population will have positive attitude towards it. According to Fichman (2000), the law of diffusion states that a population is divided into five segments that fall under the normal curve distribution: innovators, early adopters, early majority, late majority and laggards. The law specifies that 2.5% of the population are innovators, 13.5% early adopters, 34% early majority, 34% late majority, and 16% laggards. Moore and Westley (2011) refer to innovators as those who pursue products, ideas or new strategies aggressively and are intrigued by a fundamental advance. This implies that a small percentage of population of the study area would have positive attitude towards modern malaria control strategies such as utilizing ITNs, which in turn could reinforce receptivity, hence the virtuous circle.

In addition, the results of this study, which show that the more the positive attitude recipients have, the higher the degree of receptivity to malaria control strategies, corroborate Sinecks' (2016) argument that each of us attaches different values to different things, ideas or methods and our behaviour follows accordingly. This is one of the main

reasons why it is very hard to convince someone of the value of a new idea or strategy based on rational arguments and tangible rewards or benefits. Only when there is negative attitude as well as a set of beliefs can people be somewhat convinced.

Furthermore, the situation becomes complicated with negative attitudes. Negative attitude amplifies fixed mind-sets, which leads to apathy and indifference towards modern malaria control strategies, hence the vicious circle in Figure 4.17.

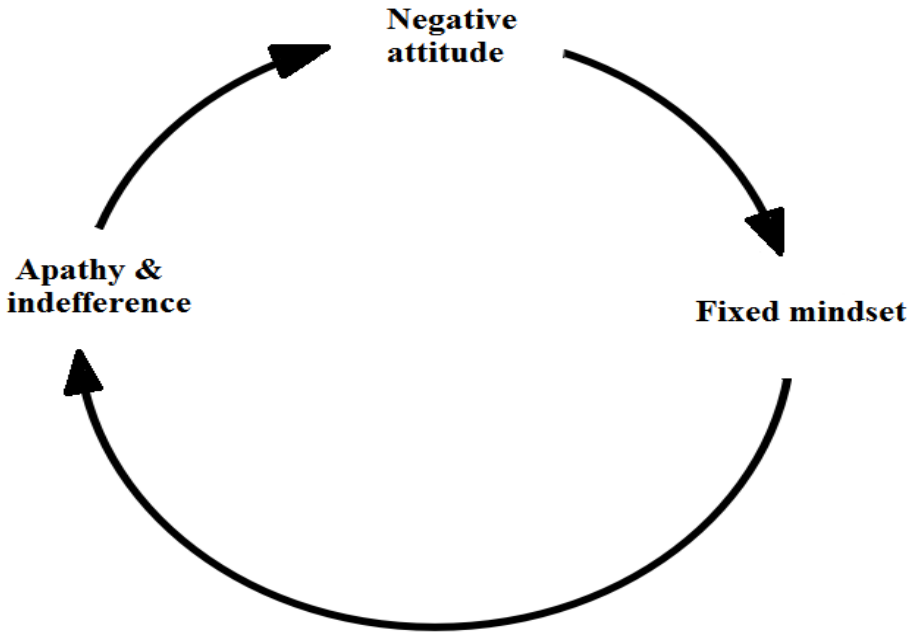


**Figure 4. 17: Conceptualization of vicious circle of fixed mind-set**

This begs a question, what causes this situation? By analytical thinking, we can attribute the situation to a linear cause and effect relationship. We may think of culture (set of beliefs and values) that generates negative attitude and fixed mind-sets, consequently, the less or no responses to the strategies. In contrast, by systems thinking we conceive of the system of delivery of these control strategies as being responsible for this vicious circle. This can be explained by the concept of dynamism of the whole process: the interplay of elements of strategies with respect to change and time. Let us take an example of distributing ITNs.

For a bed mosquito net to be used, there are fundamental factors that have to be considered. Among many other factors are the size of the bed that should correspond to that of the net, the number of members in a household, the design of the house, and whether members who are recipients of the bed sheets sleep on the floor or not. In addition, because members of household change overtime in numbers, growth, and extension, balancing effect is required. Also, since bed nets can fray over-time, can get torn or form holes, then balancing effect in terms of stock and flow would be required. By stock means a quantity of bed nets and flow in the rate of distribution over variable time. In order to achieve homeostasis, the condition in which the use, change and supply will be balanced, stock and flow must be in equilibrium. If these factors and the interaction or interconnection of these elements are not considered, the negative attitude, fixed mind-sets, apathy as well as indifference which results in hardly any receptivity is more likely to ensue.

The responses to malaria control strategies being higher for married and not for single respondents ($p = 0.012$) implies that almost all married couples are likely to use this method because the husband is the head of the household (family). Receptivity to malaria control strategies being higher among male than among female respondents can be explained on the basis of historical contexts and indigenous beliefs. Historically, males have been the bread winners for the family. They have been engaging in trade, which required them to travel far from their locality in agriculture, hunting and fishing. These activities made men more exposed to malaria than women. This condition impelled them to seek remedy for this ailment from other people via folkways. This is concurrent with a research conducted by Brues (1920) who found that a myriad of men in West and Central Africa who were engaged in agriculture, invasions, wars and travelling contributed to spreading of malaria and emergence of traditional approaches to control it. Further, long-

term held beliefs, misunderstanding and misconceptions about malaria had been entrenched and engrained in some people's sub-consciousness. The belief such as attributing the causes of malaria to other things than what really is could highly contribute to high responses to these strategies. Studies corroborating these results are abound, for example Hommond Raymond (1936), Tooke (1969), Gessler *et al*. (1995 and Green (1999).

Although malaria distribution is mostly strong-minded by the climatic and environmental factors which affect mosquito and malaria parasite reproduction and propagation at a given time, malaria is also influenced by various socio-economic factors. In this regard, with respect to relationship between socio-economic factors and response to malaria control strategies, the results of this study indicate that there was a strong relation. Only main occupation ($p = 0.039$), demographic factors (age and sex) showed no association with receptivity to malaria control strategies. Other elements such as marital status ($p = 0.007$), education level ($p = 0.01$), size of household ($p = 0.001$), knowledge ($p = 0.001$) and income spent ($p = 0.001$) signalled to have contributed differences in receptivity of malaria control strategies. These results are in line with the findings of a study undertaken by Akambi *et al*. (2016), which overtly indicated that marital status, education level, knowledge, income and household size had association with malaria control approaches. The results of this research and Akambi's can be attributed to mental models of respondents of these studies. We believe that these respondents had mental models at variance of respondents of this research and those of Akambi's study.

