KNOWLEDGE, ATTITUDES AND PRACTICES WITH REGARD TO MALARIA CONTROL IN AN ENDEMIC RURAL AREA OF MYANMAR

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Abstract. Malaria is a global health problem, in particular, a major health problem within Southeast Asia. This study aimed to investigate malaria control within a rural area of Myanmar, where traditionally non-western medicine is the preferred treatment. Whilst malaria was perceived by the local people to be a major health problem, knowledge about the mode of transmission and correct treatment for malaria was relatively low. Consequently, the practices of the local people to control malaria were often ill-informed or based on cultural and traditional beliefs.

INTRODUCTION

Malaria remains a major global health problem, with over 40% of the world population, an estimated total of 2,400 million people being exposed to a varying degree of malaria risk in some 101 countries and territories (WHO, 1998). It is estimated that 500 million people are infected by malaria, representing nearly 10% of the world's population with 1 to 2 millions deaths each year (Global Malaria Initiatives, 1998). According to the World Health Organization, it is estimated that 23 million malaria cases occur in the Southeast Asia region. Furthermore, malaria is thought to cause 34,000 deaths each year in the region (Olov, 1995). It is because of these reasons that malaria is a global health problem, being one of the most serious diseases, which threaten world populations, and in particular the Southeast Asia region.

Myanmar is a developing country in the Southeast Asia region. In Myanmar, the resurgence in the overall incidence of malaria, as well as an increase in the number of chloroquine-resistant *Plasmodium falciparum*, has been adversely felt at all levels of health care (Win and Myint, 1986). According to the 1997 report from the Myanmar Vector-Borne Disease Center, 568,000 malaria cases were reported. The number of malarial deaths in hospitals was given as 2,943 with a morbidity rate of 17/1,000 population and a mortality rate of 6.3/100,000 population. The Case Fatality Rate (CFR) among suspected malaria cases was reported as 3.5%, increasing up to 25% in cerebral malaria cases. The number of confirmed malaria cases was 88,662, with 80.7% of these cases suffering from *P. falciparum* malaria, the most serious type of malaria. Approximately 31% of the total Myanmar population live in high malaria risk areas, with 41% living in moderate to low malaria risk areas, while only 21% reside in an area free from malaria transmission. The high risk of contracting malaria is reflected in the health statistics for Myanmar where malaria is seen as a major health problem and is one of the leading causes of mortality and morbidity. As a result, malaria was made a priority disease in the National Health Plan of Myanmar for 1996-2000.

There have been a considerable number of studies about the knowledge, attitudes and practices relating to malaria in different parts of the world. Several knowledge, attitudes and practices surveys indicate that misconceptions concerning malaria still exist and practices for the control of malaria have been unsatisfactory (Ongore *et al*, 1989; Ejov *et al*, 1996; Vundule and Mharakurwa, 1996; Hla-Shein *et al*, 1998; Miguel *et al*, 1999). Health education has often been indicated as a potential response so that communities are made aware of the transmission of the disease, the consequences and preventive measures as well as the importance of the disease, especially in endemic areas. (Ongore *et al*, 1989; Ejov *et al*, 1996; Hla-Shein *et al*, 1998).

Studies on knowledge, attitudes and practices are applicable to design or improve malaria con-

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trol programs, to set epidemiological and behavioral baselines and to identify indicators for monitoring a program's effectiveness (Macheso *et al*, 1994). Analyses, using the outcomes from knowledge, attitudes and practices studies of communities, have become important in terms of making health education effective. Health education materials and programs can be tailored to fit the local needs of the community, based on the information collected from such analyses (Ongore *et al*, 1989; Hla-Shein *et al*, 1998). For example, a community's awareness of malaria transmission and treatment can be applied to develop health education material and to strengthen control efforts (Miguel *et al*, 1999). The results of these types of studies can be incorporated into the decision making processes, the design of interventions with active community participation, and the implementation of educational schemes (Nieto *et al*, 1999). This study explored the knowledge, attitudes and practices concerning malaria and its control in a selected Myanmar township. Health services were provided in the study area which consisted of 2 rural health centers and their sub-centers. These services were based within the township.

