COMMUNITY'S KNOWLEDGE AND PERCEPTION ON MOSQUITOES AS VECTORS FOR MALARIA AND BANCROFTIAN FILARIASIS AND THEIR INITIATED PARTICIPATION IN CONTROL MEASURES IN ILALA MUNICIPALITY

By

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A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Master of Public Health of the Muhimbili University of Health and Allied Sciences.

Muhimbili University of Health and Allied Sciences

November, 2007

CERTIFICATION

The undersigned certifies that has read and hereby recommends for acceptance a dissertation entitled **Community's knowledge and perception on mosquitoes as vectors for malaria and bancroftian filariasis and their initiated participation in control measures in Ilala Municipality** in fulfilment of the requirements for the degree of Master of Public Health of the Muhimbili University of Health and Allied Sciences.



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Date: 12/10/2007

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AND

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DEDICATION

This work is dedicated to my parents Gacii and Wairimu, husband Ken, son Ryan and my unborn child whom I lost in the course of my studies. You have all contributed greatly to what I am today.

ABSTRACT

Tanzania is among the developing countries laboring under the burden of vector borne diseases among them malaria and bancroftian filariasis. Community participation in control and prevention of the vectors is quite key in addressing the burden of vector borne infections. This in turn depends on their knowledge and perception of mosquitoes as disease vectors.

A descriptive cross sectional study was carried out in Ilala Municipality to determine the community's knowledge and perception of mosquitoes as disease vectors and their initiated participation in control activities. A total of 246 heads of household 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.

Results revealed that malaria ranked the most common health problem. Filariasis though endemic in the coastal area of Tanzania was not mentioned as a health problem. Even though, the community could associate mosquito bites with malaria and filariasis. The overall knowledge of mosquitoes as disease vectors was found to be moderate. It was evident that knowledge increased with increase in educational level. Knowledge of mosquito control measures was also found to be moderate. Knowledge decreased with increase in age. At the same time, knowledge among the females was found to be low. Use of bed nets was the most common preventive measure being practiced. The use of

bed nets in this community primarily for malaria control could conceivably have a spill over effect for filariasis control.

The findings indicate that reported use of preventive measures was lower than the reported knowledge of the control measures apart from use of bed nets. Bed nets were perceived as the most effective and safest method of mosquito control as they were affordable and durable.

The community should be sensitized more on treating their bed nets regularly as a considerable proportion had not treated their nets in the last six months.

Health education campaigns should be more targeted to the women and the older people who were found to have a relatively lower knowledge compared to their counterparts.

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ACRONYMS / LIST OF ABBREVIATIONS

WHO	World Health Organisation
UNICEF	United Children's Educational Fund
ITNS	Insecticide Treated Nets
MUCHS	Muhimbili University College of Health Sciences
EPS	Expanded Polystyrenes Beads
UMCP	Urban Malaria Control Program
PI	Principle Investigator
GMCS	Global Malaria Control Strategies
BF	Bancroftian Filariasis
CORPS	Community Own Resource Persons
TDHS	Tanzania Demographic Health Survey
IEC	Information Education and Communication

CHAPTER ONE

1.0 INTRODUCTION

Vector borne infections are among those infectious diseases with the highest disease burden today. According to the Africa Malaria Report by WHO/UNICEF (2003), approximately 90% of all malaria deaths in the world today occur in Africa South of Sahara. This is due to the fact that majority of infections in Africa are caused by *plasmodium falciparum* the most dangerous of the four human malaria parasites. An estimated one million people in Africa die from malaria each year and most of these are children under five years old.

In all malaria endemic countries in Africa, between 20% and 80% of all hospital admissions are as a result of malaria. It is therefore responsible for a high proportion of public health expenditure on curative treatment. (Africa Malaria Report WHO\UNICEF 2003). Countries with intensive malaria have income levels only 33% of those without malaria (WHO 2004).

Filariasis is the second most common vector borne disease globally after malaria (WHO 1999). It contributes to poverty, disability and social stigmatisation (WHO 1998). Its characteristics of slow manifestation and also low mortality rate have lead to low priority given to it by the decision makers regarding its control.

In Tanzania, more than 10 million people live in areas endemic for bancroftian filariasis (BF) and of these 12% are infected. Studies conducted in Tanzania showed that Lymphatic Filariasis is prevalent along the entire coastal belt of the Indian Ocean, its islands, and in the regions around the Great Lake .Along the coast of Tanzania prevalence rates ranged from 22% to 38% (Simonsen, et al 1995).

Substantial reductions in these infections, would free up available health resources and facilities and health workers time to tackle other health problems. When these are not addressed, the consequences go far beyond health to affect the economic circumstances of communities and the entire region as a whole. The Roll Back Malaria (2002) for instance aims at halving the burden of malaria by the year 2010.

Other emerging infections that are vector borne such as the Rift Valley Fever which is transmitted by the *Aedes* mosquito has in the recent past caused 411 suspected cases with 121 deaths in Kenya. The case fatality rate was 29% (WHO, 2007).

Reasons for Vector Control

The Global Strategy on Malaria Control has four basic technical elements among them to provide early diagnosis and prompt treatment and also to plan and implement selective and sustainable preventive measures including vector control (WHO, 1993). These measures can sometimes be difficult and costly to implement especially when communities are not involved.

The idea behind vector control is to reduce levels of mortality and morbidity by reducing transmission of the disease. This requires effective vector control, which is the application of targeted site-specific activities that is cost-effective. What is needed is an environmentally sustainable method for vector control aimed at reducing reliance on chemical insecticides and involving inter-sectoral collaboration (Toure, 2001).

Vector control has a proven record in the prevention and control of vector borne diseases. Most of these diseases have no vaccines and are characterised by drug resistance. In such circumstances, vector control often plays a vital role (WHO, 2004).

Vector Control Strategies

Various strategies have been used in vector control. Walker (2002) differentiates between three methods of vector control namely environmental management, chemical application and biological control. Chemical application, which includes indoor spraying, and larviciding when properly employed are effective and can produce results at a relatively low cost if used efficiently. It is also good for high mortality endemic areas and drug resistant areas (Toure 2001). However, the method is only effective when breeding sites are relatively few or are easily identified and treated. It must be possible to treat enough of the sites to have a significant impact on the mosquitoes. The method is specifically effective in the urban areas (Walker 2002).

Biological control includes use of organisms to regulate especially the *Anopheles* populations through predation, parasitism and competition. The larvivorous fish has been successfully used in the control of *Anopheles* which breeds in relatively clean water. The method is advantageous over the chemical control as it is safe to human beings and animals as well as lower risks of resistance development. The disadvantage of this method is that it is more specific in the type of mosquito it can control. *Culex* mosquitoes can also be controlled biologically using *Bacillus sphaericus* and *Bacillus thuringiensis* (Walker 2002).

The environmental management focuses on avoiding the creation of vector breeding sites and changing natural habitats. Environmental management needs to be used more often by the local community for collective protection from vectors and incorporated into the planning of development projects (WHO, 1993).

The techniques of environmental management could be grouped into two categories namely environmental modification and environmental manipulation.

Environmental modification targets long term physical change to potential breeding sites. It addresses problems of man-made vector breeding sites associated with water holding structures. Creation and cleaning of drainages is done to keep the water moving thus ensuring there is no stagnant water which will result into breeding sites (Walker 2002). The major disadvantage with this control method is that it requires huge investments in terms of money and if poorly maintained can result into breeding sites.