Furthermore, low income was associated with poor responses to malaria control strategies in the study population. Many studies have regarded malaria as a disease of the poor, which is substantiated by the fact that the malaria burden is often concentrated in the

poorest continents and countries with low income. People with low income have relatively less access to antimalarial and anti-mosquito measures, since they cannot afford personal protection measures, a clean environment free of mosquito breeding sites, and are particularly vulnerable to the impact of ineffective diagnosis and treatment due to burden of low income and cultural implications. Further, people with low income are often marginalised by the health sector and many of them have no health insurance and survive under tremendous burden of malaria and other communicable diseases. Because of low income many of them live in poorly constructed houses where they become vulnerable to many mosquito bites per day which is associated with high level of mosquito infestation. It is most likely that poorly constructed houses might have a number of gaps and holes through which a vector mosquito could easily enter, following the scent of human hosts. This is in line with one of studies which were done in Laos which suggested that a good quality house could reduce malaria infestation by reducing the human-mosquito contact with mosquito vector (Hiscox, 2016).

Understanding is influenced by mental models of the recipients of the strategies. Senge (1992) refers to mental models as ‘deeply ingrained assumptions, generalizations or even pictures or images that influence how we understand the world and how we take action’. Surely, frequently we are not willingly aware of our mental models or the effects they have on our behaviour. In this light, we believe that the respondents of this study had unified views of the elements while the respondents of the other study had a holistic view of the world. If one has a unified view of understanding, then one would regard formal education as the only source of knowledge and could disregard non-formal and informal education. Consequently, education would likely appear to have no influence on responses to all categories of the levels of education. It was significant for people with no

informal education up to primary education level but not significant for recipients with higher education level, especially the tertiary education while intrinsically it is influential.

Regarding the relation of level of understanding which implies knowledge in this paper, with responses, the results of this study manifest that responses were different by knowledge of respondents. This implies that respondents had information about malaria control strategies and moderate understanding about strategies. As Arbab (1998) clarifies, facts and information are the raw materials of knowledge in the same way that sand and cement, earth, wood, metals and glass are raw materials of a building. Knowledge is a structured system that includes facts and information as well as concepts, patterns, connections and hierarchies. Moreover, knowledge is meaningful if it is accompanied by true understanding. Understanding generates the meaning of entities, and connections that underline the existence of these entities. Accordingly, it would be very difficult or impossible for information by itself to influence receptivity as defined in this study.

### 4.9 Conclusions and Recommendations

This paper has some conclusions and recommendations to policy-makers, NGOs and individuals who are at the fore-front in the fight against malaria. These findings have substantial conclusions and recommendations on how problems can be resolved rather than how they are actually solved, gain insight of the complex problems and achieving a shift of mind regarding malaria control strategies. Further, these results signalize that malaria is a disease that involves dynamic and multiple factors that coherently interact with one another. It follows that, in order to eradicate malaria, systems thinking must be considered rather than only analytical linear thinking.

Furthermore, this paper puts forth suggestions that the connection between subtle elements such as attitudes, mind-set and mental models must be explored before and during the implementation of malaria control strategies as to heighten receptivity of those strategies. In addition, local government officials can identify potential influencers within the areas of their jurisdiction. These individuals can initiate words of positive effects of some malaria control strategies. In doing so, they would be able to make a start of reinforcing feedback and hence Pygmalion effect. This would lead to a virtuous circle about the importance of usefulness of particular malaria control strategies, thus amplifying positive attitudes, growth mind-set and intentional willingness to combat malaria. Thus, effective implementation of malaria control strategies requires adequate synergy between supply (service provider) and demand (community response) (Tyagi *et al.*, 2005; WHO, 2008).

On the basis of the results reported in this paper, it can be concluded that receptivity by members of these communities towards malaria control strategies is low in the study areas. In addition, there exists a linkage between knowledge and attitude whereas receptivity has association with socio-economic factors. Consequently, it is suggested that policy makers, community health officers and NGOs involved in the campaigns against malaria and educators should consider the interaction and interplay of attitude, mind-sets, mental models, and Pygmalion effects in fostering receptivity. It is concluded further that community-based interventions which bring improvement in standard of living, access to healthcare facilities and health awareness will make a significant change in receptivity of malaria control strategies, hence welfare and wellbeing of those communities. Without receptivity to malaria control strategies, the strategies will have short term effectiveness, at best, but will prove futile in the long run. It is therefore recommended that health workers and local government should engage household members in importance of

acquiring, integrating, extending and using meaningfully the knowledge about malaria control strategies.

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# CHAPTER FIVE

## 5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Summary of Major Results

#### 5.1.1 Knowledge about malaria control strategies and its association with demographic and socio-economic variables

Knowledge of communities about malaria control strategies and its association with demographic and socio-economic variables is presented and discussed in chapter two. The chapter presents results on knowledge about malaria control strategies on their own sake and as they relate to socio-economic factors and demographic characteristics. The average score on an index summated scale that was used to determine knowledge about malaria, was 53%, which showed that they had moderate knowledge. The respondents who had low, moderate and high knowledge about malaria were 28.4%, 40.5% and 31.0% respectively. Chi-square results showed that knowledge about malaria was significantly associated ($p < 0.05$) with demographic and socio-economic factors with $\chi^2$-values of 7.393, 9.617, 28.537, and 80.789 with respect to sex, education level, main occupation and income respectively.

Moreover, the results indicated that there were misperceptions about malaria prevention measures. As highlighted during focus group discussions, members of the communities, in general, believed that malaria could not be prevented using mosquito nets or any other methods. They perceived that mosquitos are too many to be annihilated, avoided or be prevented from biting.

### 5.1.2 Peoples' attitude towards malaria control strategies

The overall attitude towards malaria control strategies among all the respondents was positive; they scored an average of 54.5 points on the Likert scale that was used to determine the attitude, while the score for undecided attitude was 48.0; scores from 16 to 47 represented unfavourable attitude and scores from 49 to 80 points represented favourable attitude. The proportions of respondents with unfavourable, undecided and favourable attitudes were 18.63%, 6.86% and 74.51 respectively. Sex of respondent (Chi-Square = 8.569, p = 0.014), marital status (Chi-Square = 14.803, p = 0.022), education level (Chi-Square = 21.690, p = 0.001), main occupation (Chi-Square = 24.940, p = 0.001) and household income (Chi-Square = 51.707, p = 0.001) were significantly associated with attitude towards malaria control strategies.

Although community members have positive attitude towards malaria control approaches, they have negative attitude towards using mosquito nets. Although this paper found that respondents had favourable overall attitude towards malaria control strategies, the variation in their levels of favourability was not explained by household size.

