ROLE OF COMMUNITY PARTICIPATION IN VECTOR CONTROL ACTIVITIES TO REDUCE MALARIA BURDEN IN URBAN TEMEKE MUNICIPALITY

By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Public health of the Muhimbili University of Health and Allied sciences,

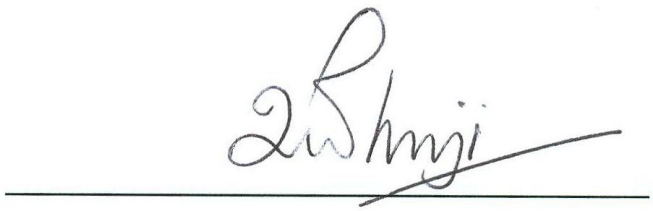
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October, 2008

CERTIFICATION

The Undersigned certifies that he has read and hereby recommends for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled ***"Role of community participation in vector control activities to reduce malaria burden in urban Temeke municipality",*** in Partial fulfillment of the requirements for the degree of Master of Public Health of the Muhimbili University of Health and Allied Sciences.



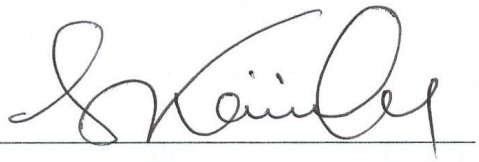
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I, **Kamba Gunini Patrick**, declare that this dissertation is my original work and that it has never been submitted for diploma or degree in any other University

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God bless you all.

DEDICATION

This work is dedicated to public health practitioners whose work makes a difference in the lives of millions of people around the world.

ABSTRACT

Tanzania is among the developing countries laboring under the burden of vector borne diseases like malaria. Community participation is pivotal in malaria control. In particular malaria vector control by its very nature requires community participation for achieving sustainable success. A descriptive cross sectional study was carried out in urban Temeke Municipality, to evaluate the role of community participation in vector control activities to reduce malaria burden. A total of 320 heads of households took part in this study. Participants to the study were selected using a multi stage sampling technique. A semi-structured questionnaire was used to generate data. Overall the role of community participation in malaria vector control activities was 52%. Community awareness regarding malaria vector control was high hence the reason for more than a half (51%) of respondents agreeing that their environment was conducive for the breeding of mosquitoes in line with presence of active breeding sites in 55% of the households. The use of bed nets was the most frequently practiced control measure however a significant proportion of respondents had not treated their nets. At community level keeping surroundings clean was the most common practiced measure. The findings also indicate that a slightly more than one third (40%) of community members financially contributed for different malaria intervention activities. However there was a significant proportion who maintained that vector control activities should be free. Majority of community members were aware of the Urban Malaria Control Program. It was evident that the community rated the success of the program by a reduction of mosquito numbers. The government through Council Health Management Team of Temeke municipality should sensitize the community on the importance on treating their bed nets regularly as one third (33%) of members had not treated their nets in the last six months and also on benefits of contributing financially towards malaria vector control activities.

TABLE OF CONTENTS

CERTIFICATION..... ii

DECLARATION AND COPYRIGHT..... iii

ACKNOWLEDGEMENT..... iv

DEDICATION..... v

ABSTRACT..... vi

TABLE OF CONTENTS..... vii

LIST OF TABLES xi

LIST OF FIGURES..... xii

ACRONYMS/LIST OF ABBREVIATIONS..... xiii

CHAPTER ONE..... 1

1.0 INTRODUCTION..... 1

1.0.1 Background information..... 1

1.0.2 Global Overview..... 4

1.0.3 Malaria Situation in Tanzania..... 5

1.0.4 Transmission of Malaria..... 5

1.0.5 Home based management of malaria..... 6

1.0.6 Insecticide-treated nets..... 7

1.0.7 Indoor residual spraying and other methods of vector control..... 7

1.2 Problem statement.....10

1.3 Justification of the problem..... 11

1.4 Research questions:..... 13

1.5 Objectives:..... 13

1.5.1 Broad Objective:..... 13

1.5.2 Specific objectives:..... 13

CHAPTER 2..... 14

2.0 LITERATURE REVIEW..... 14

CHAPTER 3..... 20

3.0 METHODOLOGY..... 20

3.0.1 Description of the Study Area..... 20

3.0.2 Study Design..... 21

3.0.3 Study Unit..... 21

3.0.4 Sample Size..... 22

3.0.5 Sampling Techniques..... 23

3.0.6 Data Collection Techniques..... 23

3.0.7 Measures..... 24

3.0.8 Pre testing..... 24

3.0.9 Data Analysis and Management..... 25

3.10 Limitation of the Study..... 26

3.11 Ethical consideration..... 26

CHAPTER FOUR..... 27

4.0 RESULTS..... 27

4.0.1 Socio-Demographic Characteristics..... 27

4.0.2 Community awareness regarding malaria vector control..... 28

4.0.3 Control measures being practiced at the household level..... 30

4.0.4 Assessing community participation in malaria vector

control activities at community level..... 34

4.0.5 Community financial contribution for malaria

vector control activities..... 37

4.0.6 Community perceptions on the various control measures being

implemented by other stakeholders..... 38

CHAPTER 5..... 41

5.0 DISCUSSION..... 41

5.0.1 Community awareness on malaria vector control..... 41

5.0.2 Control measures being practiced at household level..... 42

5.0.3 Community participation in malaria vector control activities at

community level..... 43

5.0.4 Financial contribution in malaria vector control activities by

community members.....;..... 44

5.0.5 Community perception on the various control measures being

implemented by various stakeholders 46

CHAPTER SIX..... 47

6.0 CONCLUSION..... 47

6.1 RECOMMENDATIONS..... 48

REFERENCES:..... 49

APPENDICES..... i

APPENDIX 1..... i

APPENDIX 2..... iv

APPENDIX 3..... vii

APPENDIX 4..... xvii

LIST OF TABLES

ITEM

Table 1: Socio-demographic data of respondents in urban Temeke municipality..... 27

Table 2: Distribution of indoor control measures practiced by the Respondents..... 31

Table 3: Distribution of outdoor control measures practiced by the Respondents..... 31

Table 4: Level of practice of control measures and selected socio-demographic data..... 33

Table 5: Distribution of community control measures practiced by the respondents..... 35

Table 6: Level of practice of control measures and selected socio-demographic data..... 36

Table 7: Malaria control activities that received financial contributions..... 37

Table 8: Amount of money contributed by respondents..... 38

Table 9: Success rating of the program by the respondents..... 39

Table 10: Participation in control activities..... 40

LIST OF FIGURES

ITEM

FIG 1: Common health problem as reported by the respondents.....29

FIG 2: Factors that contribute to breeding of mosquitoes.....30

FIG 3: Distribution of control measures as mentioned by the respondents in Percentage.....32

LIST OF ACRONYMS/LIST OF ABBREVIATIONS

BTi	Bacillus thuringiensis var. israelensis
CCHP	Comprehensive Council Health Plan
CHWs	Community Health Workers
CORPs	Community Own Resource Persons
IMCP	Integrated Malaria Control Program
IPT	Intermittent Preventive Treatment
IRHS	Indoor Residual House Spray
IRS	Indoor Residual Spray
ITN	Insecticide Treated Nets.
MOHSW	Ministry of Health and Social welfare
MUHAS	Muhimbili University of Health and Allied Sciences
NMCP	National Malaria Control Programme
PI	Principal Investigator
PMI	President's Malaria Initiative
PSI	Population Service International
RA	Research Assistant
RBM	Roll Back Malaria
TDHS	Tanzania Demographic Health survey

ULV	Ultra Low Volume
UMCP	Urban Malaria Control Project
UNPO	Un-presented Nations and Peoples Organization
VCN	Volunteer Collaborator Networks
WHO	World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

1.0.1 Background information

Community participation is not new. It has been practiced in many different ways for many years not only within health but more broadly within social practice and development (Kahssay and Oakley, 1999). Community participation is the process by which communities influence the decisions and resources that directly affect them (WHO, 2002). The declaration of Alma Ata states that "Primary health care requires and promotes maximum community and individual self reliance and participation in the planning, organizing, operation and control of primary health care, making fullest use of local, national and other available resources, and to this end develops through appropriate education the ability of communities to participate" (WHO, 1978). It's importance as Manderson et al (1992). describe that the only way to overcome limited and unequally distributed resources to ensure Health for All is through the involvement of local communities in the prevention of disease and the treatment of the sick, and that without community involvement and responsibility, programs will fail (Manderson et al, 1992). The introduction of interventions into communities should take into account all actors, their roles, competence and experience, as well as their environment. Communities should participate at the inception and planning of new interventions whenever possible, although community participation can be introduced at any stage of an ongoing intervention. Continuous monitoring and evaluation of community activities

are critical, since adjustments and improvements to interventions can only be made by identifying strengths and weaknesses in their implementation.