Environmental manipulation on the other hand refers to activities that reduce larval breeding sites. This is done through temporal changes to the aquatic environment. These activities include changing the water levels in reservoirs sometimes through planting of trees such as Eucalyptus Robusta. Expanded polystyrenes (EPS) beads applied to pit latrines are used to control the *Culex* mosquito. This method is cheap and safe to use. (Walker 2002)

Other control measures include personal protection based on insecticide treated bed nets and also curtains. These are quite useful in terms of preventing drug resistance (Toure 2001). Use of treated bed nets is useful for personal protection and when coverage is high can reduce transmission of mosquito related diseases.

Vector Control in Tanzania

Urban agriculture and poor drainage are the major sources of mosquito breeding sites especially in the urban areas. Others include soak pits, septic tanks, pit latrines, uncollected garbage heaps, and any other stagnant polluted water which become fertile breeding sites for the *Culex* mosquitoes. Overhead tanks, household domestic containers left outside collect water and become breeding sites. Other items include shoes, coconut shells and tyres.

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. EPS beads have also been used for control of the *Culex* mosquitoes. Control of the urban mosquitoes has been taken over by the Urban Malaria Control Program (UMCP) but basically targeting the *Anopheles* mosquito larvae. This is being carried out in Dar es Salaam.

Use of ITN is now considered as a primary health intervention to reduce malaria transmission in Tanzania. The National Voucher Scheme which is a national program targeting pregnant women whereby they buy nets at a reduced price is in place in Tanzania.

It is important that the communities undertake interventions against vector mosquitoes. For the success of these interventions, it is important to know the community's perceptions about mosquitoes and disease transmission and how best the communities can participate in the control efforts.

There is a great need to use an integrated kind of an approach in vector control which is cost effective and one that employs sustainable approaches. This cannot be successful if the communities will become mere recipients of services rather than partners in development interventions. These strategies will give better results if the community is fully participating in the control measures and takes the ownership role.

1.1 Problem Statement

The rapid growth of cities in sub-Saharan Africa brings with it a myriad of problems that include overcrowding in residential areas due to rural urban migration and unplanned settlements. These settlements are characterised by poor drainage of surface water, poor sanitation, improper garbage disposal etc. Poor drainage of surface water results in breeding of *Anopheles* vectors responsible for malaria and filariasis transmission. Due to poor sanitation and improper garbage disposal breeding of *Culex* vectors results, which is often responsible for transmission of filariasis. This situation has led to an increase in the prevalence of malaria and filarial diseases.

A number of measures like use of ITNs for the control of *Anopheles* and use of fly proof VIP toilets for the control of *Culex* have been put in place yet the prevalence of the two diseases remains high.

The general approach for the two diseases requires treatment as well as mosquito control. Possible reasons for a rise in the prevalence could be due to poor participation at household level in control activities. Low levels of awareness and knowledge of mosquitoes as disease vectors, which in turn may have an impact on their perception regarding control activities and hence their poor participation. Poor knowledge of control measures will also affect their levels of participation. Knowledge and perception of the two vectors and diseases by the community should not be overlooked otherwise it could lead to negligence in terms of prevention and control measures.

Most interventions on mosquito control target the *Anopheles* mosquito. Communities in most cases do not differentiate between the two types of mosquitoes and when the two types are not a target of any intervention, it could mean that may not feel the impact of the interventions. Communities will judge the success of an intervention by a reduction of the two types of mosquitoes.

Communities must attempt to move away from the unsustainable position of being mere recipients of services, resources and development interventions towards being active partners or owners of the interventions (WHO, 2002).

The aim of this study is to assess the knowledge and perception of mosquitoes as disease vectors and also find out what the community is doing at the household level to control mosquitoes.

1.2 Research Questions

1. What is the level of community's knowledge on mosquitoes as disease vectors for malaria and filariasis and what is their perception?
2. What is the level of community's knowledge on various mosquito control measures?
3. What control measures are practiced at household level?

4. What is the community's perception of the comparative effectiveness of the mosquito control measures practiced at the household level?
5. What is the community's perception on the various control measures being implemented by other actors in the area?

1.3 Broad Objective

To assess the community's knowledge and perception on mosquitoes as vectors for malaria and filariasis, and their initiated participation in control activities at household level in Ilala Municipality.

1.4 Specific Objectives

1. To assess the community's knowledge and perception on mosquitoes as disease vectors for malaria and filariasis
2. To assess the community's knowledge on various methods of mosquito control.
3. To determine the mosquito control measures practiced at the household level.
4. To assess the community's perception of the comparative effectiveness of the mosquito control measures practiced at the household level.
5. To assess the community's perception on the various control measures being implemented by other actors.

1.5 Rationale of the Study

The primary focus for most governments has been on early diagnosis and treatment rather than prevention of mosquito related diseases. Treatment is known to give

immediate results hence the focus. However, preventive and control measures ought to be in place to reduce the incidence of mosquito related problems and diseases. These measures require investments in terms of resources and also a high level of community participation.

Most programs have overlooked the importance of the target population's knowledge and perception in the cause, transmission and prevention of the resulting diseases. Ignorance can lead to negligence in prevention and control measures.

The purpose for this study is to assess the community's knowledge and perception of mosquitoes as disease vectors for malaria and filariasis, and their initiated participation in control activities at the household level. To attain community participation, and design socially acceptable control strategies, researchers must be familiar with people's knowledge and perception in relation to vectors and the resulting diseases (Ramaiah *et al* 1996).

The findings of this study will be shared with implementers of different vector control programs. This will facilitate the designing of better ways of carrying out these measures and also involving the community. The study results are also expected to stimulate further studies in Dar es Salaam and elsewhere regarding community participation for effective and sustainable mosquito control interventions.

CHAPTER TWO

2.0 LITERATURE REVIEW

Vector control remains the most generally effective measure to prevent vector borne diseases and is therefore one of the four basic technical elements of the GMCS. It reduces the number of cases requiring treatment.

Vector control has to be an ongoing program and sustainability of such programs can only be attained through community participation. This will be determined by their awareness and perception of these vectors as disease causing agents.

Townson, (2005), states that for vector borne diseases such as lymphatic filariasis where preventive chemotherapy is the principle control strategy; vector control can accelerate the reduction in disease transmission and also lessen the risk of drug resistance. With the emergence of drug resistance for diseases such as malaria, greater priority needs to be given to preventive strategies that are based on vector control. Deployment of curative drugs has been more emphasized in the case of malaria. A reduction in the parasite reservoir cannot be achieved without a reduction in the vectorial capacity that is brought about by vector control. This requires community participation for effective and sustained implementation.

However these activities must receive support from the relevant authorities such as the municipal council for effectiveness. This support could be in form of financing, technical assistance and relevant knowledge on vector control. A study carried out in Malindi, Kenya by Kibe, *et al* (2006), showed a decline in control activities due to low technical assistance and financial support from the municipal council. Limited knowledge on mosquito control activities was also a contributory factor to the decline. The study proposes involvement of communities in planning and implementation of activities while the relevant government authorities mobilize resources and provide technical support and supervision and the monitoring in order to sustain the mosquito control activities.

A study by Aggarwal, *et al* (2004) in Delhi India, indicates that 70% associated mosquito bites with malaria transmission. There was minimal participation at community level as only 7% of the people were resorting to community efforts for cleaning stagnant water near their houses when need arose. About 32% reported cleaning of the same through self-effort. At the same time, the 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 responsibility.

Vector control programs are more effective with the involvement of the community and faster results are obtained from community-based programs compared with government-supported activities alone (Rodriguez, *et al* 2003). In the study, only 48% of the respondents associate malaria with mosquito bites. Mosquito bed nets were among the most recognized methods of personal protection against mosquitoes. About 99% of those interviewed indicated that they had mosquito bed nets though only 76.5% use them.