### 5.1.3 Receptivity of malaria control strategies on the basis of knowledge, attitude and socio-economic factors

The minimum, median and maximum points scored on the scale that was used to measure receptivity of malaria control strategies were 126.72 and 198.00respectively. The proportions of the respondents who had lower and higher receptivity of malaria control strategies were 20% and 80% respectively. Using Kruskal-Wallis test, receptivity of malaria control strategies was significantly different among respondents with different levels of knowledge (p = 0.001), among respondents with different attitudes towards malaria control strategies (p = 0.001), among respondents with different marital statuses

($p = 0.007$), among households of various sizes ($p = 0.001$), among households whose heads had various levels of education ($p = 0.01$), among households with different amounts of income ($p = 0.001$), and among respondents who had different occupations ($p = 0.039$). Using Mann-Whitney U test, receptivity of malaria control strategies was not significantly different between male and female respondents ($p = 0.852$), and it was also not significantly different between young and old respondents ($p = 0.921$).

## 5.2 Conclusions

Based on the results that meet the first specific objective of the study, respondents hence members of the communities, have information on malaria preventive strategies. However, they hardly have knowledge about malaria causes, how to utilize preventive measures, and the importance of using bed nets for malaria prevention. Moreover, since sex of respondent, education level of respondent, main occupation of respondent and household income were significantly associated with knowledge about malaria; they are main factors which explain knowledge about malaria in the research area.

On the basis of the findings that meet the second specific objective of this study, it is concluded that members of the communities have positive dispositions towards malaria control strategies, but that they have negative attitude towards distribution and use of mosquito nets. Moreover, since sex of respondent, marital status, education level, main occupation and household income were significantly associated with attitude towards malaria control strategies; they are main factors which explain the attitude.

According to the findings that meet the third specific objective of the study, it is concluded that receptivity of malaria control strategies in Lindi and Mtwara is low and associated with knowledge, attitude, and socio-economic factors. Particularly, because

there were significant differences in receptivity of malaria control strategies by different levels of knowledge, different attitudes towards malaria control strategies, different marital statuses, household sizes, levels of education, household income, and different occupations; it is concluded that these are main factors related to receptivity of malaria control strategies.

## 5.3 Recommendations

Based on the results and conclusions of this study, it is recommended that knowledge about malaria control strategies should be promoted through training, non-formal and informal education by community development officers, health officers, and teachers found within the local communities. Further, local government should empower members of communities by engaging them, holding training sessions, workshops and seminars on multivariate malaria preventive measures.

Further, it is recommended that, in order for malaria control strategies to bear anticipated outcomes, positive attitude towards these strategies should be promoted and fostered through engaging people, positive growth mind-sets and integrating indigenous control approaches that are appropriate.

Above all, for efficiency and effectiveness of malaria control strategies, receptivity by people, who are the recipients of these measures, should be considered deeply and cultivated. In order to attain this, the systemic application of growth mind sets, mental models, attitude and community influencers should be implemented.

## 5.4 Relevance of the Theories Reviewed

Because the study was about receptivity of people about malaria control strategies with respect to knowledge, attitude and socio-economic factors, some related theories and concepts were reviewed and applied to the study. Among these were education, cortex, and limbic brains, growth mind-sets and fixed mind-sets, mental models and Pygmalion effects, theory of reasoned action, and the theory of planned behaviour.

As asserted by Akambi (2016), socio-economic factors such as occupation, income, sex and education have impact on malaria control. It is through learning that people acquire knowledge, values, skills, and underlying beliefs. A set of common beliefs and values generate general mental models and attitudes. The coherent dynamic interaction of mental models and values can result into either positive attitude or negative attitude towards some courses of action or entities. These in turn, interplay with mind-sets that have important roles in motivation, drive, energy and self-regulation. Positive attitude is linked with growth mind-set. This link leads to more learning of malaria control strategies. As people learn, they gain more knowledge and acquire capability to implement the strategies. Once the initial stages of implementation are successful, then people become more inspired to do more and become receptive to the strategies. This would in turn enhance well-being, more learning, growth mind-set and positive attitude.

The theory of reasoned action as well as the theory of planned behaviour explain the genesis of attitudes as inherent and internal beliefs, as part of the brain that controls memory and influence behaviour. They expound that attitudes can be diversely expressed, depending on the context in which they act upon and manifest. The concept of memory and emotions can be succinctly explained by neo-cortex and limbic brains. Together, they can be used to tell an individual’s intent to perform behaviour at particular times and in

specific contexts. On this basis, we can discern that the hallmark of the theory of reasoned action and planned behaviour is prediction of intent. Intentions are influenced by attitude as well as subjective evaluation of the risks involved and the corresponding outcome of the behaviour. It follows then that these theories and concepts were useful and relevant to the study at hand.

The theory of reasoned action as well as the theory of planned behaviour explains the genesis of attitudes as inherent and internal beliefs, as part of the brain that controls memory and influences behaviour. Those attitudes are diversely expressed depending on the content in which they are expressed. The concepts of memory and emotion can be succinctly explained by neo-cortex and limbic brains. Together, they can be used to tell an individual's intent to perform behaviour at a particular time and in a specific context. On this basis, we can discern that the hallmark of theory of reasoned action and planned behaviour predict intent. Intentions are influenced by attitude as well as subjective evaluation of the risks involved and the corresponding outcome of the behaviour. It follows then that those were useful and relevant to the study on which the thesis is based.

## 5.5 Contribution of the Study

### 5.5.1 Theoretical contribution of the study

This study has some theoretical contribution to knowledge about malaria and how this debilitating disease can be put under control. Knowledge, in this study, is assumed to be distinctively different from facts, information, awareness, understanding and implementation of malaria control strategies. Knowledge consists of the elements mentioned above. In other words, knowledge is more than a sum of facts, information, awareness, understandings and application because knowledge about malaria and its associated control strategies is the function of those elements. Facts, information and

awareness are like raw materials for building an edifice while understanding is the cement that binds them in a state of dynamics and interaction. This leads to the application and ultimately the knowledge.

Knowledge about malaria and malaria control strategies is necessary but not sufficient. For knowledge to be effective, it must be linked to and must be dynamic and coherent with positive attitude. This interaction yields a new way of thinking and perceptions. Consequently, new behaviour is not determined by the reality but by the perceptions about reality. Once this point is reached, people are able to see non-obvious problematic parts of a programme or intervention.