Studies conducted in various places, have shown that if community participation is well planned, it can influence community member to play their role. For example the Tigrean People's Liberation Front in Ethiopia established a primary health care system in Tigray in which community residents helped to plan and implement health services through health committees and community health workers (CHWs). To strengthen and update this system, a Community-Based Malaria Control Programme was initiated in 1992. The primary objectives of the Programme were to reduce malaria morbidity and mortality and to prevent malaria in pregnant women through early diagnosis and treatment of cases, chemoprophylaxis during pregnancy and vector control by environmental management. A significant proportion of the rural population at risk of malaria was able to be treated at the village level (Ghebreyesus et al 1996).

Community involvement has contributed to achieving set goals in malaria control. Eritrea is a very good example in this respect. In 2004, it met the Abuja target by reducing overall mortality from malaria by nearly 60% compared to the 1999 baseline. Community participation in malaria control contributed largely to that achievement in Eritrea where 50% of malaria cases are managed at community level by Community Health Agents (CHAs). That helped to improve access to ITNs and promote their regular and proper use and re-treatment. In 2004, 60%-70% of households had at least one ITN and about 66% of children aged below five years were sleeping under ITN (WHO, 2006)

In place where community participation is implemented, it will be easy to do surveillance of malaria. This has happened in most rural areas of Latin America, where malaria surveillance and treatment is carried out by a network of unpaid village malaria workers, known as Volunteer Collaborators, who are trained and supervised by the National Malaria Service (Trenton et al 1994).

In Latin American it can be seen that in two years after the modifications were introduced, Volunteer Collaborators identified nearly twice as high a percentage (33% versus 17%) of patients with suspected malaria in their villages. Delays in examining blood smears were reduced from 23 days to 11 days and delays from blood smear examination to curative treatment were reduced from 21 days to 7 days. The Volunteer Medicators identified and treated only a slightly higher percentage of patients than the Volunteer Collaborators (36% versus 33%). However, the cost of maintaining a network of Volunteer Medicators ($0.61 per patient treated) was much lower than the traditional Volunteer Collaborator Networks – VCN ($2.45) or the modified VCN ($1.85), (Trenton et al 1994).

Additionally, this Latin America example can be modified to make it a more suitable model for community-based malaria control and surveillance networks in other malarious areas of the world, which differ in terms of their level of endemicity, the goals of the malaria program, or the available health care infrastructure. However the concept and practice of community involvement in health are affected by the way the responsibilities and roles of community members are seen and appreciated by health

professionals and government. For example, under some drug policies, only health professionals are allowed to manage drugs (WHO, 2006).

1.0.2 Global Overview

Malaria is the major public health problem in the world and kills more people than any other communicable disease. As of 2004, 107 countries and territories have reported areas at risk of malaria transmission. Although this number is considerably less than in the 1950s, with 140 endemic countries or territories (WHO, 2000), 3.2 billion people are still at risk. Present estimates are that around 350–500 million clinical disease episodes occur annually (Korenromp, 2004). Around 60% of the cases of clinical malaria and over 80% of the deaths (WHO, 2003) occur in Africa south of the Sahara. Of the more than 1 million Africans who die from malaria each year (WHO, 2003), most are children under 5 years of age. In addition to acute disease episodes and deaths in Africa, malaria also contributes significantly to anaemia in children and pregnant women, adverse birth outcomes such as spontaneous abortion, stillbirth, premature delivery and low birth weight, and overall child mortality. The disease is estimated to be responsible for an estimated average annual reduction of 1.3% in economic growth for those countries with the highest burden (Sachs, 2001).

1.0.3 Malaria Situation in Tanzania

Malaria is endemic in almost all parts of Tanzania and ranks number one in terms of morbidity and mortality in Tanzania. It is estimated that about 16 million cases occur every year, resulting in about 100,000 deaths, of which 39,000 are among children under age of five years. Malaria accounts for 30 percent of the national disease burden, 43 percent of hospital admissions, and 32 percent of in-patient deaths for children less than five years of age (Malaria Consortium, 2004). Vector control is one of the National Malaria Policy and Strategy. Others include use of Insecticide Treated Nets, Intermittent Preventive Treatment (IPTp) among pregnant women and epidemic prevention and control. Malaria continues to pose a high burden in both societal and economic terms in Tanzania, ranging from school absenteeism to low productivity at work places, thus malaria control must go hand in hand with community participation.

1.0.4 Transmission of Malaria

The wide variation seen in the burden of malaria between different regions of the world is driven by several factors. There is great variation in parasite– vector–human transmission dynamics that favour or limit the transmission of malaria infection and the associated risk of disease and death. Of the four species of Plasmodium that infect humans—*P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale*— *P. falciparum* causes most of the severe disease and deaths attributable to malaria and is most prevalent in Africa south of the Sahara and in certain areas of South- East Asia and the Western Pacific.

There are over 40 species of anopheline mosquitoes that transmit human malaria, which differ in their transmission potential. The most competent and efficient malaria vector, *Anopheles gambiae complex*, occurs exclusively in Africa and is also one of the most difficult to control. Climatic conditions determine the presence or absence of anopheline's vectors. Tropical areas of the world have the best combination of adequate rainfall, temperature and humidity allowing for breeding and survival of anophelines (WHO, 2005)

1.0.5 Home based management of malaria

In areas of high malaria transmission and poor access to facility-based health care, particularly in rural Africa, RBM advocates home management of children less than 5 years of age with malaria as a strategy to achieve high coverage of prompt and effective antimalarial treatment in this highly vulnerable group (WHO, 2003). This involves educating mothers, training community-level providers—including shopkeepers— and supplying pre-packaged quality-assured medicines. In Tanzania this has now been included in the national malaria control strategy together with other 21 countries in Africa. Artemisinin combination therapy (ACTs) has been adopted as first-line treatment for uncomplicated malaria. HMM involves presumptively treating febrile children at or near home with antimalarial drugs distributed by trained members of the community or with drugs purchased from shops (WHO, 2003). Community distributors provide medications and educate primary caregivers about treatment of malaria, administration of antimalarial drugs, and recognition of severe illness.

1.0.6 Insecticide-treated nets

In areas of malaria transmission where sustained vector control is required, ITNs are the principal strategy for malaria prevention. To promote the usage of ITNs, the Tanzania National Malaria Control Program use various implementation methods including: (i) the public sector as community based projects; (ii) public/private partnerships implemented by non-governmental organizations directly to the community; and (iii) the private sector's social marketing initiatives such as those assisted by Population Services International (PSI). According to Tanzania Demographic Health Survey it shows that almost half (46 percent) of all households own at least one mosquito net. However, ownership of ITNs is lower, with only 23 percent having at least one ITN (TDHS 2004-5).