Jima, *et al* (2005) found out that community participation in the prevention and control of malaria was found to be high. In the study conducted in Ethiopia shows that 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 surrounding and seeking treatment. Approximately 10% were not directly involved in prevention and control interventions. Most respondents knew that mosquitoes breed on stagnant water with a small percentage mentioning dirty water. At the same time, 95% perceived fever, headaches and chilling of the body as the main symptoms for malaria. A 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.

In their study on dengue knowledge, practices and impact on the mosquito population, Koenraadt, *et al* (2006), found that sex, age, and education were related to overall knowledge. Females were more knowledgeable than males. Younger persons had more knowledge than older ones and that persons with formal education knew more about dengue than persons with less schooling. There was a weak relation between dengue knowledge and practice. Better knowledge does not necessarily lead to better practices, presumably because it is difficult to change a person's behavior. However knowledge of preventive measures had a significant and beneficial effect on container protection practice. Households with a high proportion of protected containers were less likely to be infested with adult mosquitoes.

A study carried out in South India by Ramaiah *et al* (1996) found only 20% of the unaffected individuals knew that filariasis is caused through mosquito bites. About 83% of the affected and 87% of the unaffected individuals were either uncertain or felt that filariasis is not preventable. The study shows that as people's awareness of the cause and transmission are poor; their ideas on prevention were also poor.

In a study by Benthem *et al* (2002), persons with knowledge of dengue reported a significantly higher use of prevention measures than persons without knowledge, though knowledge was relatively low among housewives, unemployed and old persons.

A study in northern Thailand in 2002 found that use of preventive measures was higher in persons with knowledge of the disease than in persons without. In the same study, women and older persons had a lower knowledge of malaria. Knowledge of malaria decreased with increasing age; Younger persons had a higher knowledge of malaria compared to older persons. Headache, shivering and fever were the most frequently mentioned symptoms for malaria. Mosquito nets were the most frequently mentioned preventive measure followed by wearing protective clothes and use of mosquito coils. (Benthem *et al* 2006)

Understanding of local disease perceptions including mode of transmission and means of prevention is necessary for sustainable prevention programs. Respondents did not identify lymphatic filariasis as an important current health problem. This could have been due to the low prevalence of the disease in the area. Asked about the source of filariasis, only 3 focus groups in a study done in Papua, New Guinea could identify mosquitoes as the source of illness. The role of mosquitoes as a vector of any disease was poorly understood. Mosquito nets were infrequently used and breeding sites were poorly controlled either for malaria and filariasis control. Almost half of the community members associated good health with participation in the elimination program (Wynd, *et al* 2007).

Kumar, *et al* (2005) conducted a study on community perception regarding mosquito-borne diseases. In the findings, a majority (94%) of the respondents perceived mosquitoes as a problem as they bite and cause nuisance. The disease causing aspect was only mentioned by a small number (20%). However, in the urban sample, 28% of the respondents did not know where the mosquito breeds. Drains and stagnant water was associated with mosquito breeding. A very small percentage of people associated clean water collections with mosquito breeding. Asked about the preventive measures they can take against mosquitoes, about 34% were not aware of any measure. About 30% mentioned keeping the surroundings clean while 12% mentioned proper drainage as the measure. Though many of the respondents perceived mosquitoes as a problem, some were not taking any preventive measure (22%). Only 3% were using bed nets as a preventive measure. A considerable number of respondents could only mention malaria as the disease transmitted by mosquitoes. Filariasis was mentioned by a very small percentage.

Minimal community participation especially in environmental control of mosquitoes was revealed in a study carried out in Dar es Salaam by Stephens, *et al* (1995). In the study, fewer people associated filariasis with mosquito bites. The study recommends community support and participation so as to achieve the intended results on control measures.

According to the TDHS (2004-2005), ownership of ITN's was found to be low. Retreating of nets was also found to be a problem. At the same time, 65.2% of children aged 6 months to 59 months, had anaemia due to malaria while 42.8% of women were found to be anaemic.

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

CHAPTER THREE

3.0 METHODOLOGY

3.0.1 Description of the Study Area

The study was conducted in Ilala Municipality which is one of the three municipalities within Dar es Salaam region. The Municipality covers an area of 210 km^2 with a population of approximately 637573 as per 2002 census with 148386 households. The informal sector employs an estimated workforce of 150,000. The unemployed workforce is estimated at 118906. The mode of health services delivery in Ilala Municipal Council is based on curative, preventive, promotive health care and rehabilitative services provided by either private or government owned health facilities. Malaria, Acute Respiratory Infection (ARI) Pneumonia, Urinary Tract Infection and Tuberculosis Diseases rank as the top five diseases in the district.

For administrative purposes the Municipality is divided into 3 Divisions and 22 Wards (CCHP-Ilala 2006/2007). The District was selected randomly as the research problem cuts across the three districts and for convenience purposes.

3.0.2 Study Unit and Design

This research employed a cross sectional descriptive study. The study unit was a household where the male or female head of the household was interviewed.

3.0.3 Sample Size

The sample size was calculated using the formula for estimating a single proportion.

$$N = \frac{(Z)^2 P (100 - P)}{\varepsilon^2}$$

Where:

N = Desired sample size

Z = Percentage of standard normal distribution corresponding to 95% confidence interval which is 1.96. (Approximated to 2)

P = Estimated proportion of community members that participate in control measures which is 50%

E = Margin of error of P which is 7%

Therefore,

$$N = \frac{(4)\ 50\ (100-50)}{(7)^2}$$

N = 204.1

246 heads of households were interviewed.

3.0.4 Sampling Techniques

Participants for the study were selected using a multistage sampling technique. A list of wards was obtained from the municipal council. All the names were written down on a piece of paper and 5 wards were randomly selected. The second stage involved selecting

streets whereby four streets were randomly selected from each of the five wards using the same method. A list of households was obtained from the ten cell leader. The third stage involved drawing up a list of all the households in a street with help of the ten cell leader. A total of 10 households were selected systematically whereby every second household was selected.

3.0.5 Measures

Dependent Variables:

Knowledge of mosquitoes as disease vectors, knowledge of control measures, perception, practice of preventive measures were considered as the dependent variables.

Independent Variables:

Age, sex, level of education, knowledge of mosquitoes as disease vectors, knowledge of control measures were considered as independent variables.

3.0.6 Data Collection techniques

Quantitative data collection tool was used. Semi structured questionnaire were used with both open ended and close-ended questions. The questionnaire was prepared first in English and then translated back to Kiswahili for data collection.

Data was collected on daily basis for a period of twelve days. Information on the community's knowledge on mosquitoes as disease vectors and their initiated participation in control measures was gathered. Knowledge was measured by asking questions related to diseases transmitted, symptoms, breeding sites for mosquitoes and

prevention measures. Participation was measured by determining the control measures being practiced at household level. Questions related to knowledge were asked before questions on control measures to avoid bias.

The PI together with two research assistants collected data. Research assistants were recruited prior to the study and trained for two days on how to administer the questionnaire. The training comprised of briefing of the study, administration of the questionnaire and conducting interview through house to house visits. 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 the prevention and control of mosquitoes to the study participants.

3.0.7 Pre testing

Prior to the data collection, pre testing of the tool was done in Kir.ondoni District to check whether the tool would collect relevant and desired information. Questions that were irrelevant were omitted and unclear ones revised to give the desired information. Comments from the interviewees were also incorporated.