Moreover, new thinking emerges. Instead of looking at malaria as an isolated disease, it is perceived as a problem which is part of a system. It is a disease that involves various aspects of life such as social, economic, political, biological, psychological and family elements. It follows then that when dealing with the problem of malaria, the underlying issue is to understand the interrelation and interaction of these elements, and how they reinforce and balance each other.

On the basis of this line of thinking, malaria cannot be combated by a sequence of strategies rather by interaction and interplay of diverse malaria control strategies including other systems' factors. For example, the distribution of insecticide treated nets involves numerous factors that are to be considered for this strategy to be effective. The size of the net, the size of the household, the conditions of nets, durability of nets, rate of supply, rate of child birth, attitudes of recipients, knowledge of recipients which may be dependent on educational level or the mind-sets of the recipients in case they pursue knowledge via informal or formal education. Moreover, this relies upon the mental

models and limbic brains of the people. These can amplify the strength and effectiveness of malaria control strategies or can act as a limit to growth of these strategies.

### 5.5.2 Policy Contribution

It is expected that this study will assist policy makers gain insights about the dynamic nature of malaria. It is hoped that there will be realization that dealing with malaria is actually working on a dynamic system that requires systems thinking, making distinctions, establishing relationships, and observing from multiple perspectives. It is our prospect that policy makers and in policy making, it will be discerned that linear thinking will produce the same results. We cannot have a different future, if we continue thinking and acting at the present as we did in the past. If we want a different future from the past, then we must think and act differently, at this present. We must have to foster perceptions that will result into changed behaviour at the present moment.

In this sight, it is expected that policy makers will reconsider the free-distributed mosquito nets by adding some value to them either by soliciting meagre contribution or selling them at subsidized prices. This, it is believed, will help people value the nets, own them and preserve their honour and dignity. In addition, it is thought that this may generate growth of mind-sets in members of community. In so doing, these members will be empowered by the belief that they can solve their own problems rather than being dependent upon assistance from outside.

In case of members from households that are in dire need of free-distributed nets or come from destitute families, they should be given the nets free of charge with parallel measures that empower them through knowledge and how they could be somewhat self-reliant economically. One of the viable solutions is to sponsor their children so that they

can realize their full potential and be able to escape this trap of vicious cycle—malaria, poverty and ignorance. Moreover, a stock of nets must be maintained so that the supply as well as distribution is done on the basis of process rather than as an event. In addition, this process can be juxtaposed with other types of training such as on family planning and entrepreneurship.

Furthermore, it is expected that policy makers will use the insights gained from this study by making sure attitudes, indigenous beliefs, cultural values, and traditional methods are assessed before any malaria control strategies are introduced to communities. More importantly, it is expected that they will find ways which integrate members' approaches to control malaria with the strategies to be delivered to the communities. Additionally, engagement of the members of these communities would be paramount for effective strategies.

Furthermore, it is expected that policy makers will come up with policies that will ensure that there exists a local mechanism that propels and encourages members of communities to learn and become protagonists of these malaria control strategies. Additionally, it would be important that these strategies are designed and implemented at the grassroots level rather than being imposed from the top. While the top can coordinate the whole process, members of communities should be empowered to initiate and spearhead programmes tailored to control malaria. This can be achieved by assistance of some local prominent people who can act as influencers.

## 5.6 Recommendations for Further Research

Because this study employed a cross-sectional research design whereby data were collected once and therefore were suitable to describe the situation at that particular

period of time, it is suggested that longitudinal studies should be conducted to replicate the research.

In addition, other studies can be conducted on impact of malaria on preventing children from realizing their full potential

Moreover, further research should be conducted on why members of communities in Lindi and Mtwara Regions and elsewhere use freely distributed bed nets for ulterior purposes, and how malaria influences family planning.

# APPENDICES

## Appendix 1: A copy of the questionnaire used for the research

**SOKOINE UNIVERSITY OF AGRICULTURE DEVELOPMENT STUDIES INSTITUTE**

**A Household Questionnaire for Research on:**

**Effects of Knowledge, Attitude and Socio-Economic Factors on Receptivity of Malaria Control Strategies in Lindi And Mtwara Regions, Tanzania**

**BY**

**ZAWADI ALLY NKULIKWA**

**PhD Student**

**P. O. Box 3024, Morogoro, Tanzania, Mob: 0767485156**

Dear respondent, I am asking you to participate in this study by answering the questions. As an interviewee your ideas and responding to the questions asked are invaluable for this study. You are important person because you represent all other people of Mtwara and Lindi regions who had no opportunity to participate in this crucial activity. I assure you that your responses will only be used for scientific purposes in the within context and scope of this study. Thus, all information you offer will be handled with strict confidentiality and will be presented in of statistical forms or anonymously or both. It should be born that findings originating from this study will be one of the important tools for policy makers, government institutions and other development agencies such as NGOs, CBOs, community development officers, community health careers, local

government organizations, local communities and other international organizations as well as communities to better refine or generate their development policies, design specific and integrative intervention strategies , develop long-term research policies and be better equipped for the battle against malaria, hence be able to reduce its morbidity and mortality rate. in your community and in our beloved country, Tanzania. Thank you very much indeed for your consent and accepting in participating.it is kind of you!

**SECTION A**: **QUESTIONNAIRE IDENTIFICATION**

Date of interview…….

Name of ward ……

Name of Village……

Name of interviewer……

Background / demographics

| | Female | Male |
|---|---|---|
| **Q 1.** Gender **[Interviewer: Enter respondent's gender]** | 0 | 1 |

| | | |
|---|---|---|
| **Q 2.** What year were you born? **[**Interviewer: Enter a four-digit number. If they do not know the year of their birth, ask for their age. Don't Know = -9] | Year | Years |

| **Q 3**. What is the highest level of education you have completed? **[Circle response options that apply]** | |
|---|---|
| None formal education | 0 |
| Informal education only | 1 |
| Some primary schooling | 2 |
| Primary school completed | 3 |
| Some secondary school / high school | 4 |
| Secondary school / high school completed | 5 |
| Post-secondary qualifications, other than university e.g. a diploma or degree from a technical or college | 6 |
| Some university | 7 |
| University completed | 8 |
| Post-graduate | 9 |
| Don't know | -9 |

| **Q 4**. Marital status **Circle response option that apply]** | | | | |
|---|---|---|---|---|
| | Married | Single | Widowed | Divorced |
| | 1 | 2 | 3 | 4 |

| **Q 5**. What is your main occupation? **Circle response option that apply]** |
|---|

| | Food crop production | Livestock | Vegetable | Employment |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Others (**specify**) | | | | |

| **Q 6.** How many members are in your household at present? | |
|---|---|

**Household composition**

| Age group | Male | Female |
|---|---|---|
| Children less than 5 years | | |
| Children from 5to 18 years | | |
| Adult greater than 18 years | | |