Objectives of the study

Action research was used to discover the knowledge, attitudes and practices of a Myanmar community with regards to malaria. The study was performed for a number of reasons; firstly to collect information about the needs of the community regarding malaria and services for malaria control. Secondly the study aimed to collect baseline data concerning the knowledge, attitudes and practices of people in the area under the services of rural health workers. This can provide a measurement of the changes in the knowledge, attitudes, practices, perceptions and services provided by the rural health workers. In other words, the change in the knowledge, attitudes and practices of the people from the study area regarding malaria and its control would be used as indirect indicators of a change in the services provided by the rural health workers. The study also aimed to develop or adapt educational material and programs to suit the needs of the local communities.

It was expected that the development of health education strategies could be undertaken in collaboration with health workers and the community. Health workers (both basic health staff and volunteer health workers) cooperatively participated in the education program with the community to reinforce their current knowledge, attitudes and practices about preventing malarial infection. This approach was developed to improve both the community and rural health workers levels of awareness concerning malaria.

MATERIALS AND METHODS

Study area

The study area was located in the Teikkyi township, situated approximately 100 km northeast of Yangon, Myanmar. The area's height above sea level was between 3 m on the plain to 457 m in the mountainous areas. The climate is tropical monsoon, with an annual rainfall of 2,000 mm. This township is located in an area highly endemic for malaria.

This study was carried out in villages provided with health services. Rural health centers and sub-centers form the basic functional units of the health care system in Myanmar. From these units, rural health workers provide primary health care activities, including the control of local endemic diseases.

Study design and research instrument

An integrated approach, utilizing both quantitative and qualitative research methodologies was used for both data collection and the analysis of knowledge, attitudes, and practices concerning malaria in the study population. Focus group discussions were held among community members, with the intention of combining all the data collected in order to develop the data collection tool (interview guide) for the sample survey of the local community.

Participants in the qualitative study that were from different units in the areas were organized into 2 focus groups. Each group was taken from the areas under the services of 1 of the 2 local health centers. Malaria inspectors and rural health workers contacted and informed the local leaders, detailing the objectives of the study. The leaders were asked to invite 15-20 members of their community to participate in the group sessions. The following inclusion criteria were used to recruit the participants:

1. The participant should be a member of a community organization, such as: the Village Peace and Development Council, the Union Solidarity and Development Association, the Maternal and

Children Welfare Association, a Volunteer Fire Fighter, a member of the Red Cross Association or a teacher in the community.

2. The participants of the focus group discussions should represent the different areas serviced by the health centers.

3. Each participant of the focus group discussions was chosen, and where possible, had a similar educational level, socio-economic and cultural backgrounds so the participant would feel comfortable participating in the discussions.

Two sessions were planned for each focus group with the discussions being held at either the office of the Village Peace and Development Council or at the Health center. The researcher ran the group, and all discussions were tape recorded while the malaria assistant took written notes.

Quantitative information was obtained using surveys in the study area with an appropriate interview guide. The interview guide consisted of 6 sections: identification; socio-demographic data; knowledge, attitudes, practices and perceptions of malaria; perceptions of the respondents concerning the government health services for malaria control; and economic characteristics. The interview guide was developed from the findings of the focus group discussions and was pre-tested in a similar malaria endemic area. This tool was revised before the field data collection occurred. The knowledge, attitudes, practices and perceptions section of the tool consisted of various parts. There were 9 questions centered on malaria knowledge; 12 questions on people's attitudes towards malaria; 7 questions on their practices concerning malaria; 9 questions on the perceptions surrounding malaria and mosquitos; 8 questions on the utilization and interaction of participants with public health services for malaria control. Other factors measured included the causes and misconceptions concerning the transmission of malaria; preventive measures taken by the local community; the signs and symptoms of malaria; perceptions about the presence and nuisance of mosquitos; the ownership and use of bed nets, treatment seeking behaviors, the perceptions and interactions of the respondent with the public health services, the public health services attitude towards prevention, treatment, susceptibility and severity of malaria. The answers were precategorized and not read out during the interview. The answers provided for the knowledge, practices, perceptions and interaction part of the tool included both single and multiple responses.

