

Full Length Research Paper

Assessment of knowledge and practices on home management of malaria among selected families in Morogoro Municipality

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Knowledge and practices in preventing malaria infection were assessed in a cross-sectional study in Morogoro Municipal. Malaria is a life-threatening parasitic disease transmitted caused by plasmodial species which are *plasmodium falciparum*, *plasmodium vivax*, *plasmodium ovale*, and *plasmodium malariae*. With most of the cases of malaria being due to *Plasmodium falciparum* accounting for more than 95% of infections. A total of sixty families were randomly selected from five study areas (Chamwino, Mafiga, Kichangani, Misufini and Manzese) to participate in the study. The questionnaire consisting of closed and open-ended questions was administered. The results indicated that knowledge on malaria transmission and prevention was reasonable as the respondents declared to have a significant knowledge (85%) on malaria transmission and prevention, though there was a knowledge gap among respondents. Breeding sites were also assessed and the results showed that 26.7% reported dark places as breeding sites, 40% mentioned the edges of ponds and stagnant water, 26.7% tagged dirty areas as breeding sites, 1.7% mentioned cattle sheds, and 5% were not aware at all. Methods used for management of malaria in their homes indicate that most of the respondents (73.3%) agreed with indoor residual spraying (IRS) while (26.7%) did not agree with IRS. Most respondents commented on the effectiveness of Home Management of Malaria (HMM) to be somehow helpful in reducing malaria infection cases, while 31.7% strongly agreed that HMM has been effective in reducing malaria infection cases. Therefore, there is a need to improve the emphasis of HMM to ensure that the effectiveness of HMM is being achieved at a great level.

Key words: Knowledge, mosquito, indoor residual spraying, home management of malaria.

INTRODUCTION

Malaria is a life-threatening parasitic disease transmitted through the bite of an infected female anopheles

mosquito. It is caused by plasmodial species which are *plasmodium falciparum*, *plasmodium vivax*, *plasmodium*

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ovale and *plasmodium malariae*. Approximately 93% of the continental people live in areas where malaria is spread for at least 1 month per year. Though Tanzania has been promoting the use of long-lasting insecticide-treated nets (LLINs), there are still between 60,000 and 80,000 malaria attributable deaths per year, primarily children under the age of 5 years and pregnant women (Ministry of Health, 2015). The extent of the disease is deeper where knowledge and awareness of malaria and its vectors, health infrastructure, and human resources for health are poor (Measure DHS Project, 2011; Mboera et al., 2015). Most of the cases of malaria are due to *Plasmodium falciparum* accounting for more than 95% of infectious and this species is responsible for the severe form of the disease that may lead to death (Killeen et al., 2013). According to Chukwuocha et al. (2009), malaria is among the cause of childhood mortality in most countries. The infections for malaria can be either symptomatic or asymptomatic as an individual can be suspected to have been infected with malaria but without showing symptoms, thus effective management for malaria should be accompanied by several diagnostic tests. Home Management of Malaria (HMM) is one of the key strategies to reduce the burden of malaria in Morogoro Municipal. HMM is a national policy that is being implemented throughout the country, including the Morogoro region (Daniel and Sigsbert, 2017).

Vector control is the main component of the global strategy for malaria control which targets averting parasite transmission mainly through interventions targeting adult *Anopheles* mosquitoes by protecting individuals who sleep or rest indoors (Killeen et al., 2013). Pyrethroids in LLINs and indoor residual spray (IRS) use have improved dramatically and turned into being the cornerstone of malaria control programs (Moonen et al., 2010). Presently, the Ministry of Health and Social Welfare highlights a scale-up of insecticide-treated net dissemination programs under the Roll Back Malaria initiative (Partnership Roll Back Malaria, 2005). To accomplish this, the country embarked on nationwide free distribution of LLINs to ensure that every household owned treated bed nets (Partnership Roll Back Malaria, 2005 and Moonen et al., 2010). HMM was selected to be done on these areas because there are standing water bodies created by rainfall which provide breeding grounds for malaria-carrying mosquitoes. HMM is a key strategy to reduce the burden of malaria for vulnerable populations in endemic cities (WHO, 2005), and it has been adopted by the WHO as a cornerstone of malaria control. Moreover, most of the people who have been affected are those staying in families who do not take preventive measures. The strategy for HMM also aims to improve the ineffective self-medication practices that is very common among most people in their families.