SECTION B

| *Let's talk for a moment about* malaria awareness. *Circle the number of the corresponding to YES or NO in subsection. Explain briefly whenever it applies.* |
|---|

| **Q 7**. Have you ever heard of malaria [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| please explain briefly | | |

| **Q 8**. Is there another name of malaria in your community? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| In case, it is Yes, what is it called by your community? | | |

| **Q 9**. Do you know how people get malaria [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| If Yes, please mention some possible ways that a person can contract malaria | | |

| **Q 10**. Have you ever suffered from malaria? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| If **yes**, how did you know it was malaria? | | |
| **Q 11**. Do you know symptoms of a person who suffers from malaria? [Circle **response options that apply]** | | |
| | YES | NO |
| | 1 | 2 |
| If **yes**, will you please mention some of them? | | |

| How were you able to know this? | | | | |
|---|---|---|---|---|
| | Books | Radio | Health worker | School |
| | 1 | 2 | 3 | 4 |

| |
|---|
| If it is not through those mentioned above, which are the other way did you get information then? Please mention them. |

SECTION C

| |
|---|
| *Let's talk for a moment about* health seeking behaviour |

| **Q 12.** How many times has had malaria in your living? (**in order of severity**?**]** | |
|---|---|
| None | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| More | |
| **Q 13.** The last time you had malaria, what symptoms did you experience? (**in order of action).** | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |

| |
|---|
| **Q14**. What feelings did you have about the symptoms mentioned above before you knew it was malaria? Please explain briefly |

| |
|---|
| **Q15**. How did you realize that it was malaria? Will you please explain |

| |
|---|
| **Q16**. How did you get cured of this malaria? |
| **Q17**. The last time you had malaria, for how long had you been suffering before you got treated? |

| |
|---|
| **Q 18**. How long did it take for you to feel better after you had started treatment? |

| **Q 19.** Had you been using mosquito nets when you contracted this malaria? [**Circle response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| **Q 20.** If **yes**, what type of the mosquito nets? [**Circle response options that apply]** | | |

| | Treated mosquito net | Non-treated one |
|---|---|---|
| | 1 | 2 |

| **Q21**. If you changed the treatment, where did you go for further treatment? |
|---|
| |

| **Q22**. Do you have any health problems still persisting up to this moment? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| If yes, what are the problems? Please explain | | |
| | | |

| **Q23.** Did you face any difficulties the last time you had malaria in accessing treatment? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| What was the difficulties you faced? Please explain | | |
| Qn. The last time you had treatment for malaria, did you change the treatment? [Circle **response options that apply]** | | |
| | YES | NO |
| | 1 | 2 |

| **Q24**. If you changed the treatment, where did you go for further treatment? |
|---|
| |

| **Q25.** Did you face any financial difficulties the last time you had malaria, while seeking treatment for your illness? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| If Yes, how did you get money for treatment? Please explain | | |
| | | |

| **Q26.** Has anyone in your family who have been ill with malaria in the last 3 months? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| If Yes, how much did you spend on this treatment? | | |

| **Q27.** What was done for treatment? (**in order of action).** | |
|---|---|
| 1 | |
| 2 | |
| 3 | |

| | |
|---|---|
| 4 | |

SECTION D

| |
|---|
| *Let's talk for a moment about* socio-economic factors |

| **Q28.** The last time any member of your household had malaria, did you face any problems in treating it? | | |
|---|---|---|
| | **YES** | **NO** |
| | 1 | 2 |

| If yes, what kind of problems? (please specify) | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |

| **Q30.** Does malaria cause any financial problems for your family? | | |
|---|---|---|
| | **YES** | **NO** |
| | 1 | 2 |
| If yes, to what extent? (please specify) | | |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |

| **Q29** Do you know any preventive methods for malaria? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| If Yes, please mention them? | | |

| **Q29** Do you practice any preventive methods in your household? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| If Yes, which ones do you prefer? | | |

| **Q29** Are there any members in your community who died of malaria? | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |
| If Yes, how did you know it was malaria that caused their deaths? Please explain | | |

| **Q29** What kind of people is most affected with malaria? |
|---|
| |

**Q.** People with lower income are [Circle **response options that apply]**
1. Most affected with malaria
2. Just affected with malaria
3. Free from malaria infection
4. I do not know

**Q.** Rich people are [Circle **response options that apply]**
1. Most affected with malaria
2. Just affected with malaria
3. Free from malaria infection
4. I do not know

**Q.** People with low level of education are [Circle **response options that apply]**
1. Most affected with malaria
2. Just affected with malaria
3. Free from malaria infection
4. I do not know

**Q.** Educated people are [Circle **response options that apply]**
1. Most affected with malaria
2. Just affected with malaria
3. Free from malaria infection
4. I do not know

SECTION E

*Let's talk for a moment some* preventive measures

**Q30** Do you think government is playing any role to prevent malaria?
[Circle **response options that apply]**

| | YES | NO |
|---|---|---|
| | 1 | 2 |
| If Yes, what are they? Mention them? | | |

**Q31** Do you think government is playing any role to prevent malaria?
[Circle **response options that apply]**

| | YES | NO |
|---|---|---|
| | 1 | 2 |
| If Yes, what are they? Mention them? | | |

**Q32** Are you aware of any health facilities in your area?
[Circle **response options that apply]**

| | YES | NO |
|---|---|---|
| | 1 | 2 |
| If Yes, what are they? Mention them? | | |