The data entry software used was EPI_INFO 6. Data from the structured interviews was analyzed using SPSS/PC version 9.0 for Windows. Correct and incorrect answers for the knowledge and practice questions were assigned a score of one and zero respectively. Attitudinal questions were structured in a 3 point Likert scale with responses comprised of either agree, disagree or undecided. The knowledge, attitudes and practices scores were summed up into a composite score which was then ranked as either low, average or high.

There were 12,587 households with approximately 68,000 inhabitants who lived in the study area. The villages from the study area were divided into 25 blocks of approximately 500 households. From each of these blocks, 2 villages were randomly selected to be included in the study. From the selected villages, 10-15 households, depended on the size of the village, were systematically selected. Household members with the following criteria were included in the survey: the participants selected were residents of the study township, had resided in this area for a minimum of 6 months, could be of either gender, and were between 16 and 65 years old. Mainly, the heads of individual households were interviewed using a structured interview guide. When the head of the household was unavailable, an adult of the household was selected randomly to answer the questions. The trained research assistant conducted the household visits; collecting information about malaria knowledge, attitudes, practices and perceptions as well as socio-demographic and economic characteristics from the participants.

RESULTS

As illustrated in Table 1, a total of 700 people participated in the study and of those studied, 455 (65%) were male and 245 (35%) were female. The majority of respondents, approximately 71%, were either able to read and write or had primary education (1-4 years schooling). The next largest group of participants had a middle school education (5-8 years schooling), a total of 20.7% while 3% were illiterate and 4.3% were classified as having a high school education (8-10 years of schooling). Only 0.6% of the participants had a university education and 0.6% were graduates. Approximately 56%

Table 1
Characteristics of study population (N=700).

Characteristics	Frequency	%
Gender		
Male	455	65
Female	245	35
Age (years)		
18 - 25	68	9.7
26 - 35	174	24.9
36 - 45	170	24.3
46 - 55	130	18.6
56 - 65	158	22.6
Marital status		
Single	280	40
Married	270	38.6
Widowed/Divorced	149	21.3
Education		
Illiterate	21	3
Able to read and write	247	35.5
Primary school level	249	35.6
Middle school level	145	20.7
High School level	30	4.3
University level	4	0.6
Graduates	4	0.6
Occupation		
Government employee	9	1.3
Farmer/Cultivator/Gardener	393	56.1
Casual worker	210	30
Shop keeper	25	3.6
House wife/Dependent	49	7
Student	7	1.0
Others (Fisher/traditional healer)	7	1.0

Table 2
Common illnesses in the study area which were described by community (N=700).

Sample survey	Frequency	%
Malaria	598	85.4
Common cold	55	7.9
Influenza	28	4
Diarrhea diseases	25	3.6
Dengue hemorrhagic fever	15	2.1
Others[a]	3	0.4

Please note that respondents could give more than one response.
[a]Respiratory tract infections and tuberculosis.

Table 3
Community perceptions regarding malaria and mosquitos (N=700).

Identification and reasons why malaria causes problems	Frequency	%
Malaria is a problem	479	68.4
Malaria causes what problems:		
Many people suffer from malaria	204	42.6
Suffering by respondents and family members	77	16.1
Work is affected	134	28
Family income is reduced	90	18.8
Some people in the village die of malaria	24	5.0

of the respondents worked as farmers/cultivators/gardeners, followed by 30% who did casual work, with shopkeepers making up 3.65% of the participants. Seven percent classified themselves as housewives/dependants, 1% were students, while only 1.3% of those surveyed worked as a government employees.

When asked about the common illnesses in the area, malaria was the most frequently described response. As demonstrated in Table 2, this response was given by 85.4% of the participants. This was followed by the common cold with 7.9% of the responses. Influenza was mentioned by 4% of the responses, diarrhea and dengue hemorrhagic fever accounted for 3.6% and 2.1% of the responses respectively. Both malaria and dengue hemorrhagic fever frequencies were similarly described in the 2 focus groups with the common cold, flu, and diarrheal diseases also mentioned. When respondents were asked whether malaria was a problem in the area, a majority of respondents (68.4%) stated malaria was a problem for the area. The reasons behind the community's acceptance of malaria as a problem are shown below in Table 3.