3.0.8 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 knowledge:

Answers to questions that were measuring knowledge of mosquitoes and control measures were scored. Right answers were given a score of one point while wrong answers were given zero score. All the scores were then summed up and categorized as follows:

Knowledge of mosquitoes:

Out of twenty three questions, the highest score was twelve while the lowest was four.

Score	**Level of knowledge**
4-7	Low
8-11	Moderate
+12	High

Knowledge of control measures

Out of a total of nine questions, the highest score was eight while the, lowest score was two.

Score	Level of knowledge
2-4	Low
5-7	Moderate
+8	High

Thus, the above categories constituted the operational definition of low, moderate or high level of knowledge of both mosquitoes and control measures.

3.0.9 Limitation of the Study

Some would be respondents were reluctant to participate in the study due to previous experience with other implementers whereby the promised benefits were not delivered.

3.0.10 Ethical consideration

Ethical clearance was obtained from the MUCHS research and publications committee. Permission from the wards and ten cell leaders was sought. The purpose of the study was explained to the participants at the beginning of the 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 246 respondents were recruited for the study. The socio-demographic characteristics of the respondents are shown in Table 1.

Table1:Socio-demographic data of respondents in Ilala municipality (n=246)

Characteristics	Category	Frequency	Percentage
Age (years)	Below 25	40	16.30
	26-40	113	45.90
	41-55	56	22.80
	Above 55	37	15.00
Gender	Male	123	50
	Female	123	50
Marital status	Married	171	69.50
	Single	57	23.20
	Cohabiting	5	2.00
	Widow	12	4.90
	Separated/Divorced	1	0.40
Occupation	Employed	46	18.70
	Petty trader	118	48.00
	Depend on partner	53	21.50
	Casual laborer	11	4.50
	Depend on relatives	18	7.30
Level of Education	Post secondary	13	5.30
	Secondary education	67	27.20
	Primary education	128	52.00
	No formal education	38	15.40

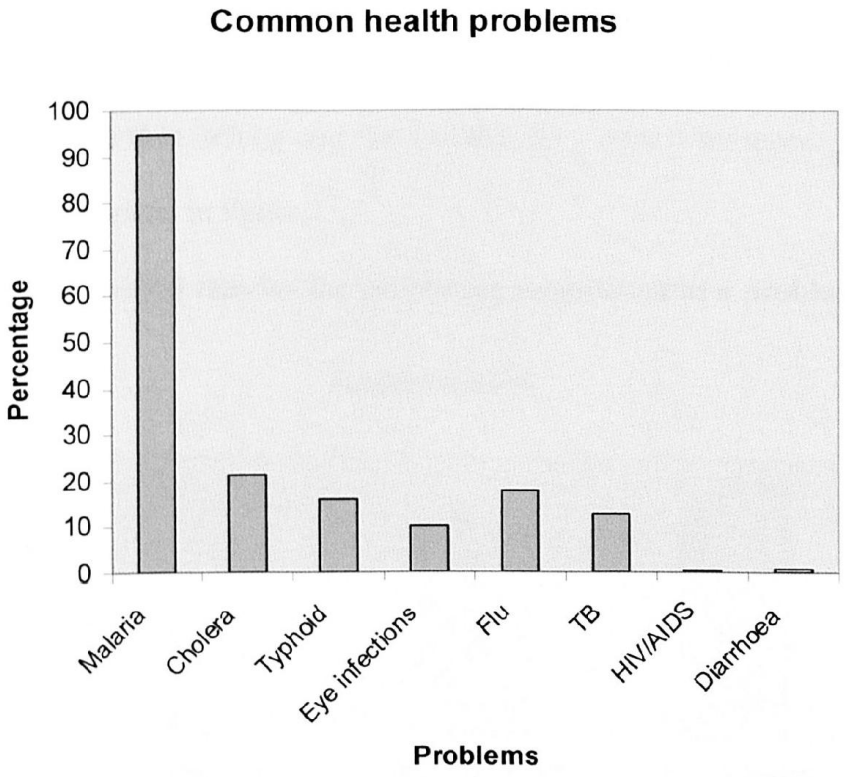
The mean age of the respondents was 39.3 with the minimum being 19 and the maximum being 78. The number of male respondents was equal to that of female respondents. A large percentage (62.2%) of the respondents had the age of up to 40 years. The majority (69.5%) of the respondents were married and about half (52.0%) of them had up to primary level education. Most respondents were engaging in petty trading (48.0%).

4.0.2 Knowledge and perception of mosquitoes as disease vectors

Common Health Problems

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 cholera and typhoid as shown in figure 1.

Fig 1: Common health problem as reported by the respondents. (n=246)

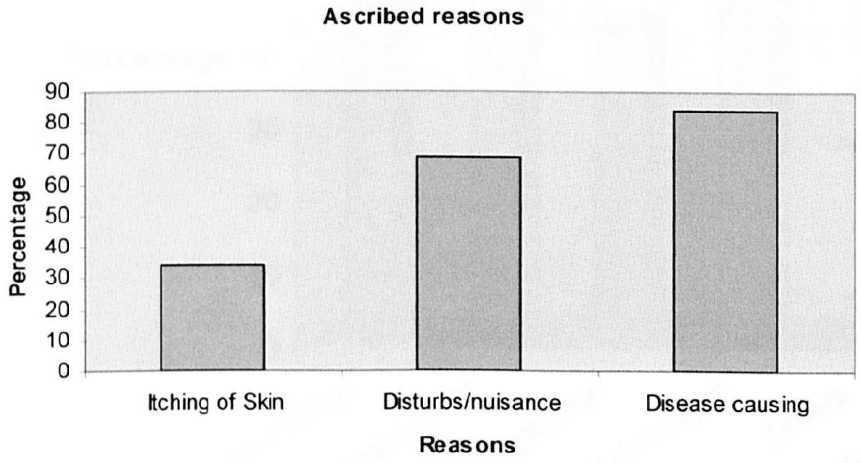


Asked whether there were many mosquitoes in the area, the larger majority (84.1%) of the respondents were in agreement that there were many mosquitoes, while 15.9% (39) thought there were few mosquitoes. Of the 234 respondents who felt there were many mosquitoes in the area, the larger majority (85.9%) felt they were in deed a problem. Only a small percentage (14%) perceived mosquitoes as not a problem.

Ascribed reasons for perceiving mosquitoes as a problem

The respondents were further queried as to why they perceived mosquitoes as a problem. Among reasons cited, the disease causing aspect was the most common. Other reasons given were skin itching and the fact that they were a nuisance. The reasons mentioned are summarized in figure 2.