1.0.7 Indoor residual spraying and other methods of vector control

Indoor Residual Spraying is a highly effective method for malaria vector control that is particularly useful for achieving a rapid reduction in transmission during epidemics and other emergency situations provided it is well timed and high coverage is achieved (WHO, 2005). In areas of intense malaria transmission, IRS could have a long-term impact similar to that of ITNs, although ITNs are generally recommended in such areas because of better sustainability. Previous use of IRS in Dar es Salaam showed poor acceptance from the communities because it had little impact in the control of *Culex quinquefasciatus*, the main cause of mosquito biting nuisance in urban areas (Chavasse et al, 1995)

Larval control has the potential to radically reduce malaria transmission in even the most challenging African settings (Killeen et al, 2004) and is now being reconsidered as a complementary intervention to current priorities such as bednets and access to early diagnosis and prompt treatment (Utzinger et al, 2002 & WHO, 2004). Larval control can be attained through environmental management, large space coverage, and community participation, and can be done through chemical or biological control (WHO, 2004).

Environmental control also is used to prevent breeding, nesting, and feeding of vectors by source reduction and even through better housing, windows, doors, screening. Environmental changes from road, dam, or pipeline construction, deforestation, agriculture, and irrigation can generate larval breeding sites. Environmental control can mostly be used in urban and peri-urban areas, and mostly requires community participation and intersectoral collaboration (WHO, 2006). Urban agriculture and poor drainage are major sources of mosquito breeding sites especially in urban areas. Also coconut shells, tyres, different types of containers including overhead tanks, household domestic containers left outside collect water and become breeding sites too.

Vector control has been ongoing since Tanzania was a colony of Germany. This was mainly concentrated in the urban areas. The major control measures that were being undertaken were source reduction. Control of the urban mosquitoes has been taken over by the Urban Malaria Control Program (UMCP) basically targeting the *Anopheles* mosquito larvae. The UMCP benefits 614,000 people in Dar es Salaam through the regular monitoring of malaria vector mosquito breeding sites and application of the biological pesticide BTi, which kills the mosquito larvae before they can become adults

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and transmit malaria. Begun in 2002 as a small indigenous project by one of Dar es Salaam's three municipal councils, the UMCP is an example of a local initiative supported with targeted PMI funding that has reaped exponential benefits with malaria risk in these neighborhoods cut by half in just the past two years (Salgado, 2006)

Unless individuals in communities see the merits of preventing the illness, even the best-designed prevention strategies may not succeed. It is necessary to understand how a community perceives febrile illness, the importance placed on it in people's belief systems regarding illness in general, and what existing behaviors are practiced that can either complement or hinder preventive measures (Bloland et al, 2002). Control of malaria in Tanzania appears difficult, and prospects for a lasting solution have in the past decade diminished with the advent of widespread antimalarial drug resistance (Schönfeld et al, 2007).

The purpose of the study is to evaluate the role of community participation in vector control activities to reduce malaria burden in urban Temeke district.

1.2 Problem statement

Despite of several interventions programs towards reducing the malaria burden, malaria in Tanzania remains a major public health problem as it was in the 1950s. Perhaps a major constraint of most control programs has been the focus on parasite and the vector while largely ignoring the role of the community. For example Community-based surveillance of malaria vector larval habitats, a baseline study conducted in urban Dar es Salaam showed that the levels of coverage achieved by modestly trained and supported Community-Owned Resource Persons (CORPs) at the start of the Dar es Salaam urban malaria control program (UMCP) were insufficient to enable effective suppression of malaria transmission through larval control (Vanek et al, 2006). Also in another urban malaria control project conducted in Tanga and Dar es salaam established in a bilateral agreement between the governments of Japan and Tanzania, launched in 1988 in which had multiple interventions in the vector control which included chemical larviciding, indoor residual house spraying (IRHS), space spraying of insecticides at ultra low volume (ULV), ITNs, and environmental management, evaluations indicated that local people lacked adequate expertise in planning, implementing, and monitoring control interventions due to lack of their participation. (De Castro et al, 2004)

Indeed community involvement in malaria is a contribution of community members by fulfilling given responsibilities. In some cases, the community assumes only social responsibilities by setting up structures to support the implementation of health

programs, while in some other; communities have both social and implementation responsibilities.

This study intends to evaluate the role of community participation towards malaria vector control activities in the context of reducing malaria burden.

1.3 Justification of the problem:

Malaria is a problem that affects a community. Every community has its local realities, its strengths and its limitations. To combat a long-standing disease like malaria one has to harness local initiatives, local resources, community mobilization and a sense of ownership among the people who are most affected by the problem. These are lessons learned from the history of community based health care which taught us the value of community participation. Communities often have the knowledge and the will to combat a public health problem like malaria but they lack the resources and the organizational capacity to sustain the effort. The steps needed to prevent and combat the menace of malaria have been well recorded by agencies like World Health Organization. Our strategy will be to introduce a strengthened community malaria initiative into an existing initiatives recorded by agencies such as WHO.

Health professionals must place the community's perspective at the centre of interventions in order to empower the community to develop its own self-determined action (Madan, 1987).

Vector control programs are more effective with the involvement of the community, and faster results are obtained from community-based programs compared with government or donor-supported activities alone (Ruebush et al, 1994).

This control requires combination of efforts from different sectors with particular attention to the susceptible community. This is obvious because where there is full involvement of community, the concept of ownership and reduction in disease burden exists. For example the incidence of malaria in Zanzibar has fallen significantly over the past five years from 54 percent in 2003 to 31 percent at the end of 2005. This is because the government was working with its people to get them keeping the environment clean, use treated nets, and use of the right treatment for malaria (UNPO, 2006). Vector control remains the most generally effective measure to prevent malaria transmission and is therefore one of the four basic technical elements of the global malaria controlling strategy.

It is anticipated that the findings from this study will generate information indicative of promotive factors for community participation in vector control for malaria. The information shall be used to inform policy makers on possible alternative approaches for optimal operationalization of the control of malaria vector. The study results are also expected to stimulate further studies in Dar es Salaam and elsewhere regarding community participation for effective and sustainable malaria control intervention

1.4 Research questions:

- What is the level of community's awareness regarding malaria vector control?
- What control measures are applied at household level?
- What is the level of community's participation in malaria vector control?
- What is the level of community financial contribution in malaria control?
- What is the community's perception on the various control measures being implemented by various stakeholders?

1.5 Objectives:

1.5.1 Broad Objective:

To evaluate the role of community participation in vector control activities to reduce malaria burden.

1.5.2 Specific objectives:

1. To determine community awareness regarding malaria vector control.
2. To determine malaria vector control measures practiced at household level.
3. To assess community participation in malaria vector control activities at community level.
4. To assess community financial contribution in malaria vector control activities.
5. To assess community perception on the various control measures being implemented by various stakeholders.

CHAPTER 2

2.0 LITERATURE REVIEW

Malaria control must go hand in hand with community participation. Vector control has to be an ongoing program and sustainability of such programs can only be attained through community participation.

In a study done in southern Mexico on knowledge and beliefs about malaria transmission and practices for vector control it showed that Malaria knowledge was poor and only 48% associated malaria with mosquito bites. The perceived benefit of indoor residual spraying was associated with a reduction of mosquitoes, a reduction in the numbers of cockroaches and rats, but only 3% associated it directly with the prevention of malaria transmission (Rodríguez et al, 2003).