**Q33** What services do health facilities in your area provide? (Please specify)

| | |
|---|---|
| 1 | |
| 2 | |
| 3 | |

| | |
|---|---|
| 4 | |

| **Q34** Do you get mosquito nets from government/NGOs? [Circle **response options that apply]** | | |
|---|---|---|
| | NGO | GOV |
| | 1 | 2 |
| If NGO, what are they? Mention them? | | |

| **Q35** If you get a treated mosquito net do you use it? [Circle **response options that apply]** | | |
|---|---|---|
| | NGO | GOV |
| | 1 | 2 |
| If yes how? If NO why? | | |

| **Q36** Do you use any chemical around your house to control mosquitoes? [Circle **response options that apply]** | | |
|---|---|---|
| | NGO | GOV |
| | 1 | 2 |
| If Yes mention the name of the chemical you use | | |

| **Q36** Do you use any chemical around your house to control mosquito? [Circle **response options that apply]** | | |
|---|---|---|
| | NGO | GOV |
| | 1 | 2 |
| If Yes mention the name of the chemical you use | | |

| **Q37** Do you use any chemical around your house to control mosquitoes? [Circle **response options that apply]** | | |
|---|---|---|
| | NGO | GOV |
| | 1 | 2 |
| If NO why? Explain | | |

| **Q38** Are there any other activities, which you carry out to prevent malaria? (Please specify) | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |

| **Q39** What, according to you, can be done to reduce the incidence of malaria in your area? Please explain | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |

| **Q39 please provide** any other information that would be important for the process of elimination of malaria |
|---|

| | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |

SECTION F

| |
|---|
| *Now, I would like to ask you some questions on how you feel about malaria control strategies*1. Please for each of the following statements say whether you Strongly agree (SA), Agree (A), are Uncertain (U), Disagree (D) or Strongly disagree (SD) |

| **Q40** | | | |
|---|---|---|---|
| **Statement 1**: I always feel like using mosquito nets when I sleep at night. | | **Statement 2**: I often use mosquito nets when I sleep at night. | |
| Agree Very Strongly With Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree Very Strongly With Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Q41** | | | |
|---|---|---|---|
| **Statement 1**: I usually use mosquito nets. | | **Statement 2**: I never use mosquito nets | |
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly with Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Q42** | | | |
|---|---|---|---|
| **Statement 1**: I sometimes use mosquito nets. | | **Statement 2**: I rarely use mosquito nets | |
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree Strongly With Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with Neither | | | 5 |
| Don't know | | | -9 |

| **Q43** | |
|---|---|
| **Statement 1**: I love using insecticidal mosquito nets. | **Statement2:** I like using insecticidal mosquitoes' nets |

| Agree vvery Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly With Statement 2 |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Q44** | | | |
|---|---|---|---|
| **Statement 1**: I am fond of using insecticidal nets | | **Statement 2**: I hate using insecticidal mosquito nets. | |
| Agree Very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree Very Strongly With Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Q45** | | | |
|---|---|---|---|
| **Statement 1**: I hesitate to use insecticidal mosquito nets | | **Statement 2**: I am elated using insecticidal mosquito nets | |
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly with Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Statement 1**: Mosquito treated nets prevents people from suffering malaria. | | **Statement 2**: Mosquito treated nets repel mosquitoes away. | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very strongly with Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Statement 1**: Mosquito treated nets can help increase the number of children in the family | | **Statement 2**: Mosquito treated nets control the births rate in African family. | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with statement 1 | Agree with Statement 2 | Agree very Strongly With Statement 2 |
| 1 | 2 | 3 | 4 |

| | |
|---|---|
| Agree with none of the above statements | 5 |
| Don’t know | -9 |

| **Statement 1**: Mosquito treated nets cause people to suffer from malaria. | | **Statement 2**: Mosquito treated nets attract mosquitos to sting on people (user). | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly with Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don’t know | | | -9 |

| **Statement 1**: Mosquito treated nets are effective means of controlling malaria when each member in household, use them always. | | **Statement 2**: Mosquito treated nets are effective means of controlling malaria when some member in household, use them always. | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly With Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don’t know | | | -9 |

| **Statement 1**: Mosquito treated nets are effective when only elders’ member, in a household, use them always. | | **Statement 2**: Mosquito treated nets are useful only for children under five age. | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly with Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don’t know | | | -9 |

| **Statement 1**: Mosquito treated nets are useless when each member, in a household, use them always. | | **Statement 2**: Mosquito treated nets are of no use when some members use them, in household, always | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly With Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don’t know | | | -9 |

| **tatement 1**: Most people in our community die of malaria. | | **Statement 2**: Most people never die out because of malaria | |
|---|---|---|---|
| Agree very strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very strongly With Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Statement 1**: People die when they spray insecticide on crops/plants/ surrounding their houses. | | **Statement 2**: Insects but not mosquito dies when you spray insecticide surrounding your house. | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very strongly With Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |
| **Statement 1**: Most members of our community die because of mosquito treated nets. | | **Statement 2**: Mosquitos die out because of treated nets. | |
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly with Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Statement 1**: Malaria control strategies save people's lives. | | **Statement 2**: Malaria control strategies lose people's lives | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly with Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Statement 1**: Malaria control strategies are useful for some people not us. | | **Statement 2**: Malaria control strategies are important for everyone. | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very strongly with Statement 2 |

| | | | |
|---|---|---|---|
| | | | |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

| **Statement 1**: Malaria control strategies are are means for some people to get some money from donors. | | **Statement 2**: Malaria control strategies are are useful for some people. | |
|---|---|---|---|
| Agree very Strongly with Statement 1 | Agree with Statement 1 | Agree with Statement 2 | Agree very Strongly with Statement 2 |
| 1 | 2 | 3 | 4 |
| Agree with none of the above statements | | | 5 |
| Don't know | | | -9 |

*Now I would like to ask you some questions on how you understand about malaria prevention and its control*

| **Q45** Malaria is a disease, which is caused by mosquito stinging. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q46** Reducing the bushes surrounding the places where you live is one way to control mosquito multiplication? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q47** Malaria can be caused by some people who are able to bewitch others [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q48** Malaria is more dangerous in tropical areas because mosquitoes like to bite the black skins more than white skins? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q49** Malaria is more dangerous during the rainy season, especially when places are waterlogged? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |

| | | |
|---|---|---|
| | 1 | 2 |

| **Q50** Mosquitoes multiply and bite more when temperatures are high? [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q51** There are many things that can cause someone to suffer from malaria [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q52** Some people can produce and keep mosquitoes that affect other people with malaria. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q53** Mosquitoes cause malaria especially when people do not use treated nets. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q54** Malaria can be controlled using mosquito nets, clearing bushes and draining logged water around households [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q55** Malaria affects black people and do not affect white people [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q56** Mosquito multiplication can be controlled using, clearing bushes, and draining logged water around households. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q56** To prevent malaria, we need to have strategies of eliminating bad people who bewitch . [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q56** Prayers and worshiping prevent people from becoming sick of malaria. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q56** Herbs are more potent to control malaria than modern medicine. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q56** Malaria is caused by rain and water logged. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q56** Mosquitos cause malaria when people do not use treated mosquito nets. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q56** Witch doctors can control malaria. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

| **Q56** Mosquito multiplication can be controlled using, nets, clearing bushes surrounding house, and draining logged water near households. [Circle **response options that apply]** | | |
|---|---|---|
| | YES | NO |
| | 1 | 2 |

## Appendix 2: A copy of the checklist of items used for key informant interviews

**SOKOINE UNIVERSITY OF AGRICULTURE DEVELOPMENT STUDIES INSTITUTE**

**EFFECTS OF KNOWLEDGE, ATTITUDE AND SOCIO-ECONOMIC FACTORS ON RECEPTIVITY OF MALARIA CONTROL STRATEGIES IN LINDI AND MTWARA REGIONS, TANZANIA**

**A checklist for key informants**

**WARD LEADERS**

1. Measures taken to educate villagers on malaria
2. Regular meetings concerning malaria
3. Special agenda concerning cleaning the environment
4. Indigenous knowledge and practices concerned with Malaria
5. Special agenda concerned modern malaria control strategies

**LOCAL GOVERNMENT**

1. How do you help people deal with Malaria?
2. Do you have any programme of training communities about malaria control?

How do you get involved in assisting people prevent themselves from malaria?