The participants in the focus group discussions also expressed the view that malaria is seen as a very important health problem. The two following quotations demonstrate this view:

'Malaria is a fatal disease and those who suffer malaria [and] do not [get] treatment die of malaria. I know of some people who are mentally impaired (Oun hnau'pje) because of malaria'. [sic]

'People can not work at all while they suffer malaria and it affects their income. [sic] Mostly forest-goers suffer from malaria since they went into the forest for woodcutting. Once they suffer

from malaria they have to spend a lot of money to recover from it and all the money they earned is gone, or the disease can stay for years (Hnge: hpja'swe) and [the] sufferer can be debilitated'.

When the participants were asked about their primary source of information concerning malaria, most of the respondents (63.3%) stated that they were aware of malaria from their own suffering or that of family members. This was followed by friends with 19% and community members with 11.75%. Only 2.6% were informed by basic health workers and 1.7% by volunteer health workers respectively. Media sources, such as television, radio and books accounted for 1.4% as the primary information source. The primary source of information for malaria is summarized in Table 4.

Table 5 presents the beliefs about the causes of malaria. The majority of respondents, 63.6%, answered that a mosquito bite is the cause of malaria. Misconceptions about the transmission of malaria were also listed. These misconceptions included drinking or bathing in spring water from the forest (18.9%), eating bananas from the forest (8.3%), eating indigestible food, fatigue/weakness and change of weather accounted for a total of 9.4% while 9.7% respondents stated they did not know the cause for the transmission of malaria. The three causes that were prompted are shown in comparison to the unprompted responses. The answers are summarized in Table 5.

Table 4
Primary source of information about malaria (N=700).

Primary source of information	Frequency	%
Suffering of self or family member/s	443	63.3
Friends	133	19.0
Community leader	84	11.75
Basic Health Worker	18	2.6
Volunteer Health Worker	12	1.7
Television	4	0.6
Reading books	3	0.4
Radio	3	0.4

In focused discussions, the participants did have some relevant knowledge concerning the transmission of malaria, with the majority of participants linking malaria to mosquitos. One of the participants knew that malaria was transmitted by the bite of an infected mosquito. They then described how the malaria parasite spread via the blood system, causing malaria. While the majority of participants mentioned mosquito bites, they also stated having a bath in the canal water collected from the dam via the streams that flowed from the forest as another transmission route. They also stated that drinking spring water and eating bananas from the forest can cause malaria. A few of the participants mentioned that fatigue and weakness also leads to malaria. These findings were consistent with the results of the sample survey.

When asked about the presence of mosquitos in the area, 92.1% of the respondents believed there to be a lot of mosquitos in the area. When participating in the section titled 'Reasons for the large number of mosquitos in the study area', the respondents knew that the vector breeds in stagnant water and lives in bushes and dark places, as well as the fact that malaria is transmitted by mosquitos. The participants acknowledged that there were a lot of mosquitos in the area due to standing water from the dam, canals, bushes, dirty surroundings, and poor water drainage. These results re-

Table 5
Beliefs regarding the causes of malaria (N=700).

Variables	Phase I			
	Unprompted		Prompted	
	Frequency	%	Frequency	%
Mosquito bite	445	63.6	649	92.7
Drinking/Bathing spring water from forest	132	18.9	573	81.9
Eating bananas from the forest	58	8.3	484	69.1
Eating indigestible food	14	2.0		
Fatigue	43	6.1		
Change of weather	9	1.3		
Do not know	68	9.7		

Table 6
Preventive measures for malaria described by study population (N=700).

Focus groups discussions	Sample survey	%
Personnel protective measures		
Use of bed nets	Sleeping under bed net	58.7
Fumigation by smoke	Burning mosquito coils/ Fumigating by smoke	8.8
Environmental measures		
Eliminating possible breeding sites	Chemoprophylaxis	20.3
Keeping water containers covered and clean	Drinking boiled water	5.6
Clearing of bushes	Clearing of bushes	4.9
Keeping the house clean	Keeping the house clean	4.1
Drainage of standing water	Drainage of standing water	1.7
Household spraying	Insecticide spray	1.5
Health education for the community	Drinking alcohol	0.6
Promoting the health post and the improving the health services		

Please note that multiple responses were given by respondents.

flected those from the sample survey. In that survey, 61.1% of the people assumed the mosquito presence was due to the dam and canals; 26.7% because of the standing water near the village, and the location close to the forest was mentioned by 11.5% of the respondents as another reason.