A study by Aggarwal et al, (2004) demonstrated that majority of the respondents (82%) mentioned malaria as the most common cause of fever followed by viral fever (13%). Majority of the respondents mentioned lack of anti-malaria activities in the surrounding areas. Eighty nine percent of the respondents didn't ever see any surveillance worker paying visit to their area. The study showed that only 7 percent of the respondents were resorting to community efforts for cleaning stagnant water adjacent to their houses when need for the same arose. Also 43 percent of the respondents reported cleaning of stagnant water by the Government agencies and 32 percent reported self-effort for the same. Community had not taken an active role in ensuring garbage is not thrown on the streets to prevent water from stagnating in front of their houses. The urban community

viewed such work as the government's responsibility. When views of the respondents were sought for involving community for taking collective action for the prevention and control of malaria, 53 percent of the respondents preferred choosing representatives amongst themselves, and 32 percent suggested the formation of Mohalla committees for preventing water stagnation in low-lying areas. Others (25%) suggested monetary contributions and 24percent of the respondents didn't give any opinion.

In another cross sectional study done in Vietnam on control of malaria (Le Q Hung et al, 2002), showed that with the involvement of the community malaria control interventions it increased awareness of possibilities for preventing and eradicating malaria from 19% in 1995 to 80% in year 2000.

In another study (Rojas et al, 2001) proved that, with simple, accessible measures, applicable in any endemic malaria region, it is possible to adequately control the disease. Community participation on the Pacific Coast of Columbia, proved to be effective on 23 communities on the Chocó Pacific Coast of Colombia which were involved in Integrated Malaria Control Program (IMCP). An important component of the IMCP was that it included the community (human), the only one of the three actors in preventing malaria who can be educated. Through the IMCP, mosquito breeding grounds were filled, deaths were avoided, the incidence of cerebral malaria (the most serious complication) was reduced by 46%, and average sick leave due to malaria decreased from 7.6 to 3.6 days (Rojas et al, 2001)

In the study conducted in Ethiopia by Jima, et al (2005) showed that community participation in the prevention and control of malaria was found to be high. More than 90% of the study population took part in malaria prevention and control measures. Participation was achieved through discussions and consultation with health workers, cleaning their surroundings and seeking treatment. Approximately 10% were not directly involved in prevention and control interventions. Majority did not know about mosquito nets (59%) and only 5.3% of the respondents reported the presence of at least one mosquito net in their households. Reasons cited for owning a net were unavailability of mosquito nets and lack of money to purchase it. Affordability was seen as a determinant factor that impedes the possession and use of the nets.

Kumar et al, (2005) found out that a considerable number of about 27% of those interviewed were using mosquito coils and about 17% were using mosquito mats. Only 3% were using bednets. About 4% mentioned about covering themselves with blankets/bed sheets. About 11% were using combinations of above and about 22% of people mentioned that they were not doing anything to prevent themselves.

Opiyo et al, (2007) found that malaria was considered a major threat to life but relevant knowledge was a chimera of scientific knowledge and traditional beliefs, which combined with socio-economic circumstances, leads to ineffective malaria prevention. In an exploratory study of community factors relevant for participatory malaria control on Rusinga Island, western Kenya showed that the actual malaria prevention behaviour practiced by community members differed significantly from methods known to the

respondents. Beside bednet use, the major interventions implemented were bush clearing and various hygienic control measures, even though these are ineffective for malaria prevention. Encouragingly, most respondents believed malaria could be controlled and were willing to contribute to a community-based malaria control program but felt they needed outside assistance.

In a community based environmental management program for malaria control in Kampala and Jinja, environmental management activities were a model of community participation. The activities were taken up with great enthusiasm and dedication. They were carried out routinely and successfully, with the considerable support of the district and municipal health authorities. However in a marked contrast there was a general reluctance in the community to participate in the activities since community members expected financial benefits for all activities to be carried out. Despite of pay to try to stimulate activity over the first three months of the intervention year, this effort proved to be unsuccessful. Therefore for the activities to be successful it was important to engage the community in the decision-making processes at every opportunity (Lindsay et al, 2004).

In a study carried out in Malindi Kenya by Kibe, et al (2006) showed that Nineteen (56%) of the 34 identified community groups participated in malaria control reported some form of mosquito control with the intention of reducing malaria vector populations. However major challenges facing the community included lack of technical expertise, supervision, and maintaining control activities in the absence of funds. Limited knowledge on mosquito control activities was also a contributory factor to the

decline. Community groups were willing to participate in control operations, but lacked government and technical support. The study proposed involvement of communities in planning and implementation of activities while the relevant government authorities mobilized resources and provide technical support, supervision and monitoring in order to sustain the mosquito control activities.

In a study done by Onwujekwe et al, (2005), a small proportion (25.2%) of the households spent money on malaria prevention and the average monthly expenditure to prevent malaria was 55.55 Naira ($0.5). Conversely, the average monthly expenditure that people spent to treat malaria was 365.9 Naira ($3.05) with a 95% confidence interval of 306.8 Naira ($2.56) to 429.9 Naira ($3.58). People spent money on many preventive tools, including insecticide sprays, mosquito coils, window-nets, untreated bed-nets and drugs for chemoprophylaxis. More than 80% of the respondents had never purchased any form of untreated mosquito net. The nets that a few of the people had were window-nets. Only 32.6% claimed to know where to buy an untreated net.

Malaria vector control activities in Tanzania have focus mainly on the use of ITNs. In Tanzania it has been increasing markedly over the past few years. Statistics indicate that the proportion of households with at least one untreated net has increased from 14% in 2001 to 58% in 2005. On the other hand, the proportion of households with at least one ITN has increased from 14% in 2001 to 25% in 2005. (Mboera et al, 2007).

The recent introduction of health sector reform in Tanzania has shifted responsibilities for the implementation of disease control activities from the national level to district levels. However, most districts in Tanzania fail to develop effective malaria control programs. Their capacity is often insufficient to perform proper situation analysis, selection, and implementation of effective interventions and monitoring and evaluation. Moreover, recent studies have shown that the primary healthcare approach, community involvement being one of its essential element, does not work for malaria control and an integrated approach is required to accommodate all appropriate strategies (Alilio et al, 2004).

The Temeke Municipal district health council identifies weak vector control strategies as one of the contributory factors to transmission of malaria (CCHP-Temeke Municipality 2007/2008). Poor drainage systems and swamps lead to breeding of mosquitoes that transmit malaria

CHAPTER 3

3.0 METHODOLOGY

3.0.1 Description of the Study Area

The study was conducted in Temeke Municipality which is one of the three municipalities within Dar es Salaam City. The Municipality is the largest of the three districts covering an area of 786.5 km^2 with a population of approximately 771,500 as per 2002 National population census with 187,609 households.

Temeke District is the southernmost of three districts in Dar es Salaam, with Kinondoni located to the far North of the city, and Ilala being located in the downtown of Dar es Salaam.

For administrative purpose the Municipality is divided into 3 divisions (Chang'ombe, Mbagala and Kigamboni), and 24 wards that are **Azimio**, Chamazi, Chang'ombe, Charambe, **Keko**, Kigamboni, Kibada, Kimbiji, Kisarawe, **Kurasini**, Makangarawe, Mbagala, **Miburani**, Mjimwema, **Mtoni**, Pemba Mnazi, Sandali, Somangira, Tandika, Temeke, Tuangoma, Vijibweni, and Yombo Vituka. Also it has 165 streets.

Based on health facility data malaria remains the leading cause of morbidity and mortality in the municipality. Other common diseases are respiratory tract infections, Anemia, Urinary tract infections, malnutrition, tuberculosis, AIDS, skin infections and Hypertension.

Currently there is an ongoing vector control program under the urban malaria control project (UMCP) in five wards namely Azimio, Keko, Kurasini, Miburani and Mtoni, basically targeting the *Anopheles* mosquito larvae in the district which deals with environmental sanitation and larviciding, involving the community.