The HMM strategy empowers communities to respond to malaria using effective, good-quality antimalarial medicines through community involvement (WHO, 2009).

The Roll Back malaria has defined the HMM as an integral part of an overall malaria case management strategy aiming to improve access to treatment for malaria in areas with limited access to health facilities. As in Morogoro Municipal, some areas are quietly difficult to access competent health services as a result the practices for home management of some diseases including malaria is necessary. So far HMM is being promoted with artemisinin-based combination therapy (ACT). Conrad and Rosenthal (2019) indicated that based on different studies conducted in Africa ACT has shown excellent treatment efficacy. The need to reduce malaria morbidity and mortality through the improvement of home management for malaria is thus of crucial importance as it will lead to a number of community-based initiatives including training of mothers, community health workers, and appropriate anti-malarial use (Oreagba et al., 2004). Since preventive measures for malaria are never 100% effective in most families, this has made the transmission of malaria persist for several years in cities.

This study intends to assess public knowledge on malaria together with the practice on home management of malaria among selected families in Morogoro Municipality. Understanding the knowledge and practice of malaria will assist communities in fighting against malaria.

MATERIALS AND METHODS

A random sampling procedure was used to select the areas and 60 families were selected for this study. The areas selected were Chamwino, Mafiga, Kichangani, Misufini and Manzese. These areas were selected because there are standing water bodies created by rainfall which provide breeding grounds for malaria-carrying mosquitoes. Data were collected using a structured, questionnaire which was in Kiswahili translated from the English version. The questionnaire consisted of closed and open-ended questions. For each selected household, the head or second-in-charge was selected to fill out the questionnaire. The questionnaire was divided into two parts which were knowledge and practices. The questionnaires contained multiple-choice questions, and some consisted of two optional answers "yes" or "no". The questionnaires were developed on the basis of guidelines and in regard to adaptations from previous literature studies.

Data processing and analysis

Data collected were coded and entered into Excel, then plugged into Epi Info 7 ready for data analysis. All questions on knowledge of mosquitoes and malaria and awareness of changed biting behavior of mosquito were scored with one mark for the correct answer, so as to categorize participants with 'good knowledge' zero was given for incorrect answers, and those participants giving incorrect answers were categorized as having 'poor knowledge'.

Ethical consideration

Ethical clearance for the studies was granted by the Sokoine University of Agriculture (SUA).

Table 1. Age of respondents in years.

Age in years	Frequency	Percent
17-25	11	18.30
26-34	28	46.70
35-43	15	25
44-52	6	10

Table 2. Response on breeding sites of mosquitoes.

Variable	Dark places	Dirty areas	On ponds and stagnant water	Cattle sheds	Not aware
Chamwino,	5	2	4	0	1
Mafiga	2	4	6	0	0
Kichangani	2	2	5	1	2
Misufini	4	2	6	0	0
Manzese	3	6	3	0	0
percentage	26.70	26.70	40	1.70	5

Table 3. Mosquitoes biting time.

Variable	Day time	Night time	Any time	Don't know
Chamwino	4	6	2	0
Mafiga	0	6	4	2
Kichangani	1	7	4	0
Msufini	3	8	1	0
Manzese	2	6	2	2
Percentage	16.67	55.00	21.67	6.67

RESULTS

A total of 60 participants were involved in the study in which 21/60 (35%) were males and 39/60 (65%) were females. Out of this, 86% were married; while the rest (14%) were not married. Table 1 shows the range of ages of respondents who were involved in the study. As 18.3% ranged in age, between 17 and 25, 46.7% ranged in years between 26 and 34, 25% were in the age between 35 and 43 and 10% ranged in years between 44 and 52.