Fig 2: Ascribed reasons for perceiving mosquitoes as a problem (n=234/246)

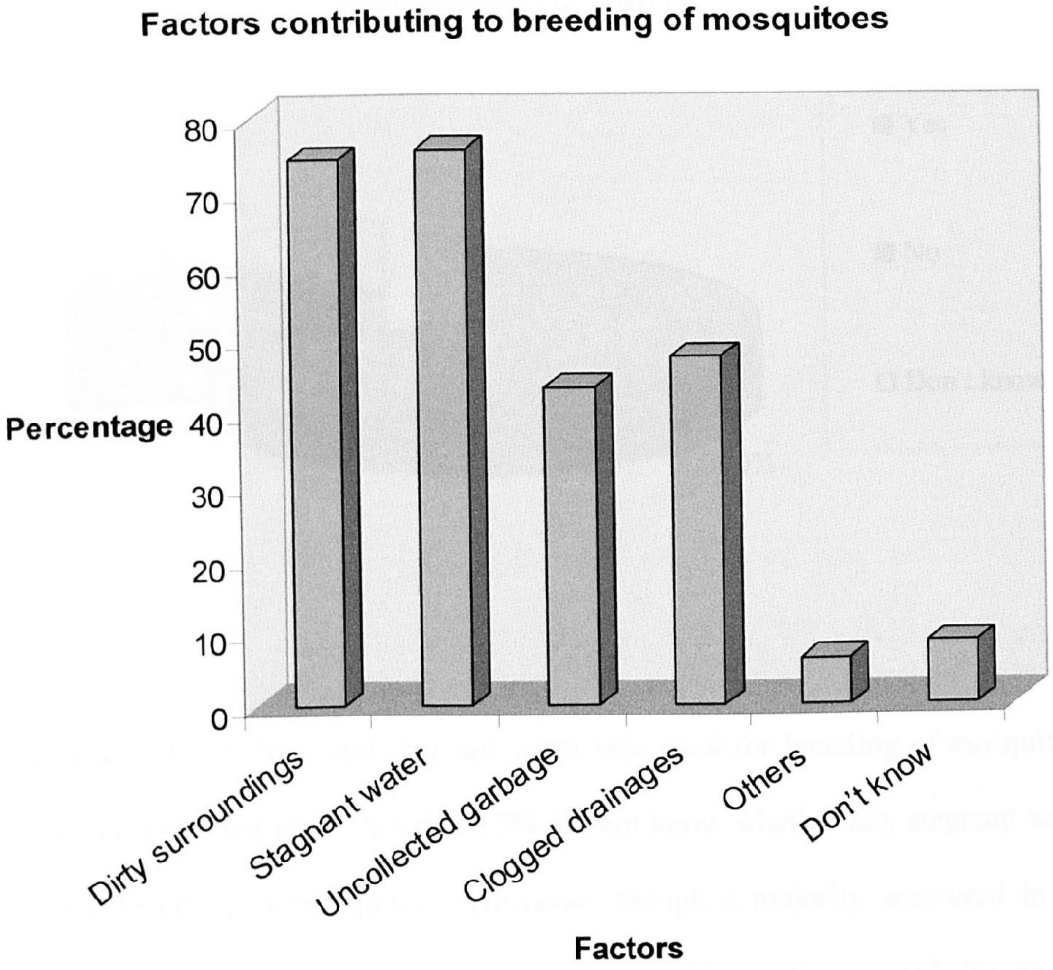


Regarding seasonality, half (50.9%) of the respondents cited mosquitoes as a problem throughout the year while 49.1% (115) viewed mosquitoes as a problem only during the rainy season.

Factors that contribute to breeding of mosquitoes

The respondents were asked to cite the factors that they felt contributed to 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 figure 3.

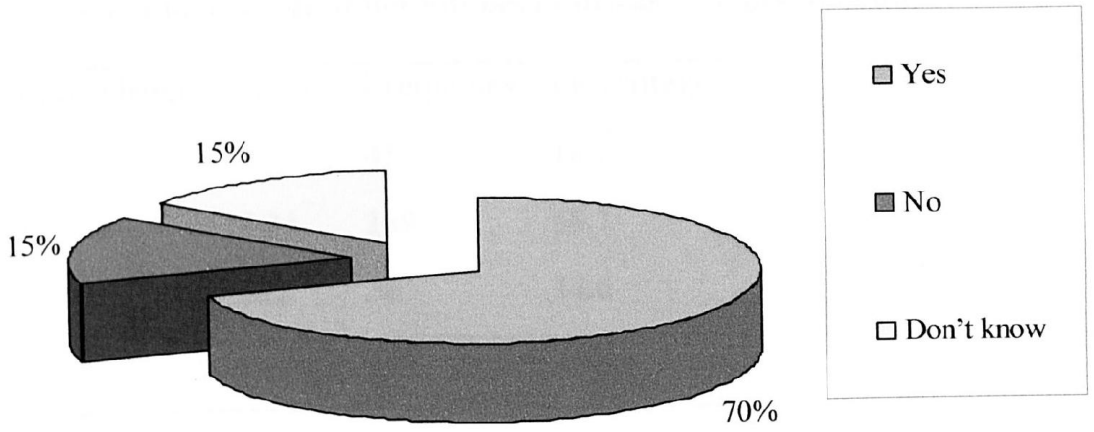
Fig 3: Factors that contribute to breeding of mosquitoes (n=234/246)



Other reasons cited by 6.4% of the respondents, included poor planning and congestion of housing and poor drainage system. However, 8.5% of the respondents could not cite any factor.

Respondents were further asked whether all stagnant water was ideal for breeding mosquitoes that transmit malaria and filariasis. The results are shown in figure 4.

Fig.4 Responses for ideal water for breeding of mosquitoes (n=246)



Of the 246 respondents, 70% said stagnant water was ideal for breeding of mosquitoes while 15% said it was not ideal. Another 15% did not know whether any stagnant water was ideal for breeding of mosquitoes. However, though a majority answered in the affirmative, only 14.6% (36) of the respondents could mention *anopheles* as the mosquito that breeds in fresh water. Three quarters of the respondents (75.2%) had no knowledge. At the same time, only 15.9% (39) of the respondents could mention *culex* as the mosquito that breeds in breeds in polluted water. A majority, 72.8% (179), had no knowledge. To most of them, "a mosquito is a mosquito".

Knowledge of Mosquitoes as Disease Vectors

Knowledge of mosquitoes as disease vectors was measured by asking respondents to cite illnesses transmitted through a bite by a mosquito, symptoms of malaria in adults and in

children and symptoms of filariasis. Out of twenty three (23) questions, the highest score was twelve (12) while the lowest score was four (4). Knowledge was categorized as low (4-7), moderate (8-11) and high (above 12). Results are presented in table 2.

Table 2. Level of knowledge of mosquitoes as disease vectors (n=246)

Level of knowledge	Score	Frequency	Percentage
Low	**4-7**	**41**	**16.7**
Moderate	**8-11**	**169**	**68.7**
High	**+12**	**36**	**14.6**
Total		**246**	**100**

The table shows that slightly more than two thirds (2/3) of the respondents (68.7) had moderate knowledge of mosquitoes as disease vectors as they answered correct to utmost 11 of the questions asked. Only a small percentage (14.6%) who answered correct to at least 12 questions had high knowledge. Diseases that were mostly mentioned included malaria and filariasis though malaria was mentioned more. Most respondents mentioned headache, fevers, chills and pain in the joints as the symptoms for malaria. At the same time, swelling of limbs was mentioned by most respondents as a symptom for filariasis.

Table 3: Association of selected socio-demographic characteristics with the level of knowledge of mosquito as disease vectors (n=246)

Socio-demographic data		Level of knowledge (Frequency & percentage)			
Characteristics	**Category**	**Low**	**Moderate**	**High**	**P Value**
Age (years)	Below 25	7(17.1)	20(11.8)	5(13.9)	
	26-40	19(46.3)	83(49.1)	19(52.8)	**0.6655**
	41-55	11(26.8)	36(21.3)	9(25.0)	
	Above 55	4(9.8)	30(17.8)	3(8.3)	
Gender	Male	20(48.8)	85(50.3)	18(50.0)	**0.9849**
	Female	21(51.2)	84(49.7)	18(50.0)	
Level of Education	Secondary education	6(14.6)	57(33.7)	17(47.2)	**0.0194**
	Primary education	25(61.0)	86(50.9)	17(47.2)	
	No formal education	10(24.4)	26(15.4)	2(5.6)	

Table 3 presents the association between knowledge of mosquitoes as disease vectors and selected socio-demographic characteristics. Age and gender were not significantly associated with the level of knowledge of mosquitoes as disease vectors ($p>0.05$). However, level of education was significantly associated with the level of knowledge of mosquitoes as disease vectors ($p<0.05$). Thus respondents with secondary education were more likely to have a high level of knowledge of mosquitoes as disease vectors.