3.0.2 Study Design

This research employed a cross-sectional descriptive survey. Data was gathered from early July to August. Household survey was conducted using semi structured questionnaire with both open and closed ended questions.

3.0.3 Study Unit

The unit of analysis was the head of household either male or female living in that area. In the case where the head of household was absent then any adult male or female aged above 18 years who was living in the area for the past 3 months was interviewed.

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3.0.5 Sampling Techniques

Participants for the study were selected using a multistage sampling technique. A list of wards was obtained from the municipal council. All five wards under UMCP intervention were selected conveniently. The second stage involved selecting streets whereby street names were written down on a piece of paper and four streets were randomly selected from each of the five wards by balloting. The third stage involved drawing up a list of all the households in a street with help of the ten cell leader. A list of households was obtained from the ten cell leader. A total of 16 households were selected systematically whereby every second household was selected.

3.0.6 Data Collection Techniques

Quantitative data collection tool was used. Semi structured questionnaire was used with both open ended and closed ended questions. The questionnaire was prepared first in English, translated to Kiswahili for data collection. A back translation to English was done independently to verify the translation.

Data was collected on daily basis for a period of ten days. Information on the community's participation in vector control activities to reduce malaria burden was gathered. Participation was measured by determining the control measures being practiced at household level up to community level and financial contribution in malaria vector control activities. Questions related to awareness regarding malaria vector control were asked before questions on control measures to avoid bias.

The PI together with five research assistants collected data. Research assistants were recruited prior to the study and trained for two days about the study and on how to administer the questionnaire. The training comprised of briefing of the study, administration of the questionnaire and conducting household interviews. Research ethics and administrative issues were also part of the training. The participants were guided through the consent form by the research assistant and signed before the start of the interview. At the end of each interview session, the research assistants who came from the Urban Malaria Control Program gave education on prevention and control of mosquitoes to the study participants.

3.0.7 Measures

Dependent Variables:

Community participation

Independent variables:

Age, sex, level of education, awareness, practice of control measures, control activities at community level, financial contribution and perception were considered as independent variables.

3.0.8 Pre testing

Prior to the data collection, pre testing of the tool was done in Ilala District to check whether the tool would collect relevant and correct information. Questions that were irrelevant were omitted and indistinct ones revised so as to provide correct information. Comments from interviewees were also incorporated.

3.0.9 Data Analysis and Management

At the end of each day, the PI together with the research assistants checked all the quantitative data collected for completeness and consistency. Open-ended questions were coded and categorized. Data entry followed. Data was analyzed using EPI INFO WINDOWS VERSION. Univariate and bivariate analysis was done and results presented in tables and bar graphs.

Scoring of awareness and control measures

Answers to questions that were related to awareness in vector control activities and control measures and activities were scored. Those who were not aware were given score 0-1 while those who were aware were given score 2-5. For control measures practiced at household level, questions were categorized in three categories where by those practicing up to three preventive measures were categorized under low level of practice. Respondents practicing up to six preventive measures were categorized under moderate level of practice while those who practiced seven and above preventive measures were categorized under high level of practice. Likewise at community level questions were categorized in three categories whereby those practicing one preventive measure were categorized under low level of practice, two preventive measures were categorized under moderate and up to three measures were categorized under high level of practice.

3.10 Limitation of the Study

There were some household heads reluctant to participate in the study due to previous experience with other implementers whereby the promised benefits were not delivered.

3.11 Ethical consideration

Ethical clearance was obtained from the Research and Publication Committee of the Muhimbili University of Health and Allied Sciences. The purpose of the study was explained to the participants at the beginning of each interview session. Verbal consent from the participants was obtained before administering the questionnaire. Information obtained was treated with confidentiality.

CHAPTER FOUR

4.0 RESULTS

4.0.1 Socio-Demographic Characteristics

A total of 320 respondents were recruited in the study. The socio-demographic characteristics of the respondents are shown in Table 1.

Table 1: Socio-demographic data of respondents in urban Temeke municipality (n=320)

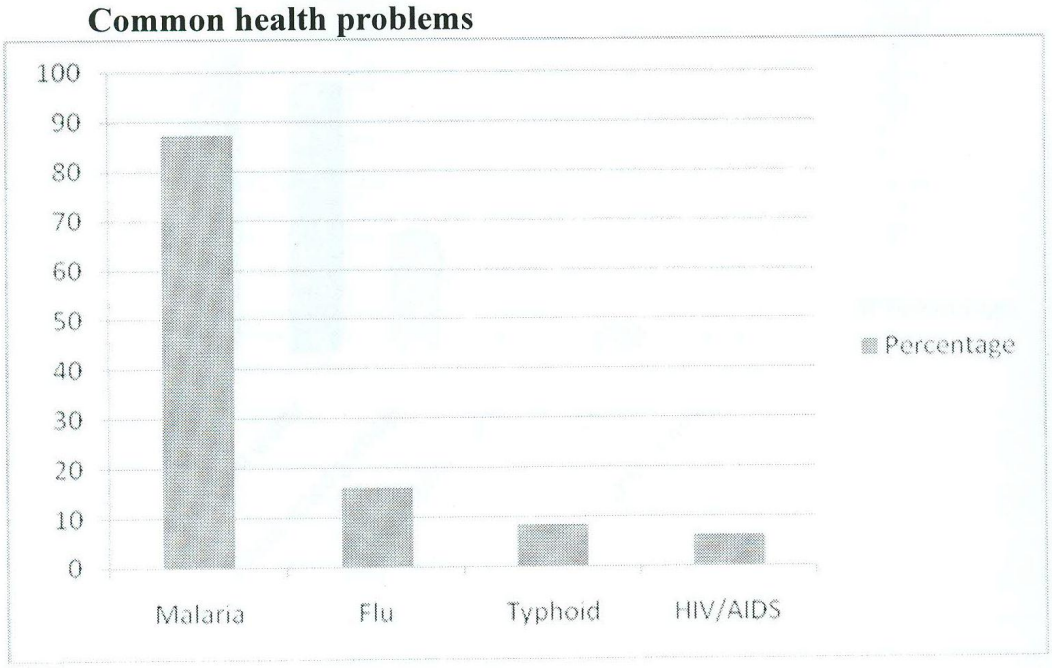
Characteristics	Category	Frequency	Percentage
Age (years)	Below 25	85	26.6
	26 – 40	146	45.6
	41 -55	63	19.7
	Above 55	26	98.1
Total		**320**	**100**
Gender	Male	110	34.4
	Female	210	65.6
Total		**320**	**100**
Marital status	Married	211	65.9
	Single	83	25.9
	Cohabiting	1	0.3
	Widow	18	5.6
	Separated/Divorced	7	2.2
Total		**320**	**100**
Occupation	Employed	32	10
	Petty trader	141	44.1
	Depend on partner	80	25
	Casual laborer	40	12.5
	Depend on relatives	27	8.4
Total		**320**	**100**
Level of Education	Post secondary	25	7.8
	Secondary education	66	20.6
	Primary education	204	63.8
	No formal education	25	7.8
Total		**320**	**100**

The mean age of the respondents was 34.6 years with the minimum being 18 years and the maximum being 68 years. The number of female respondents was nearly twice as much as compared to that of male respondents. A large percentage (72%), of the respondents were 40 years of age. The majority (66%) of the respondents were married and more than half (64%) of them had up to primary level education. Most respondents were engaging in petty trading (44%).

4.0.2 Community awareness regarding malaria vector control

Community awareness regarding malaria vector control was high (72%) hence the reason for more than half of (55%) respondents being aware of the environment which contributed to the breeding of mosquitoes in their area. The respondents were asked to state the common health problems experienced in the area. Several problems were cited, malaria being the most common health problem followed by respiratory tract infections and abdominal discomfort/pain.