When asked whether malaria was a preventable disease, 76.6% of the respondents agreed that it could be prevented. Preventive malaria measures described in the focus groups and sample survey are shown in Table 6. Questions focused on preventive measures for malaria were asked during the focus group discussion. The answers from these discussions were grouped into different categories:

(1) Personal protective measures, including the use of bed nets and fumigation using smoke;

(2) Environmental measures, such as household spraying, the clearing of bushes, keeping water containers covered and clean, drainage of standing water, keeping the house clean, and eliminating possible breeding sites;

(3) Health education to increase awareness and change practices in the community;

(4) Promoting the health post and the improving the health services for malaria.

In the sample survey, respondents were asked to mention what they knew about preventive measures for malaria and its control. The most frequent response concerning personal protective measures was to sleep under a bed net, and was answered by 58.7% of the respondents. Fumigation was the only other response in this category, with 8.8%. The total in the category covered under environmental measures, including chemoprophylaxis, insecticide spraying and the drainage of standing water was 38%. Misconceptions, such as drinking boiled water and drinking alcohol as preventive measures were mentioned by 5.6% and 0.6% of respondents respectively.

The signs and symptoms of uncomplicated malaria were well recognized by the focus group participants as shown in Table 7. A recurrent high fever (hot body) with a regular fever pattern, chills and rigor, headache, aches and pains all over the body, profuse sweating, vomiting and tiredness were clearly identified by almost all of the participants. These findings were consistent with the results of sample survey where 93.7% of the respondents mentioned at least one of the signs and symptoms listed above. Fever with or without chills and rigor was most frequently described (84.7%), followed by a regular rise of body temperature (8.6%), headache (5.4%) and loss of appetite (3.1%). These were followed by an intermittent fever (3%), profuse sweating (1.6%), vomiting (0.6%) and tiredness (0.4%). Focus group participants were able to discuss the stages of a malaria episode: the cold, hot, and sweating stages.

The signs and symptoms of severe and complicated malaria were recognized by some of the focus group participants: unconsciousness, delirium, yellow-white eyes, yellow coloration of skin, brightly colored urine, very high fever and

Table 7
Signs and symptoms of uncomplicated malaria (N=700).

Signs and symptoms of uncomplicated malaria	Frequency	%
Fever with or without chills and rigor	593	84.7
Regular raise of body temperature	60	8.6
Headache	38	5.4
Loss of appetite	22	3.1
Intermittent fever	21	3.0
Profuse sweating	11	1.6
Vomiting	4	0.6
Tiredness	3	0.4
Do not know	23	3.3

Please note multiple responses were given by respondents.

Table 8
Signs and symptoms of severe and complicated malaria by respondents (N=700).

Signs and symptoms of severe and complicated malaria	Frequency	%
Unconsciousness	273	39.0
High fever	257	36.7
Delirium	116	16.6
Convulsions	34	4.9
Inability to walk	25	3.6
Fits	34	4.9

Please note that multiple responses were provided by the respondents.

apathy were mentioned by some of the participants. In the field survey, 93.7% of respondents identified at least one of the symptoms of severe and complicated malaria.

The results from the field survey showed that unconsciousness and high fever were described most by participants, 39% and 36.7% respectively. This was followed by delirium (16.6%), convulsions (4.9%), and inability to walk (3.6%). Those who did not know the signs and symptoms of severe and complicated malaria accounted for 6.3% of the responses. Table 8 describes the signs and symptoms of severe and complicated malaria as mentioned by the respondents in the sample survey.

The findings for preventive measures used to combat malaria were comparable between the focus groups and the sample survey. The focus group participants used bed nets, insecticide spray, as well as burnt leaves and herbs to produce smoke to deter mosquitos. Table 9 shows the preventive measures used by the respondents in the sample survey. Bed nets were described by just over half of the participants (51%), followed by burning dry leaves (32.4%), burning mosquito coils (18%), insecticide spraying (5%) and burning herbs (1.4%).