**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 eradicating malaria in the district.
5. How many patients attend community health centres / hospital per day?
6. Knowledge for preventing Malaria
7. Convincing them to attend several check-ups
8. Relationship between Malaria and other diseases
9. Rate of malaria increasing or decreasing

**Appendix 3: A copy of the checklist of items used for focus group discussions**

**SOKOINE UNIVERSITY OF AGRICULTURE DEVELOPMENT STUDIES INSTITUTE**

**Interview Guide for Focus Group Discussion (FGD) on Effects of Knowledge, Attitude and Socio-Economic Factors on Receptivity of Malaria Control Strategies in Lindi and Mtwara Regions, Tanzania**

**Introduction**

My name is **Zawadi Ally Nkulikwa** from Sokoine University of Agriculture. You have been selected pursively to participate in the study on "**on Effects of Knowledge, Attitude and Socio-Economic Factors on Receptivity of Malaria Control Strategies in Lindi and Mtwara Regions, Tanzania"**. Your participation is voluntary and very valuable for the success of this study. Will you please allow me to ask you some questions about knowledge **about malaria Control Strategies.** There is neither correct nor wrong answers, give your answers frankly, openly and that fit your situation as well as your circumstances. Each one of us is humbly requested to speak up his/her mind, and we will speak one by one so that it can be easier for us to write down what you will say. In addition, with your permission we will record the proceedings our discussions. We trust that you will be honest and sincere in airing your views, opinions, and ideas as much as possible. Please take our word that we will keep your responses completely confidential

**A. GENERAL PERCEPTION ABOUT MALARIA**

1. What is the general belief about causes of malaria in your communities?

2. How do you think malaria can be prevented?

3. Can insectide mosquito nets protect people from malaria? Why?

4. How about applying residual spraying in homes? Is this one the effective methods of preventing us from getting malaria?

5. What are some modern malaria control strategies that most members of communities prefer? What are some reasons they like them?

6. What are some of the modern strategies that people think that are not useful for me? What would be some of reasons of disliking them?

**B. INDINGINOUS WAYS OF DEALING WITH MALARIA**

7. Some methods generally applied

8. The favourite method between modern and indigenous malaria control measures

9. Some reasons why people would resort to folkways of dealing with malaria

**Attitudes towards malaria control strategies**

10. How people feel about malaria control strategies in general

11. How people react when are provided with bed nets free of charge and they are told to buy them

12. What ulterior motives people have when they put bed nets to other uses

13 What people like or dislike about using mosquito nets

14. The role of witchdoctors in preventing malaria

14. Contribution of prayers and worship in protecting people from malaria

15. How effective are herbs in treating malaria in comparison with other approved medicine

**D. Socio economic and demographic factors with malaria**

16. The sex that is more affected in the area

17. How marital status is associated with malaria

18. The groups in terms of educational level that are mostly affected

19. Groups more affected with respect to economic conditions

20The age that is more affected with malaria

**Appendix 4:** *Operational definitions of key terms for the research*

| Construct | Variables | Operational definition | Level of measurement |
|---|---|---|---|
| Health | **1.** Ill, health<br>**2.** Healthy, healthier, healthiest | A state of complete physical, mental and social well-being, not merely the absence of disease or infirmity | **1.** Nominal<br>**2.** Ordinal |
| Perceived Norm | Subjective (injunctive) norm<br>Direct Measure<br><br>Normative belief<br>Indirect measure<br><br>Motivation to comply | Belief about whether most people have a behaviour a using malaria control strategies in their community measured using bipolar scale in 5-point scale with end point “strongly disagree” and “strongly agree”.<br><br>Belief about whether each referent accept or reject the use malaria control strategies measured using bipolar scale in 5-point scale with end point “strongly disagree” and “strongly agree”.<br><br>Motivation to do what people are doing in the community in regard to malaria control strategies measured using unipolar scale in 7-point scale with end point “unlikely” and “likely”. | Ordinal |
| Infectious disease | Types of disease | Diseases caused by pathogenic microorganisms, such as bacteria, viruses, parasites or fungi and which can be spread, directly or indirectly, from one person to another. | Nominal |
| Attitude | Instrumental measure (direct measure)<br><br>Belief (indirect measure).<br><br>Evaluation | Overall evaluation of the behaviour using semantic differential scales.<br><br>Belief that behaviour performance accepting the malaria control strategies is associated with certain attributes or outcome measured by bipolar scale in 5-point scale with end point “strongly disagree” and “strongly agree”.<br><br>Value attached to behavioural outcome or attribute measured by bipolar scale in 5-point scale with end point “strongly disagree” and “strongly agree”. | Ordinal |

| | | | |
|---|---|---|---|
| Personal Agency | Perceived behaviour control (Direct measure) | Overall measure of perceived control over the behaviour using malaria control strategies measured using semantic differential scales, under my control, not my control and easy-difficult. | Ordinal |
| | Control belief (Indirect Measure) | Perceived like hood of occurrence of each facilitating or constraining condition measured using unipolar scale in 7-point scale with end point "unlikely" and "likely. | Ratio<br>Ordinal |
| | Perceived power | Perceived effects of each condition in making behaviour performance difficult or easy using bipolar difficult-easy scale 3- points scale | |
| Poverty | TZS | Consumption expenditure by all household members | Ratio |
| | | Net monetary values of all products produced and services provided by all household members | Ratio |
| | | Monetary values of assets owned | Ratio |
| | | Capabilities of: being able to eat at least 3 meals per day, being well sheltered, being able to escape avoidable morbidity and premature mortality, households having at least any household members having a good self-employment or a salaried employment, being able to sell livestock and crop products in nearby towns, being able to pay school fees for secondary school children belonging to the households, having been able to buy new clothes during the previous 12 months, and having freedom to live the way they would value | Nominal |