Fig 1: Common health problems as reported by the respondents. (n=320)

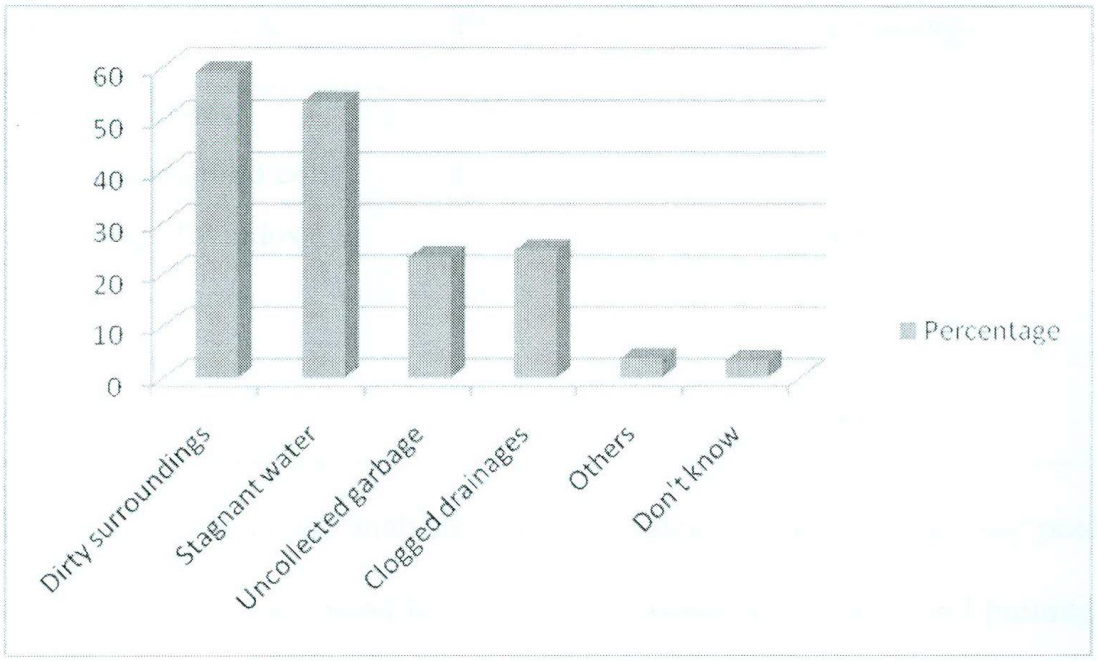


Asked whether there were many mosquitoes in the area, the larger majority 89.4% of the respondents were in agreement that there were many to moderate mosquitoes, while 11% (34) thought there were few mosquitoes. Of the 286 respondents who thought there were many mosquitoes in the area, the larger majority (76%) felt mosquitoes were indeed a problem especially during rainy season.

Factors that contribute to breeding of mosquitoes

The respondents were asked to cite factors that they felt contributed to the breeding of mosquitoes in the area. Dirty surroundings and stagnant water were cited as the most common factors contributing to breeding of mosquitoes in the area as shown in figure2.

Fig 2: Factors that contribute to breeding of mosquitoes (n = 320)



4.0.3 Control measures being practiced at the household level

Asked whether their environment was conducive for the breeding of mosquitoes, about half (51%) were in agreement. This was in line with the observation that 55% of the households had active breeding sites. Uncovered containers of water and uncollected garbage were observed in most of households. Respondents were asked on the different mosquito control measures that they were practicing at the household level. The responses are presented on in Table 2.

Table 2: Distribution of indoor control measures practiced by the respondents (n = 320)

Control measures practiced	Frequency	Percentage
Use of bed nets	296	92.5
Burning mosquito coils	64	20
Screening of windows	92	28.8
Use of repellants	56	17.5
Fumigation	30	9.4
Others	9	2.8

In a multiple response analysis, use of bed nets was most frequently practiced control measure (92.5%) followed by screening of windows (28.8%) and burning of mosquito coils (17.5%). Fumigation was the least practiced control measure with only 9.4%. Other control measures practiced included closing of windows and doors before sunset.

Of the 90 respondents that use mosquito wire gauze as a control measure, 45% of the screened windows were in a bad condition. At least all the respondents who own bed nets reported to be sleeping under the nets. More than two third of the respondents (67%) reported to have treated their bed nets at least once in the past six (6) months.

Table 3: Distribution of outdoor control measures practiced by the respondents at household level (n =320)

Control measure	Frequency	Percentage
Clearing of garbage	178	55.6
Cleaning drainages	119	37.2
Clearing stagnant water	137	42.8
Keeping the surroundings clean	267	83.4
Others	8	2.5

Table 3 shows that keeping the surrounding clean was the most practiced control measure as it was mentioned by more than three quarter (83%) of the respondents. This was followed by clearing of garbage (55%) and clearing of draining stagnant water (42%).

Though the level of practice was high, of the total households visited, it was observed that at least one third (30%) of them had stagnant water ranging from uncovered water reserve tanks, buckets to pools of water outside the houses. Uncollected garbage was also observed in 26% of the households. Likewise, clogged drainages were present in 15% of the households.

Fig 3: Distribution of control measures as mentioned by the respondents in percentage (n = 320)

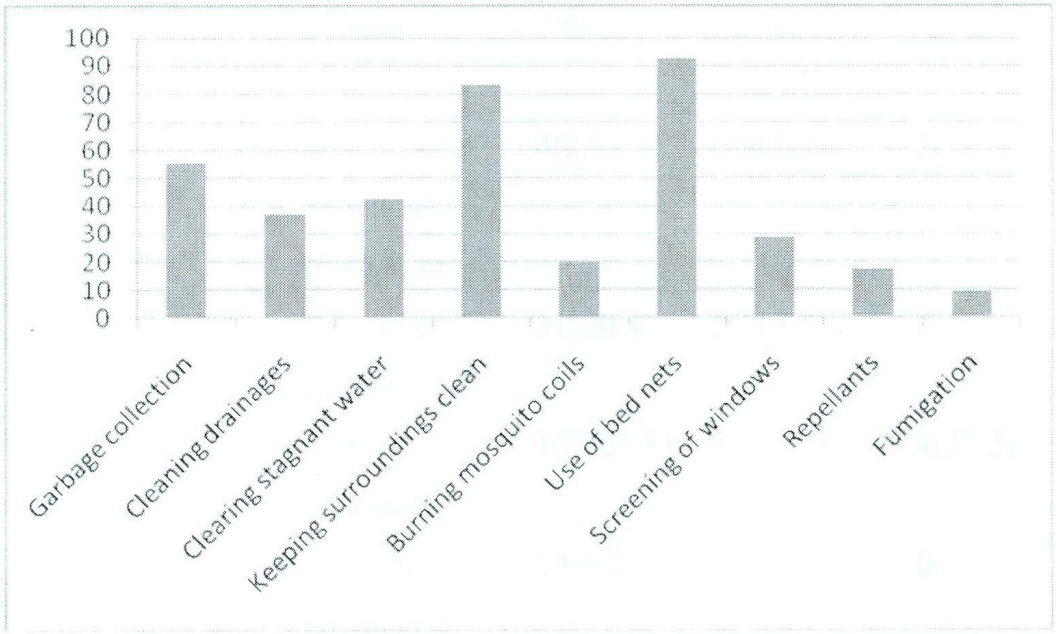


Figure 3 shows that the use of bednets was the most cited method of control measure (92.5%) followed by keeping surroundings clean (83%). The results show that

respondents were using bed nets than keeping their surroundings clean as control measure.

Table 4: Level of practice of control measures and selected socio-demographic data (n = 320).