The ownership and usage of bed nets was found to exist in both the focus group and the sample survey. The majority of participants in the focus group slept under a bed net, however the group mentioned that some people in the area did not use bed nets as they could not afford them or lacked health knowledge. Of the participants, 99.4% owned bed nets with 98.6% owning their nets and 97.1% being household members who slept under a bed net (Table 10). When ownership and the use of bed nets were analysed, it was found that the average number of people in a household was approximately 5, while the average number of bed nets per house was just under 2 (Table 11). This finding shows that people often shared bed nets. This was consistent with the findings from the focus group discussions. It was found that people who cannot afford enough bed nets were forced to share bed nets or to give the bed nets to the children of the household.

Treatment seeking patterns were determined both in the focus groups and from the sample survey. Participants in the focus groups identified the actions they took once they had contracted malaria. Most of the participants had taken a variety of self medications including paracetamol, chloroquine, indigenous medicine not registered at the central supervisory committee, such as Kyagaung, Bayinma, Yakhinegy, Yokeshwin and Thardu. Some people who visited the rural health centers receive treatment from the Sayama (midwife), while a few people had visited private clinics. There were some people who had taken treatment from quacks. Two of the participants stated that they had taken an herb-like liquid of Kokko Ywet Nu, which is made from the young leaves of a rain tree, as a remedy. One explained this in detail as follows:

Young Kokko Ywet Nu were freshly ground and squeezed into a liquid. We got a light green liquid, similar to the color of young banana leaves. The taste was very bitter. We had to take one teacup of that liquid daily for 3 days. It was incred-

Table 9
Preventive measures used by respondents against mosquito (N=700).

Measures to keep mosquitos away	Frequency	%
Burning mosquito coils	126	18.0
Burning dry leaves/ Fumigating by smoke	227	32.4
Spray insecticides	35	5.0
Usage of bed net	357	51
Burning herbs	10	1.4

Please note that multiple responses were provided by the respondents.

Table 10
Ownership and usage of bed nets by respondents and household members (N=700).

Bed net use	Number of people	%
Ownership of bed net	696	99.4
Usage of bed net		
Self	690	98.6
Household members	680	97.1
Reason for not using a bed net		
Cannot afford one	11	55
Mosquitos don't bite that much	2	10.0
Weather is too hot to use bed nets	7	35.0

Table 11
Description of ownership and use of bed nets (N=700).

Variable	Frequency
Total number of household members in the survey	3,471
Average number of people per household	4.985
% of Households with bed nets	99.6
Average No. of bed nets per household	1.997
% households where all people sleep under nets	97.1
% respondents who sleep under nets	98.6

ibly bitter. I did not want to eat anything after having it.

Some participants knew that once they had contracted malaria the best treatment was found at the health centers, private clinics or hospital. The majority of people who were treated at the hospital only went after a variety of actions did not work or their condition worsened. Knowledge was not directly related to practice (Nieto *et al*, 1999), and there were some obstacles that prevented participants from seeking proper treatment for malaria. One major problem was a financial problem, they could not afford money for both transportation and the treatment costs.

Table 12
Treatment types sought for uncomplicated malaria episode (N=700).

Types of treatment sought for uncomplicated malaria	Number of people	%
Experience of suffering malaria within 2 years	565	80.7
Self medication using unspecified drugs	238	42.1
Self medication using chloroquine	51	9.0
Self medication using paracetamol	19	3.4
Self medication using non-registered indigenous medicine	141	25
Visited a rural health center or sub-centers	28	4.0
Treatment at the public hospital	16	2.8
Visited a private clinic	38	6.7
Visited to the traditional medicine practitioner's clinic	17	3.0
Treated by quacks	13	1.9
Nothing	3	0.5
Herbal remedies	1	0.2

Table 12 shows that a total of 80.7% of participants had contracted unspecified malaria within the last 2 years. Self-medication was most described treatment, at 42.1%, followed by self-medication of non-registered indigenous medicine (25%), self-medication using chloroquine (9%), and self-medication using paracetamol (3.5%). Those who sought medical treatment made up a smaller proportion of the study. These people visited private clinics (6.7%), rural health centers and sub-centers (4%), traditional healers clinics (3%) or sought treatment at the public hospital (2.8%). A few took treatment from quacks or took herbal remedies (0.9 % and 0.2% respectively) while 0.5% did nothing. Those people waited for a few days to see what would develop.