**Appendix 5**: *Elicitation questions about accepting malaria control strategies.*

| Construct | Elicitation Questions |
|---|---|
| Experimental Attitude | 1. How do you feel about the idea of using mosquito treated nets in controlling malaria in your household?<br>2. What do you like/dislike about using insecticide as means to control malaria problems?<br>3. What do you enjoy/ hate about the idea of using mosquito treated nets as means to control mosquito? |
| Instrumental Attitude | 1. What are the plusses of spraying insecticide around your household for purpose of controlling mosquito?<br>2. What are some advantages of spraying insecticide around the household in controlling mosquito?<br>3. What are the benefits that might results from spraying insecticide around the household in controlling mosquito?<br>4. What are the minuses of spraying insecticide around your household for purpose of controlling mosquito?<br>5. What are some of disadvantages of spraying insecticide around the household in controlling mosquito?<br>6. What might be the negative results from spraying insecticide around the household in controlling mosquitoes? |
| Normative influence | 1. Who would support you in using insecticide treated nets in controlling malaria?<br>2. Who would be against you in using insecticide treated nets in controlling malaria? |
| Perceived Control | 1. What things make it easy for you to accept malaria control strategies?<br>2. What things make it hard for you to accept malaria control strategies? |
| Self-efficacy | 1. If you want to accept malaria control strategies, how certain are you that you can accept them and are able to use them?<br>2. What kinds of things would help you overcome any barriers in accepting malaria control strategies? |

**Appendix 6: An explanation of how** *comments and questions on the previous version of the thesis were addressed*

| **Comments/ Questions** | | **Improvement made** | **Pages** | |
|---|---|---|---|---|
| | | | **Previous** | **Current** |
| **1.** | Overall, the thinking is weak | It has been improved to reflect a PhD thinking, analysis and argumentation | | |
| 2. | Knowledge, attitude and perceptions cannot be a PhD studies. | The integrations, synthesis and analysis of knowledge, attitude, demographic and socio-economic variables have been enhanced in unification of thinking and association to enrich the PhD study. | | |
| 3. | Lack of current knowledge and debate | The current knowledge and debate have been added to improve the thesis. | | |
| 4. | The introduction is weak | Current evidence and references have been added and improved, to inform the problem statement and focus better on the study. | | |
| 5. | a. The problem statement is too general<br>b. Old literature to support arguments | - Efforts have been made to make it better focused.<br>- The proposal was approved in 2014. However, new literature has been added up to 2020. | | |
| 6. | Conceptualization and measurement of the variables. | Key variables have been operationally defined.<br>Knowledge = Points scored on an index of summated scale<br>Attitude = Points scored on a Likert scale<br>Receptivity = Total points scored on the malaria control strategies disseminated in the study area.<br>Socio-economic variables;<br>- Age of respondents – continuous<br>- Education level<br>- Main occupation<br>- Income – continuous<br>- Marital status<br>- Household size - continuous | | |
| 7. | How receptivity was measured | Points scored on practice of five malaria control strategies disseminate into the research areas (insecticides treated bed nets, indoor residual spraying, usage of untreated mosquito nets, mosquito repellents and environmental strategy) | | |
| 8. | Unit of analysis | Adult member of the household | | 3.3.4 |

| | | | | |
|---|---|---|---|---|
| | | | | pg.94 |
| 9. | a.Why mosquito nets in Chapter 2?<br>b. What is the study about?<br>c.Modern malaria control strategies | All the strategies that communities' members are using have been included.<br>The study was about malaria control strategies<br>The linkage and conceptualization have been improved. | | 1.9.2 pg. 34 |
| 10. | **General methodology**<br>a.How many Focus group discussions?<br>b. Analysis of FGDs<br>c.Why both interview and FGDs<br>d. Why in Hospital setting<br>e.Mixed methods | Ten Focus Group Discussions<br>a.FGDs helped the researcher to clarify seemingly complex or unclear statements to respondents.<br>b. Explanation of how interviews were conducted has been improved<br>c.Interviews for key informants and FGD for discussants for triangulation.<br>d. This was important to maintain equally likelihood among participants and optimize the representation of the population.<br>e.Because each method has its inherent weaknesses and strengths and since these weaknesses and strengths are distinctive and unique for each, then they were used jointly and mixed in order to lessen the weakness of each and enhance the strength of each, hence achieve synergy of the methods | | Pg. 53<br><br><br><br>Pg.54<br><br>Pg. 53 |
| 11. | Conceptual framework | Improved by showing the factors that are associated with receptivity of malaria control strategies<br>Receptivity has been defined operationally<br>The pathways have been shown how the association occurs. | | Pg. 28 |
| 12. | FGDs only three quotes | More quotes have been given, interpreted and discussed. | | |
| 13. | Qualitative findings have not been triangulated | In chapters one and two, triangulation has been done.<br>Justification for the use of the qualitative and quantitative methods has been given. | | |
| 14. | **Recommendations** | | | |
| 15. | Rewrite the introduction | They have been re-written in view of the findings and conclusions. | | |
| 16. | Re-write the problem statement | The problem statement has been re-written to provide clear focus, multiple factors have been written that can affect receptivity, guided by the | | |

| | | | | |
|---|---|---|---|---|
| | | system thinking. | | |
| 17. | Rephrase your objectives | Specific objectives have been recast to reflect the problem statement, analyses done and the findings of the study. | | |
| 18. | Work more on the conceptual framework | More effort has been done on conceptual framework by defining key variables, showing the pathways of the envisaged associations that will occur, conceptualizing more factors that can affect the uptake of malaria control strategies in the communities under the study. | | |
| 19. | Rewrite your general methodology<br>a. Tendency of using PCA analysis even where it does not make sense.<br>b. Explore analysis relevant for the study<br>c. Provide information how various variables have been constructed | Data were entered and analyzed without the use of PCA.<br>Analyses were done with the right statistical techniques.<br>It has been done within the three papers. | | |
| 20. | Re-write the methodology chapter of each of the paper. | The methodology of each paper has been re-written to reflect the general methodology of the study. | | |
| 21. | Collect more data to reflect the new focus | New data have been added to reflect the new focus of the study. | | |
| 22. | Better titles and content for each paper | Improved titles have been added for each paper, reflecting the triangulation of the findings from qualitative and quantitative. | | |
| 23. | For each chapter develop and present a table with relevant descriptive statistics | Chapter two, Three and Four are presented with tables with relevant statistics to reflect the findings emanating from the contents of each paper presented. | | |