Perception about the concept of malaria

About 20% had good knowledge about malaria, 53.3% had medium knowledge, 16.7% had poor knowledge and 10% had very poor knowledge of malaria at all. The respondents of the age between 17 and 25 seemed to have more knowledge followed by the age between 26 and 34. This is perhaps because most of the respondents in these two age groups were students and some were current graduates from school. On the course of Malaria,

85% had a right perception that malaria is an illness caused by mosquito bites, while about 8.3% perceived that malaria is an illness due to spiritual problems, and the remaining 6.7%, knew nothing about the cause of Malaria.

Response on the breeding factors of mosquitoes

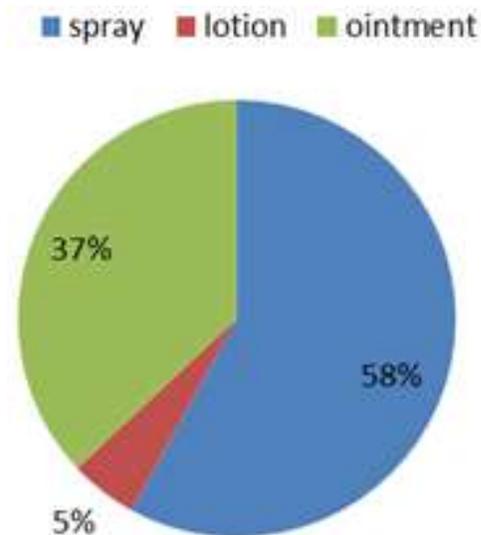
The 26.7% mentioned dark places as the breeding sites for mosquitoes, 40% recognized the breeding sites of mosquitoes to be on the edges of ponds and stagnant water, 26.7% mentioned dirty areas while 1.7% tagged the cattle sheds to accelerate the breeding of mosquitoes and 5% were not aware of the breeding sites of mosquitoes (Table 2).

Recognition on when do mosquitoes bite

Table 3 shows how the respondents in each study area responded to the time of mosquito bites. The

Table 4. Response on methods used to fight against malaria infection.

Variable	Insect repellents	Long clothing sleeves	ITNs	clearing bushes	All the methods
Chamwino	6	2	4	0	0
Mafiga	1	4	3	2	2
Kichangani	2	2	3	2	3
Misufini	3	0	4	0	5
Manzese	5	2	1	4	0
Percentage	28.30	16.70	25	13.30	16.70

**Figure 1.** Forms of repellents that are used in Home Management of Malaria.

respondents had four options to select, of these options 16.7% selected daytime, 55% mentioned that mosquitoes do bite at night, 21.67% selected mosquitoes can bite at any time and 6.67% did not know when do mosquitoes bite.

Measures are taken to control malaria

Of the five selected study areas, 28.3% chose the use of insect repellents as the method they use at their homes to manage malaria, 16.7% mentioned wearing long sleeves clothing at night, 25% used insecticidal treated nets (ITNs) as a measure to prevent a malaria infection, 13.3% reported clearing of bushes and 16.7% reported that they use all of given optional methods (Table 4).

Recognition of the forms of repellents that are used in Home management of malaria

Respondents who mentioned the use of repellents were

asked about the forms of repellents they use in managing malaria at their homes. Fifty-eight percent (58%) reported that they use sprays and the common spray repellent that was mentioned is Rungu. Thirty-seven percent (37%) mentioned ointment as the form of repellents they use and 5% (Figure 1) used repellents in lotion form, thus they are applied on the skin surface.

Frequency of the use of repellents on home management of malaria

The respondents were then asked to what extent they use repellents in controlling malaria, 15% reported that they use the repellents frequently, meaning more than thrice per week, 30% reported that they use once per week and 55% reported that they use the repellents in very rare cases.

Recognition on the impression of the level of control obtained with the use of repellants

Table 5 summarizes the impression on the level of control obtained with the use of repellents. 10% of respondents noted the use of repellents to be excellent in managing malaria, 50% perceived the use of repellents as good in controlling malaria, 35% reported as moderate and 5% perceived the use of repellents as ineffective.