Generally, the majority of respondents had a positive attitude towards malaria and its control as shown in Table 13. However, less than half of the

respondents realized that they were likely to contract malaria as they live in a malaria endemic area as compared to 91% who presumed that they would contract malaria when they went into the forest. Regarding use of bed nets, the respondents stated that bed nets should be used to prevent malaria and should be taken when going into the forest (77.4% and 84.7% respectively). With regard to chemoprophylaxis, a large proportion (95%) agreed that they took some form of protection when they went into the forest. The respondents know the consequences of contracting malaria, realizing malaria can lead to death (92.1%) and severe complications (81.9%). In regards to the treatment of malaria, over 99% of the respondents believed that malaria should be detected early and treated promptly, should be treated at a clinic or hospital, western medicine should be used in malaria treatment and an unconscious patient suffering from malaria should be hospitalized. With regard to the public health services concerning malaria, most assumed that these services were helpful (91%) and were satisfactory (68.1%).

Table 13
Attitude towards malaria and its control (N=700).

Attitudes toward:	Answers in affirmative	
	Frequency	%
Probability of a household members contracting malaria in a disease endemic area	316	45.1
Probability of getting malaria when entering the forest for work	642	91.7
Usage of bed net	542	77.4
Taking bed net when entering the forest for work	593	84.7
Taking medicine for the chemoprophylaxis of malaria	665	95
Severity of malaria - could lead to death	645	92.1
Severity of disease - complications of disease	573	81.9
Early diagnosis and prompt treatment	697	99.6
Importance of taking malaria treatment at the clinic or hospital	697	99.6
Using western medicine to treat malaria	695	99.3
Importance of hospitalization of unconscious malaria patient	696	99.4
Helpfulness of public health services concerning malaria control	637	91
Satisfaction regarding services of public health clinic - satisfied	477	68.1

Table 14 shows the level of knowledge, attitudes and practices of the community. Regarding the level of knowledge about malaria, 48.9% achieved a low knowledge level and 51% obtained an average level. With regard to attitude levels, very few respondents achieved a low or average level, with a large proportion of the respondents, 95.4%, achieving a high level score for attitude. In the practices category, 90.1% of people obtained an average level, while 1.4% received a low level score and 8.4% achieved a high level score.

DISCUSSION

An integrated qualitative and quantitative methodology was used for the focus group data, to develop a research tool, ensuring both the validity and reliability of the field study as a tool to provide crosschecks (Polgar and Thomas, 1995). Malaria was viewed as the most important health problem and was perceived as a problem in the area. The research area was located in an area highly endemic for malaria, similar to an endemic location in Western Kenya, where the majority of that population described malaria and its related issues as a health problem for the area (Ongore *et al*, 1989). The community's knowledge regarding

Table 14
Level of knowledge, attitude and practices (KAP) of the community regarding malaria (N=700).

	Knowledge		Attitudes		Practices	
Level of KAP	Frequency	%	Frequency	%	Frequency	%
Low	342	48.9	6	.9	10	1.4
Average	358	51.1	26	3.7	631	90.1
High	0	0	688	95.4	59	8.4

malaria transmission was semi-informed, where they knew that a mosquito bite causes the transmission of malaria. However, when discussing malaria transmission, they frequently described local misconceptions, such as drinking/bathing in spring water or eating bananas from the forest, as other causes of malaria transmission. The participants related the link of malaria to water and the forest, stating that malaria can be contracted by entering the forest. The level of knowledge in the community was found to be ranked as low to average. These findings suggest a need for a health education program aimed at the local community. These findings were consistent with the local knowledge, attitudes and practices study within the country. (Hla-Shein *et al*, 1998). Relevant preventive measures were described by the respondents, however some confused positive measures with misconceptions, such as drinking alcohol and drinking boiled water. In the focus group discussions, health education was requested to promote community awareness and change practices in relation to malaria as well as promoting the health post and improving the health services of the area.

The signs and symptoms were the most well described section in both the focus group and in the sample survey as the participants had learnt firsthand, either through their own suffering or that of family members and friends. This was also consistent with the local study conducted by Hla-Shein *et al* (1998). Another study in an endemic urban area in the Colombian Pacific also showed that fever was the most frequently described symptom, followed by headache, chills, vomiting and diarrhea (Nieto *et al*, 1999).

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