Socio-demographic data		Level of practice (Frequency& percentage)			
Characteristics	**Category**	**Low**	**Moderate**	**High**	**P value**
Age (years)	Below 25	50(32.9)	32(20.5)	3(25)	
	26-40	60(39.5)	80(51.3)	6(50)	**0.051**
	41-55	31(20.4)	29(18.6)	3(25)	
	Above 55	11(7.2)	15(9.6)	0	
Gender	Male	52(34.2)	53(34)	5(41.7)	**0.863**
	Female	100(65.8)	103(66)	7(58.3)	
Level of Education	Post Secondary Education	4(2.6)	19(12.2)	2(16.7)	
	Secondary education	31(20.4)	29(18.6)	6(50)	**0.003**
	Primary education	103(67.8)	97(62.2)	4(33.3)	
	No formal education	14(9.2)	11(7.1)	0	

Control measures were categorized in three categories where by those practicing up to three preventive measures were categorized under low level of practice. Respondents practicing up to six preventive measures were categorized under moderate level of practice while those who practiced seven and above preventive measures were categorized under high level of practice.

The table shows that level of education showed differences that were statistically significant ($p<0.05$). Almost half of respondents (50%) who had secondary education had high level of practice in whereas more than two thirds of respondents who had primary education had low to moderate level of practice. Gender and age showed differences that were not statistically significant. Also it was observed that respondents between 26-40 years of age had higher moderate level of practice compared to those in other categories although differences were not statistically significant. Likewise it was observed that those respondents with post secondary education had a higher level of practice compared to those in other categories.

4.0.4 Assessing community participation in malaria vector control activities at community level.

About two thirds (60%) of respondents reported participating in malaria vector control activities. Asked on what kind of activities do they perform as a community in controlling malaria mosquitoes, more than three quarters of respondents (83.3%) were involved in keeping their surroundings clean, followed by clearing of garbage (56.8%) and draining of stagnant water by less than a half of respondents (39.9%).

Table 5: Distribution of community control measures practiced by the respondents (n = 320)

Control measures practiced	Frequency	Percentage
Clearing of stagnant water or ponds	126	39.9
Clearing of garbage	180	56.8
Keeping the surroundings clean	264	83.3
Others	7	2.2
Do nothing	13	4.1

Very few (4.1%) reported doing nothing while others (2.2%) expressed their involvement in meetings with other stakeholders who are implementing various malaria control programs in their respective areas.

Asked if activities which they perform had benefits in their community, majority of respondents (88%) expressed their positive thoughts that the activities which they were performing had benefits. More than three quarters (82%) of respondents cited reasons that their surroundings became clean, followed by reduction of mosquitoes breeding sites (76%) and reduction of malaria disease cases (54%).

Table 6: Level of practice of control measures and selected socio-demographic data (n = 316).

Socio-demographic data		Level of practice (Frequency & percentage)			
Characteristics	**Category**	**Low**	**Moderate**	**High**	**P value**
Age (years)	Below 25	40(29.4)	23(26.7)	22(23.4)	
	26-40	57(41.9)	41(47.7)	46(48.9)	**0.87**
	41-55	29(21.3)	14(18.6)	18(19.1)	
	Above 55	10(7.4)	8(9.3)	8(8.5)	
Gender	Male	46(40.4)	26(30.2)	29(30.9)	**0.38**
	Female	68(59.6)	60(69.8)	65(69.1)	
Occupation	Employed	14(10.3)	3(3.5)	13(13.8)	
	Petty trader	54(39.7)	48(55.8)	37(39.4)	**0.047**
	Depend on partner	35(25.7)	20(23.3)	25(26.6)	
	Depend on relatives	10(7.4)	10(11.6)	7(7.4)	
	Casual laborer	23(16.9)	5(5.8)	12(12.8)	

Control measures were categorized in three categories where by those practicing one preventive measure was categorized under low level of practice. Respondents practicing up to two preventive measures were categorized under moderate level of practice while those who practiced up to three preventive measures were categorized under high level of practice.

The table shows that occupation showed differences that were statistically significant ($p<0.05$) while age and gender showed differences that were not statistically significant.

More than half (55.8%) of petty traders had moderate practice whereas less than a quarter (12.3%) of those who were employed had the lowest level of practice. However it was observed that above two thirds of female were more likely practicing preventive measures than their male counterparts. Also respondents of category between 26-40 years of age, higher level of practice compared to those in other categories.

4.0.5 Community financial contribution for malaria vector control activities.

Asked if they contributed financially for different malaria intervention activities in their community, about 40% responded positively. A similar proportion also agreed that there is a need to contribute so as to improve the quality of service and reduce malaria fevers. There was a significant proportion who maintained that vector control activities should be free.

Table 7: Malaria control activities that received financial contributions.

(n = 140)

Malaria intervention service	Frequency	Percentage
Fumigation/Insecticide spraying	63	45
ITNs	83	59
Larviciding	6	4.3
Keeping surroundings clean	49	34.8
Others	1	0.7

Asked about which malaria control activity they financially contribute, more than a half of respondents (59%) reported ITNs, followed by fumigation (45%) and keeping surroundings clean (35%). ITN was seen as the most popular and acceptable control measure that respondents financially contributed as seen in table 7.

Table 8: Amount of money contributed by respondents (n = 140)

Category	Frequency	Percentage
500-1000	48	34.3
1000-1500	19	13.6
1500-3000	26	18.6
3000-5000	32	22.9
5000-10000	13	9.3
Other	2	1.4
Total	**140**	**100**

In order to estimate a minimum amount that can be acceptable to the community to contribute, it was found that one third willingly contributed 500-1000/=. However more than 20% indicated that 3000 to 5000/= was also feasible amount to contribute.

4.0.6 Community perceptions on the various control measures being implemented by other stakeholders.

Respondents were asked whether they were aware of the program being implemented by the municipal council to control mosquito larvae in the area. Of the 320 respondents, a large majority of 94.4% (302) were aware of the existence of the program. Their perception towards the program was measured by asking them to rate the success of the program. Results are presented in table 9.

Table 9: Success rating of the program by the respondents (n = 302)

Attribute	Frequency	Percentage
Very successful	101	33.4
Successful	174	57.6
Not successful	27	9
Total	**302**	**100**

Table 9 shows that 302 respondents were aware of the existence of the program. The large majority (91%) of the respondents rated the program as successful; only 9% rated the program as not successful. Those who rated the program as unsuccessful when asked to state the reason, six respondents felt that there was no reduction in numbers of mosquitoes and that people were still suffering from malaria. It was evident that they were judging success of the program in terms of impact on the mosquito population and the status of malaria.

Respondents were further asked to give their opinion on whether the program was doing enough to control the mosquito larvae. Their responses represented in table 9.

However of the 302 respondents, 66.6% felt that they had been involved in the program activities while 24.8% felt they were not involved and others doubted (8.6%). The respondents were then asked to state ways in which they had participated in the control activities. Results are presented in table 10.

Table 10: Participation in control activities (n = 204)

Attribute	Frequency	Percentage
Meeting with implementers	54	22.9
Selection of CORPS	99	43.4
Actual application of larvicides	199	62.2
Others	3	0.9

Results show that majority more than half (62.2%) of respondents participated in actual application of larvicides. Some respondents expressed willingness to participate in meetings with implementers and acquire more training in actual application of larvicides so as to increase the coverage.

CHAPTER 5

5.0 DISCUSSION:

Community participation is pivotal in malaria control. In particular malaria vector control by its very nature requires community participation for achieving sustainable success. This study evaluated the role of community in malaria vector control to reduce malaria burden.

5.0.1 Community awareness on malaria vector control.

For community participation to be significant, it is important that the community is aware of the control activities and is involved in all the phases.