Response on the importance of the use of repellents in home management of malaria

The respondents were then asked to suggest if the use of repellents in accompany other methods is important in managing Malaria. Thirty-three (33.33%) noted that it is important, 40% reported it as somehow and 26.67% said it is not important (Table 6).

Assessment on who advised on the use of repellents to respondents

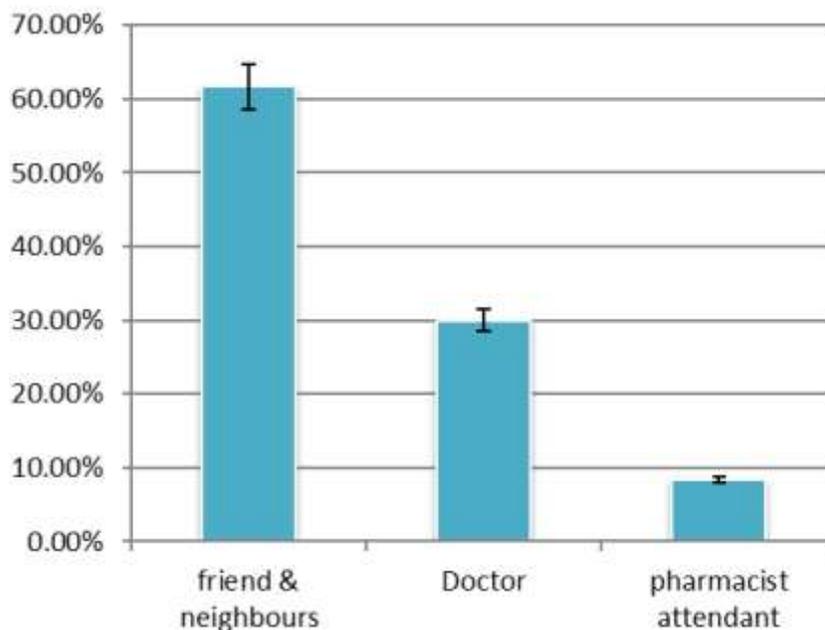
The participants were asked who recommended them to

Table 5. Levels of malaria control obtained with the use of repellants.

Level of control obtained	Excellent	Good	Moderate	Ineffective
Chamwino	3	6	2	1
Mafiga	1	8	3	0
Kichangani	0	4	6	2
Msufini	2	8	2	0
Manzese	0	4	8	0
Percentage	10	50	35	5

Table 6. Importance of repellants in HMM.

Use of repellants as important in HMM	Yes	Somehow	No.
Chamwino	3	7	2
Mafiga	2	6	4
Kichangani	6	4	2
Msufini	2	4	6
Manzese	7	3	2
Percentage	33.33	40.00	26.67

**Figure 2.** Percentage of people who advised the respondents to use repellents.

use the repellents in controlling Malaria at their homes. They were asked if they its friends, neighbors, doctors, or pharmacist attendants. Thirty-seven (37) participants (61.7%) mentioned that their friends and neighbors recommended them to use repellents, 18/60 (30%) were recommended by doctors and 5/60 (8.3%) were recommended by pharmacists attendant (Figure 2).

Indoor residual spraying

The participants were asked to comment on the issue of indoor residual spraying (IRS). Most participants (73.3%) agreed with indoor residual spraying while 26.7% of the participants denied on IRS program claiming that it is the source of other insects like bed bugs in their houses and

Table 7. Response on the use of insecticidal treated nets.

Do you sleep under Insecticidal treated nets?	Yes	No
Chamwino	8	4
Mafiga	9	3
Kichangani	8	4
Msufini	6	6
Manzese	4	8
Percentage	58.33	41.67

Table 8. Symptoms considered as indications for malaria infection.

Variable	Headache	Vomiting	Stomach pain	Bitter saliva	Not aware
Chamwino	4	2	0	6	0
Mafiga	6	1	2	3	0
Kichangani	2	6	2	1	1
Msufini	9	0	3	0	0
Manzese	1	0	2	7	2
Percentage	36.70	15	15	28.30	5

Table 9. Has the HMM become effective on reducing Malaria infection cases?