4.0.3 Knowledge of mosquito control measures

Knowledge of control measures was measured by asking the respondents to cite the different control measures (indoor and outdoor) that they were familiar with. Out of a total of nine (9) questions, the highest score was 8 while the lowest was 2. The level of

knowledge was determined using these scores whereby 2-4 was categorized as low knowledge, 5-7 as moderate knowledge while 8 was categorized as high knowledge.

Table 4. Level of knowledge of mosquito control measures (n=246)

Level of knowledge	Score	Frequency	Percentage
Low	2-4	38	15.4
Moderate	5-7	146	59.3
High	+8	62	25.2
Total		**246**	**100**

From the table, it can be noted that a larger majority of the respondents (59.3%) had moderate knowledge of mosquito control measures as they cited up to seven (7) control measures. About a quarter (25.2%) of the respondents had high level of knowledge since they cited at least eight (8) control measures.

Fig. 5 Distribution of control measures as mentioned by the respondents (n=246)

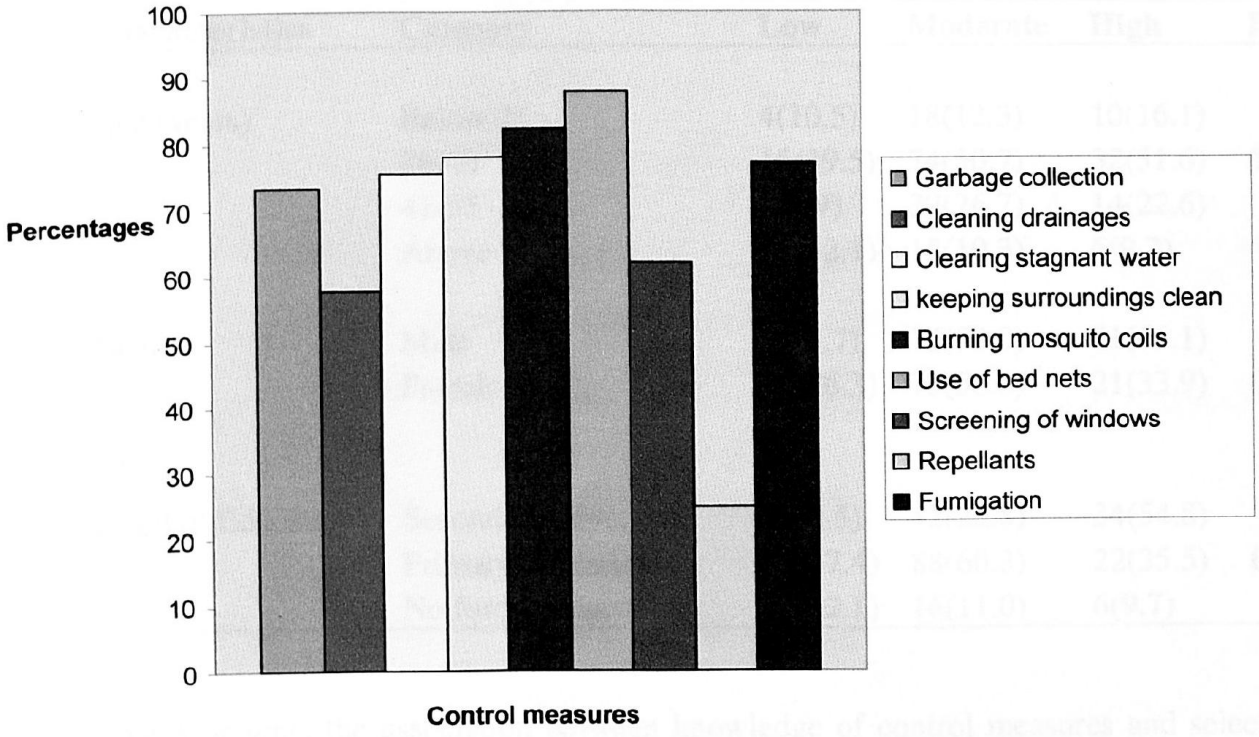


Figure 5 shows that use of bed nets was the most cited method of control measure (87.8%) followed by burning of mosquito coils (82.1%). The results show that respondents were more familiar with indoor control measures than with outdoor.

Table 5:Association of selected socio-demographic characteristics with level of knowledge of mosquito control measures (n=246)

Socio-demographic data		Level of knowledge (Frequency & percentage)			
Characteristics	**Category**	**Low**	**Moderate**	**High**	**P value**
Age (years)	Below 25	4(10.5)	18(12.3)	10(16.1)	
	26-40	15(39.5)	74(50.7)	32(51.6)	**0.001**
	41-55	3(7.9)	39(26.7)	14(22.6)	
	Above 55	16(42.1)	15(10.3)	6(9.7)	
Gender	Male	9(23.7)	73(50.0)	41(66.1)	
	Female	29(76.3)	73(50.0)	21(33.9)	**0.0002**
Level of Education	Secondary education	4(10.5)	42(28.8)	34(54.8)	
	Primary education	18(47.4)	88(60.3)	22(35.5)	**0.001**
	No formal education	16(42.1)	16(11.0)	6(9.7)	

Table 5 presents the association between knowledge of control measures and selected socio-demographic characteristics. Age, gender and level of education were significantly associated with the level of knowledge of mosquito control measures ($p<0.05$). Respondents with an age above 55years were likely to have low level of knowledge of mosquito control measures compared to those in other categories. Female respondents were likely to have low level of knowledge of mosquito control measures than males who were likely to have a high level of knowledge. Likewise, respondents with secondary education were likely to have a high level of knowledge of mosquito control measures than those with primary and no formal education.

4.0.4 Determining control measures being practiced at the household level

Asked whether their environment was conducive for the breeding of mosquitoes, slightly more than a third of the respondents (34.6%) were not in agreement. However, on observation, out of the total households (246), 83.7% of them had actual and potential breeding sites of the two types of mosquitoes. Stagnant water, uncovered containers of water and uncollected garbage was observed in most of the households (see appendix 5) Respondents were queried on the different mosquito control measures that they were practicing at the household level. The responses are presented in table 6.

Table 6: Distribution of indoor control measures practiced by the respondents (n=246)

Control measures practiced	Frequency	Percentage
Burning mosquito coils	**65**	**26.4**
Use of bed nets	**232**	**94.3**
Screening of windows	**136**	**55.2**
Use of repellants	**6**	**2.4**
Fumigation	**102**	**41.5**
Others	**4**	**1.6**

In a multiple response analysis, use of bed nets was the most frequently practiced control measure (94.3%) followed by screening of windows (52.4%) and fumigation (41.5%) respectively. Use of repellants was the least practiced control measure with only 2.4%. Other control measures practiced included closing of windows and doors at dusk.

Of the 136 respondents that use mosquito wire gauze as a control measure, more than a half (58.8%) of the screened windows were in a bad condition. At least all the respondents who own nets reported to be sleeping under the nets. More than half of the respondents (64.2%) reported to have treated their bed nets at least once in the past six (6) months.