Community awareness on malaria vector control was quite high, with more than half of respondents being aware of the environmental factors associated with mosquito breeding. Reasons of dirty surroundings and stagnant water were the common factors contributing to breeding of mosquitoes (Kumar et al, 2005). There was a general awareness that mosquitoes were abundant during and after rainy season indicating that use of control measures was high during this season. This is the picture in the coastal belt where the community holds the view that mosquitoes and associated fevers are more common during rainy and rice harvesting seasons (Winch et al, 1994). Thus this provides an opportunity for effective community participation in vector control activities. Though many respondents reported malaria as the main health problem, this might have been influenced by the fact that they knew there were asked about malaria hence could have been some bias.

5.0.2 Control measures being practiced at household level.

Use of control measures was reported by respondents but could not be confirmed apart from bed nets and screening of windows.

Almost half of respondents stated that their environments were conducive for mosquito breeding, whereby both had actual and potential breeding sites. It was evident that some households had uncovered containers of water, uncollected garbage and stagnant water even though reported good practice of outdoor control measures. This supports what was observed. Though awareness of control measures was high but still this does not necessarily translate into good practice.

It was also seen that use of bed nets was the most recognized preventive measure being practiced among the respondents. This is contrary to a study by Jima et al, (2005), whereby use of bed nets was only 5.3%. This tends to concur with a survey whereby almost half (46%) of all households at least one mosquito net (TDHS 2004-5). According to a study by Kumar et al, (2005) shows that only 3% of the study population was resorting to use of bed nets as a preventive measure. The use of bed nets in this study could make them viable for malaria control as its use is wide spread in the area. Though majority of the respondents reported to be using bed nets, a significant number had not treated their bed nets at least in the past six months. This tends to differ from TDHS findings whereby ownership of ITNs was lower with only 23 percent having at least one ITN (TDHS 2004-5).

Though slightly more than a quarter of the respondents used screening of windows as a preventive measure nearly a half of them were found to be in a bad condition. Other preventive measures such as use of mosquito repellants, burning of mosquito coils and insecticide spraying were not frequently practiced.

It was found that large proportion of respondents reported cleaning of surroundings, clearing of garbage, followed by clearing draining stagnant water are the common control measures practiced. From this findings it shows that community practice more on cleaning of surroundings and clearing of garbage instead of putting more emphasis on draining of stagnant water which is a good environment for mosquito breeding.

When the level of practice was associated with socio demographic data, level of education was found to have an influence on the practice.

5.0.3 Community participation in malaria vector control activities

Use of control measures were reported by the respondents but could not be confirmed apart from cleaning of surroundings. Community participation in malaria vector control was 51%. Though more than three quarters of respondents reported participating in cleaning of their surroundings it was observed from their neighborhood that at least a quarter of them had actual and potential breeding sites. It was obvious that external environment of a number of households had uncollected garbage, clogged drainages and stagnant water. This is contrary to the study by Jima et al, (2005) whereby cleaning of surroundings was 18.8%. Majority of respondents reported seeing the benefit of

community participation in vector control activities with more than two thirds quoting reasons from their surroundings being clean, reduction of mosquitoes breeding sites and reduction in malaria disease. A similar observation has been made in Kenya by Kibe et al, (2006) whereby more than half of community members reported some form of mosquito control with the intention of reducing malaria vector populations, environmental management activities such as clearing of drains and ditches, and the removal of standing water and debris with intention to eliminate aquatic breeding habitats and resting places for malaria mosquitoes. It was also observed that for those who never saw benefits on control measures a large percentage were not well informed about vector control activities. When the level of practice was associated with selected socio demographic data, occupation was found to have an influence on the practice. Respondents who were involved in petty trading were more likely to practice more from lower to higher level of practice in comparison to other categories of occupation. Level of income and exposure to different environments could perhaps have explained this.

5.0.4 Financial contribution in malaria vector control activities by community members.

High proportional of respondents were not contributing financially to the malaria control activities. Even when requested to explain if there was importance in contributing money towards malaria vector control activities still more than a half of respondents were not willing to contribute. Among those who were not keen to contribute more than two thirds thought that services should be without any payment.

Perhaps this could be explained by the fact that, most urban communities, the cleaning up of the environment, drainage system and garbage collection is the government's responsibility (Aggarwal et al, 2004). Communities are therefore more likely to resort to their indoor control measures which they view as their own responsibility rather than their external environment. The immediate micro-environment management should be emphasized into the community.

It was also observed that slightly less than a half of respondents who were willing to pay for malaria control activities, more than a half were contributing for insecticide treated nets. This is contrary to a study by Onwujekwe et al, (2005) whereby more than 80% of the respondent had never purchased any form of untreated mosquito net. Perhaps this may be due to affordability problems as household economic status has been related to net ownership in a number of studies (Hanson et al, 2000; Kikumbih et al, 2002). Less than a half of respondents contributed towards insecticide spraying and environmental sanitation. It was also noted that a large proportional of respondents contributed small amount of money in control activities (500-1000/=) in comparison to those who contributed 1000/= and above. Perhaps low income or priority in malaria control activities could be the attributing factor. While there is little evidence of a relationship between socio-economic status and malaria incidence, there is mounting evidence that poor households are more vulnerable to the consequences of malaria infection, such as severe or complicated malaria, or risk of mortality (Worrall et al 2002; Filmer et al 2002; Abdulla et al; 2002)

5.0.5 Community perception on the various control measures being implemented by various stakeholders

The urban Malaria Control program has been implementing mosquito larvae control measures in the area through application of larvicides to mosquito breeding sites.

Over 90% were aware of this program. Majority of respondents who were aware of the program rated the program as success. Only a small proportion felt the program was not successful at all. Most of those who felt the program was not successful gave the reason that there was no reduction of mosquitoes and they were still suffering from malaria disease. Perhaps this illustrate that support of any program by communities depend on noticeable reduction of mosquitoes. More over most programs that operate in Tanzania do not put into consideration community involvement the reason why most programs unsuccessful. This is similar to the malaria control project initiated in Dar es Salaam and Tanga region whereby local people lacked adequate expertise in planning, implementing, and monitoring control interventions due to lack of their participation (De Castro et al, 2004).

CHAPTER SIX

6.0 CONCLUSION

Overall the role of community participation in malaria vector control activities was 52%. Malaria ranked the most common health problem as it is endemic in the area.

The overall awareness regarding malaria vector control was high. Community could even associate it with environmental factors associated with mosquito breeding. Though awareness of control measures was high but still this does not necessarily translate into good practice. The findings show that level of education had an influence on level of practice control measures at household level. This means that as level of education increase likewise the level of practice control measures increased too. Use of bed nets is the most common preventive measure being practiced. Bed nets were noticed as the most effective and safest method of mosquito control as they were affordable and durable.

At community level cleaning of surroundings was reported the most common preventive measure being practiced. It was observed community members practiced more on cleaning of surroundings and clearing of garbage instead of putting more emphasis on draining of stagnant water which is a good environment for mosquito breeding.

Findings suggest that high proportional of community members were not contributing financially to the malaria control activities. Even when requested to explain if there was importance in contributing money towards malaria vector control activities still more than a half of respondents were not willing to contribute.

Majority of community members were aware of the Urban Malaria Control Program. It was evident that the community rated the success of the program by a reduction of mosquito numbers. Majority have been involved in actual application of larviciding.

6.1 RECOMMENDATIONS

- IEC strategies should focus on the areas where community control measure practices were low so to as to increase performance on malaria control activities.
- The government through Council Health Management Team of Temeke municipality should sensitize the community on the importance and benefits of contributing financially towards malaria vector control activities.
- Since use of Bednets was found to be quite high, the community should be sensitized to treat them regularly as a considerable proportion of the community had not treated their nets in the last six months.
- There is willingness by the community to participate more in the activities of the UMCP. Perhaps the program could tap into this with an aim widening the coverage for future sustainability.

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