Street	Strongly agree	Somewhat agree	Strongly disagree	Neither agree Nor disagree
Chamwino	4	4	2	2
Mafiga	3	6	0	3
Kichangani	4	2	4	2
Misufini	2	4	2	4
Manzese	6	4	1	1
percentage	31.67	33.33	15	20

the insecticides have a bad smell.

Recognition of the use of insecticidal treated nets (ITNs)

Participants in each study area were asked if they use ITNs as one of the measures to control Malaria at their homes. The 58.33% noted the use of ITNs at their homes while 41.67% do not have a tendency of using ITNs as a measure to prevent Malaria infection (Table 7).

Primary symptoms are considered as indicators for malaria infection

The respondents were given five optional choices (headache, vomiting, stomach pain, bitter saliva, and not aware) to choose as symptoms they consider in Malaria infection. The 36.675 noticed headache as a symptom of malaria infection, 15% reported vomiting, 15% noticed stomach pain, and 28.3% mentioned bitter saliva and 5%

were not aware of any of the indicators for Malaria infection. Table 8 summarizes the response to symptoms.

Perception on the effectiveness of home management of malaria in reducing malaria infection cases

Table 9 depicts the response to the recommendations on the effectiveness of HMM in reducing infection cases. As 31.7% strongly agreed that HMM has been effective in reducing malaria infection cases, 33.33% noticed the effectiveness to be somehow, 15% strongly disagreed that HMM has not been effective anymore in reducing Malaria infection cases and 20% neither agreed nor disagreed.

Recognition of the sources of information used regarding malaria

Different sources of information were tagged by

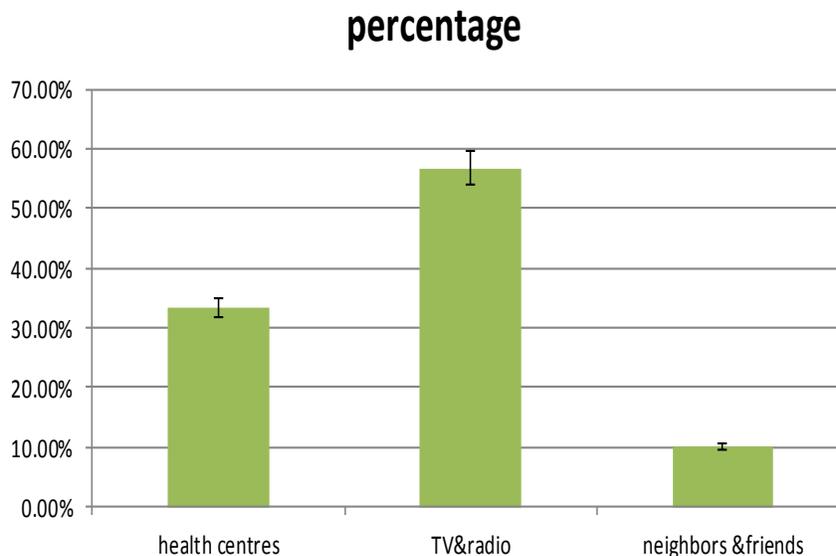


Figure 3. Sources of information used regarding Malaria.

respondents being used as ways of acquiring different information about malaria. Most mentioned Televisions and radio (56.7%) as the media for obtaining information, 33.3% mentioned health centers as their sources of information, and 10% used to obtain information from their neighbors and friends (Figure 3).

Factors hindering proper Home management of malaria

About 40% of the respondents noticed poverty as a factor that hindered proper home management of malaria. Some of the respondents (33.3%) perceived that illiteracy/ignorance is a hindering factor. However, 10% reported improper use of insecticide-treated nets as hindering factor and 15% agreed that an unclean environment and over or under dosage of drugs were factors that hindered proper Home Management of Malaria.