Table 7: Distribution of outdoor control measures practiced by the respondents (n=246)

Control measure	Frequency	%
Clearing of garbage	176	71.5
Cleaning of drainages	98	39.8
Clearing of stagnant water	162	65.9
Keeping the surroundings clean	191	77.6
Others	5	2

Table 9 shows that keeping the surrounding clean was the most practiced control measure as it was mentioned by more than three quarter (3/4) of the respondents (77.6%). This was followed by clearing of garbage (71.5%) and clearing of stagnant water (65.9%).

Though the level of practice is quite high, of the total households visited, it was observed that more than a half (54.9%) of them had stagnant water raging from uncovered buckets of water to pools of water outside the houses. Uncollected garbage was also observed in 48.4% of the households. Likewise, clogged drainages were present in 23.6% of the households.

Table 8 : Association of level of practice of control measures and selected socio-demographic data (n=246)

Socio-demographic data		Level of practice (Frequency & percentage)			
Characteristics	**Category**	**Low**	**Moderate**	**High**	**P Value**
Age (years)	Below 25	3(5.6)	27(16.5)	2(7.1)	
	26-40	22(40.7)	83(50.6)	16(57.1)	**0.01**
	41-55	8(14.8)	40(24.4)	8(28.6)	
	Above 55	21(38.9)	14(8.5)	2(7.1)	
Gender	Male	17(31.5)	88(53.7)	18(64.3)	**0.005**
	Female	37(68.5)	76(46.3)	10(35.7)	
Level of Education	Secondary education	4(7.4)	56(34.1)	20(71.4)	**0.01**
	Primary education	30(55.6)	92(56.1)	6(21.4)	
	No formal education	20(37.0)	16(9.8)	2(7.1)	

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 that practiced seven and above preventive measures were categorized under high level of practice.

The table shows that age, gender and level of education showed differences that were statistically significant ($p<0.05$). The findings indicate that males were more likely to practice preventive measures than their female counterparts. Though age showed no statistical difference, respondents below 25 years had a higher practice level compared to those in other categories. Likewise, respondents with secondary education had a higher level of practice compared to those in other categories.

Table 9 :Association of Knowledge of control measures and reported practice (n=246)

	Level of knowledge			
Reported practice	**Low(n=38)**	**Moderate(n=146)**	**High(n=62)**	**P value**
Window screening	18(47.4)	73(50.0)	38(61.3)	0.26
Repellants	1(2.6)	5(3.4)	0(0)	0.34
Fumigation	7(18.4)	58(39.7)	37(59.7)	0.0002
Burn coils	5(13.2)	38(26.2)	21(33.9)	0.072
Bed nets	38(100.0)	134(91.8)	60(96.8)	0.093
Clearing garbage	17(44.7)	108(74.0)	51(82.3)	0.0001
Cleaning drainages	4(10.5)	60(41.1)	34(54.8)	0.0001
Stagnant water	11(28.9)	98(67.1)	53(85.5)	0.0001
Clean surroundings	29(76.3)	112(76.7)	50(80.6)	0.805

From the table, it can be observed that practice of preventive measures increased with increase in level of knowledge of control measures. Fumigation, clearing of garbage, cleaning of drainages, and clearing of stagnant water showed differences that were statistically significant ($p<0.05$). For instance, respondents with high level of knowledge of control measures were more likely to clear stagnant water than those who had low knowledge in the same category. Although some control practices such as window screening, use of repellants, burning coils, use of bed nets and cleaning of surrounding showed differences that were not statistically significant, it was observed that high knowledge of control measures still had an influence on practice of preventive measure.

Use of bed nets was still high among respondents with low knowledge of control measures.

4.0.5 Assessing community's perception of the comparative effectiveness of the control measures practiced at the household level.

Respondents were asked about their perception on the comparative effectiveness of the control measures they had mentioned. Responses are shown in table 10.

Table 10: Comparison of effectiveness of control measures practiced at household level n=246

	Effectiveness		Safe	
Control measure	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Burning mosquito coil	3	1.2	3	1.2
Use of bed nets	203	82.5	197	80.1
Screening of windows	8	3.3	34	13.8
Use of repellants	0	0	0	0
Fumigation	32	13	10	2

The table shows that a majority of the respondents (82.5%) perceived bed nets as a more effective control method. Reasons given for the preference were ranging from inability to purchase other control measures; other measures not killing the mosquitoes fully and don't last longer. Still another 24.4% of the respondents did not have a reason for their preference.

At the same time, bed nets were also perceived as the most safe control method (80.1%) compared to others. A majority of the respondents (56.5%) felt that other control measures were not safe as they associated them with respiratory related diseases. Another 39.8% of the respondents could not give any reason for their preference.

4.0.6 Assessing community's perception on the various control measures being implemented by other actors.

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 246 respondents, 40.7% (101) were not 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 11.

Table 11: Distribution of rating of success of the program by the respondents (n=145)

Attribute	Frequency	%
Very successful	15	10.3
Successful	101	69.7
Not successful at all	29	20
Total	**145**	**100**

Table 11 shows that of the 145 respondents who were aware of the existence of the program, slightly more than two thirds (69.7%) of the respondents rated the program as successful while 20% rated the program as not successful at all. When asked to state the reason, a larger majority of the respondents (73.3%) felt that there was no reduction in numbers of mosquitoes and that people were still suffering from mosquito related diseases. It was evident that they were judging success of the program in terms of impact on the mosquito population and the outcome.

Respondents were further asked to give their opinion on whether the program was doing enough to control the mosquito larvae. Their responses are presented in table 12.

Table 12: Distribution of responses on whether the programs were doing enough to control mosquito larvae (n=145)

Attribute	Frequency	%
Strongly agree	14	9.7
Agree	77	53.1
Somehow agree	34	23.4
Disagree	20	13.8
Total	**145**	**100**

Table 12 shows that slightly more than a half of the respondents (53.1%) were in agreement that the program was doing enough to control mosquito larvae. The rest felt there was no reduction of mosquitoes. However of the 145, respondents, 65.5% felt they had been involved in the program activities while 33.6% felt they had not been involved. The respondents were then asked to state ways in which they had participated in the control activities. Results are presented in table 13.

Table 13: Partcipation in control activities (n=95)

Attribute	Frequency	%
Meetings with implementors	34	35.8
Selection of CORPS	3	3.2
Actual application of larvicides	30	31.6
Others	36	37.8

In a multiple response analysis, respondents participated in other ways (37.8%) such as testing for malaria more than in the rest of the activities. The results show that they were participating the least in selection of CORPS who are their representatives in the program. Some respondents expressed willingness to participate in actual application of larvicides if only they were trained so as to increase the coverage.

CHAPTER FIVE

5.0 DISCUSSION.

Community participation in mosquito control activities depends upon their perceptions and knowledge of mosquito as disease vectors. This study assessed the level of community's knowledge and perception of mosquitoes as disease vectors for malaria and filariasis and also examined their initiated participation in control measures.

5.0.1 Knowledge of mosquitoes as disease vectors:

The findings of this study show that malaria ranked the most common health problem as previously documented (Kihamia *et al* 1991). The study area is characterized by intense perennial malaria transmission that makes malaria the commonest cause of attendance and admission in health facilities (CCHP 2007/2008). Though bancroftian filariasis is also endemic in the area, it was not identified as a common health problem (Wynd, *et al* 2007).

The fact that mosquitoes are perceived as a problem indicates that the community has the potential of participating in interventions for mosquito control (Kumar, *et al* 2005). At the same time, the disease causing aspect was given as the reason for perceiving mosquitoes as a problem rather than the fact that they bit and this caused nuisance. These findings are in contrast with those found in the same study by Kumar, *et al* (2005). Awareness and knowledge of the environmental factors associated with mosquito breeding was quite high. Thus, dirty surroundings and stagnant water were

cited as the most common factors contributing to breeding of mosquitoes (Kumar, *et al,* 2005). Though more than two thirds of the respondents were in agreement that stagnant water was ideal for breeding of mosquitoes, they were not aware that clean and polluted waters are ideal for the breeding of different types of mosquito. Clean water is ideal for the breeding of *anopheles* mosquito that transmit malaria but may also transmit filariasis; while polluted water is ideal for the breeding of *culex* that exclusively transmit filariasis (Kihamia *et al* 1991). Thus IEC strategies towards control of the two types of mosquito should focus on the fact they breed in different environments. A considerable number stated that no mosquitoes could breed in polluted water (Jima, *et al* 2005). This could mean that knowledge of control measure that is likely to be effective against the two mosquitoes may be poor.

In the study, malaria and filariasis were associated with mosquito bites as documented by Aggarwal, *et al* (2004). Contrary to studies by Ramaiah, *et al* (1996) and Kumar, *et al* (2005), more than a half of the respondents knew that filariasis is caused by mosquito bites. This indicates a high potential for participation in intervention targeted for the control of malaria and filariasis.

The study shows that knowledge of mosquitoes as disease vectors was moderate (68.7%). Most respondents could associate mosquitoes with the diseases they transmit and also their symptoms. Fevers, chills and headache were the most frequently mentioned symptoms for malaria (Benthem, *et al* 2006, Jima, *et al* 2005). A larger majority could only identify swelling of limbs as a sign for bancroftian filariasis. The

findings indicate that level of education was significantly associated with knowledge of mosquitoes as disease vectors. This indicates that raising the literacy level would potentially improve the diffusion of knowledge related to mosquito control in the community. Age and gender had no influence. This is in contrast with findings in a study by Benthem *et al* (2006).

5.0.2 Knowledge of mosquito control measures.

This study indicates that knowledge of control measures was moderate. Most respondents mentioned at least up to seven control measures. This contrasts findings by Kumar, *et al* (2005) whereby knowledge was found to be quite limited. This level of knowledge could be attributed to the fact that the Urban Malaria Control Program is working in the area to control the breeding of mosquito larvae. Contrary to the findings by Jima, *et al* (2005) findings, most respondents knew about bed nets as a preventive measure. The same was found in a study by Rodriguez; *et al* (2003). Burning of mosquito coils was also cited by a large majority of the respondents. It was also evident that respondents were more familiar with indoor control measures than with outdoor control measures. Perhaps this could be explained by the fact that to 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 indoor control measures which they view as their own responsibility.

The findings indicate that age of the respondents; gender and level of education were significantly associated with knowledge of mosquito control measures. Knowledge decreased with increase in age. Older persons had significantly lower knowledge than the younger ones (Benthem, *et al* 2002). Low knowledge among the older persons could be an indication that they are not reached by health education campaigns perhaps because they are less mobile. Females had low knowledge compared to males. At the same time knowledge increased with increase in level of education (Koenraadt, *et al* 2006). However, females in the same study were more knowledgeable than males contrary to the findings in this study.

5.0.3 Determining control measures being practiced at the household level.

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

Though most respondents stated that their environments were not conducive for mosquito breeding, 83.7% had both actual and potential breeding sites. It was evident that most households had uncovered containers of water, clogged drainages, uncollected garbage and stagnant water even though they reported good practice of outdoor control measures. This contradicts what was observed. At the same time, reported use of preventive measures was lower than the reported knowledge of mosquito control measures apart from use of bed nets. This means that though they could be knowledgeable about control measures, knowledge does not necessarily translate to good practice.

It was found out 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%. 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 and filariasis control as its use is widespread in the area. Though over 90% of the respondents reported to be using bed nets, a significant number (36%) had not treated their bed nets at least in the past six months. Though slightly more than a half (55.2%) of the respondents use screening of windows as a preventive measure, more than half of them were found to be in a bad condition. Other preventive measures such as use of repellants, burning of mosquito coils and fumigation were not as frequently practiced. Cost implication as well as durability of the methods could perhaps explain this. When the level of practice was associated with socio demographic data, gender was found to have an influence on the practice. Males were practicing control measures more than their female counterparts. Perhaps this is because males have the authority and the means to purchase these preventive measures.

Respondents with secondary education were more likely to practice preventive measures than those in primary and no formal levels of education.

5.0.4 Assessing community's perception of the comparative effectiveness of the control measures practiced at the household level.

According to the findings, most respondents perceived bed nets as an effective and safe control method. Reasons given were that mosquitoes still bite even when other preventive measures are applied. Cost was another important constraint on choice of preventive measure. Durability was also taken into consideration. This probably explains the reason as to why use of bed nets is more practiced than other methods (Stephens, *et al* 1995). Even though they preferred bed nets than other control measures, about a quarter did not state any reason for their preference.

Bed nets were perceived as safer than other control measures. More than a half of the respondents felt other control measures such as fumigation and burning of coils cause respiratory problems. Perhaps this could explain the reason as to why most of them resorted to use of bed nets as a preventive measure.

5.0.5 Assessing community's perception on the various control measures being implemented by other actors.

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

About 40% were not aware of the existence of the program. The program was however rated as successful by the 60% of the respondents who were aware of the program. Still less than a quarter felt the program was not successful at all. Most of them gave the

reason that there was no reduction of mosquitoes and that they were still suffering from vector related diseases. Perhaps this means that support of any programs by communities depend on a noticeable reduction of mosquitoes. At the same time, slightly more than a half of them, were in agreement that the program was doing enough to control mosquito larvae. The rest who were not in agreement, felt there was no reduction of mosquitoes. Perhaps this explains why they felt the program was not doing enough. About a third of those who were aware of the existence of the program felt they had not participated in any way in the implementation of the program. Though a majority stated they had participated, the findings show that they mostly participated in testing for malaria than in the other activities which included selection of representatives (CORPS), actual application of the larvicides and holding meetings with the implementers.

CHAPTER SIX

6.0 CONCLUSION

Overall, malaria ranked the most common health problem. Filariasis was not mentioned as a health problem though it is endemic in the area.

The overall knowledge of mosquitoes as disease vectors was moderate. The community could associate mosquito bites with malaria and filariasis. The level of education had an influence on knowledge of mosquitoes as disease vectors.

The findings suggest that knowledge of mosquito control measures was moderate. The findings indicate that reported use of preventive measures was lower than the reported knowledge of the control measures apart from use of bed nets. This means that though they could be knowledgeable about control measures, knowledge does not always translate to good practice. Use of bed nets is the most common preventive measure being practiced. The use of bed nets in this community primarily for malaria control could conceivably have a spill over effect for filariasis control. Bed nets were perceived as the most effective and safest method of mosquito control as they were affordable and durable.

The findings suggest that a considerable portion of the community is not aware of the existence of the Urban Malaria Control Program. It was evident that the community rates success of the program by a reduction in mosquito numbers. The community feels

they have not been involved fully in implementation of the activities and they expressed a desire to be trained in the actual application of the larvicides to achieve a wider coverage.

6.1 RECOMMENDATIONS

- IEC strategies should focus on the fact that the two different types of mosquitoes breed in different environments.
- More of the health education campaigns should be targeted to the women and the older people who were found to have a relatively lower knowledge.
- Since use of bed nets 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.
- Control programs should focus on controlling the two different types of mosquitoes as communities judge the success of such programs by a reduction of mosquitoes.
- 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 of widening the coverage.

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