DISCUSSION

The areas selected were based on the fact there is standing water created by rainfall and also the community itself which provide breeding grounds for malaria-carrying mosquitoes. In this study, it was revealed that most people in the selected areas are somehow aware of malaria as they demonstrated a better understanding of malaria causes, symptoms, and preventive measures. These findings conform to previous studies by Mabaso et al. (2012). The majority of the respondents mentioned the correct route for malaria transmission (through the bite of

a mosquito). A few respondents demonstrated having poor knowledge of the malaria transmission route as some believed it is a spiritual problem. The same results were also similar to the results which were reported by Hopkins et al. (2007) and Govella and Ferguson (2012). The study communities reported identifying malaria mainly on the basis of symptoms of headache or high fever and vomiting. Despite good knowledge of symptoms to the majority of respondents, some of the respondents were not aware of the symptoms of malaria at all. Thus, lack of clear knowledge among the respondents could lead to delay in seeking appropriate care from health facilities.

Insect repellents and the use of Insecticidal Treated Nets (ITNs) were highly recognized as methods for protection against malaria, most of the studies have also reported the benefits of ITNs. The majority reported having a tendency to sleep under bed nets, though the respondents mentioned the affordability to purchase a net was the barrier to owning a net. This was an encouraging observation and can be used by the malaria control program to increase the number of ITNs to help to combat malaria cases in families. Malaria control based on indoor residual spraying depended on the acceptance of the respondents, though the majority of respondents (73.3%) agreed with the issue of IRS, other respondents did not accept it. And the causes of refusal of IRS were the bad smell of the insecticides, poisoning to their domestic animals, and may accelerate the occurrence of other insects like bedbugs. Previous studies by Ajay et al. (2008) also noticed this. Thus, there is a significant relationship between people's knowledge of the cause of malaria and preventive measures against it.

Despite a better understanding of malaria transmission

risks, signs and symptoms, the study respondents demonstrated a knowledge gap on mosquito breeding sites by stating cattle sheds, dirty areas, dark places and edges of ponds, and stagnant water to be the most breeding sites for malaria vector. In the current study, participants demonstrated better knowledge of malaria breeding sites. This study is contrary to the study conducted by Mathania et al. (2016) and Madne et al. (2014) whereby garbage and long grasses were potential breeding sites for malaria vectors. Most respondents reported their friends and neighbors to be their most common source of information, whereas most adults utilized health centers as areas for seeking health information whereas respondents of the mid-age pointed to radio and television as the source of information. The findings correlate with the study done by Edson and Kayombo (2007). Time spent at home for the mid ages could explain the reason for their choice. This study has realized that the mid ages group had better knowledge on malaria transmission is by mosquito bites when compared to adults. Perhaps this is because the mid-age respondents were currently from school thus this suggests that malaria intervention officers should involve school teachers in malaria intervention programs.

On the other the case of use of repellents, most participants mentioned the use of sprays though they had a claim on the highest cost of the repellents thus due to cost the HMM in most of the families is not achieved effectively. Most participants (43.3%) noticed the use of repellents only once per week to save the repellent in a way that lasts for a long time. Many studies have reported insecticidal pressure as a response to prevent malaria (Emidi et al., 2015), but this was in response to indoor interventions thus does not consider the people working in outdoor activities thus leaving a high chance of being exposed to malaria.

This study has found that the majority of participants were not aware that mosquitoes can bite in the early evening and are capable of transmitting malaria. This could be due to constant messages pointing to malaria as a disease transmitted by midnight-biting mosquitoes. Similar findings were reported by Russell et al. (2011). Thus, most participants (28.3%) noticed the use of repellents, and (25%) reported the use of insecticidal treated nets as methods to prevent malaria compared to other methods. Thus, the healthy community should impart knowledge to the community about the changed feeding behavior of mosquitoes responsible for malaria infection so that people can protect themselves against early mosquito bites.

CONCLUSION AND RECOMMENDATIONS

The findings of this study have shown that the communities have knowledge of malaria transmission, symptoms, and prevention measures. The use of repellents is widespread among respondents which

makes it intensive in malaria control. The high use of repellents is an advantage for the malaria control programs. There is a need for future studies to evaluate more the effectiveness of Home Management of Malaria so that to enhance the community perception of the overall program of preventing Malaria. Lastly, there is a great need for collaboration between the government and non-government sectors on malaria control.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interest.

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