

## Knowledge, Attitude and Practice on Insecticide Treated Nets in Myanmar

San San Oo <sup>1\*</sup>, Zay Soe <sup>2</sup>, Wana Hla Shwe <sup>3</sup>

<sup>1</sup> Senior Lecturer and Head of the Woman, Child and Family Health Department, UCSI University, Malaysia

<sup>2</sup> Associate Professor and head of the Internal Medicine Department, UCSI University, Malaysia

<sup>3</sup> Senior Lecturer, Internal Medicine Department, UCSI University, Malaysia

\* **Corresponding Author:** San San Oo

M.B.,B.S. M.Med.Sc (Public Health). MA(Population and Reproductive Health Research), IPSR (Mahidol University, Thailand).

Senior Lecturer and Head of the Woman, Child and Family Health Department, UCSI University, Malaysia | Email sansanoo43@gmail.com

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### Abstract

**Introduction:** In Myanmar, malaria problem has become more critical with the development of multi-drug resistance in *P. falciparum*. This development made the governments to focus their attention for building up vector control program based upon selective spraying, personal protection method, including Insecticide Treated Nets (ITNs) that can be carried out by the communities

**Objectives:** The present study is aimed to assess knowledge, attitude and practice of community on ITN in Myanmar.

**Research Methodology:** A cross-sectional descriptive study was done in 16 villages. A pre-tested structured questionnaire was used with face to face interview to 256 randomly selected households. Only one adult person was interviewed per household.

**Results:** The study results showed that more than three-fifth (62.1%) of the study population had low knowledge level on malaria and ITNs uses and some misconceptions regarding the mode of transmission of malaria. About two-thirds of the study respondents had low attitude score on malaria prevention and use of ITNs. There is significant association between knowledge and attitude level of respondents and their educational status.

**Conclusion:** This study show that there is a need for increasing availability of information on ITN and ITN tablets to prevent malaria transmission in the study township.

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**Key words:** Malaria, knowledge attitude and practice (KAP), insecticide treated nets, Myanmar

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## Introduction

Malaria parasites are transmitted to humans by the bite of infected female mosquitoes of more than 30 anopheline species. Globally, an estimated 3.3 billion people were at risk of malaria in 2010, with populations living in sub-Saharan Africa having the highest risk of acquiring malaria: approximately 80% of cases and 90% of deaths are estimated occur in the WHO African Region, with children under five years of age and pregnant women most severely affected. Malaria is an entirely preventable and treatable disease, provided the currently recommended interventions are properly implemented. Vector control through the use of insecticide-treated nets (ITNs) is one of the preventable factor.<sup>1</sup>

In Myanmar, malaria has been prioritized as the second priority disease. Like in other countries of South-East Asia Region, malaria was one of the major and re-emerging public health problems in Myanmar, due to climatic and ecological changes, uncontrolled population migration, development of multi-drug resistant *P. falciparum* parasite, development of insecticide resistant vectors and changes in behaviour of malaria vectors.<sup>2</sup>

In Myanmar, malaria problem has become more critical with the development of multi-drug resistance in *P. falciparum*, vector resistance of Dichloro Diethyl Trichloroethane (DDT) and Organo Phosphorous (OP) compounds of insecticides. This development made the governments to focus their attention for building up vector control program based upon selective spraying, personal protection method, including Insecticide Treated Nets (ITNs) that can be carried out by the communities themselves within the primary health care system in conformity with the global malaria control strategy of World Health Organization(WHO). There is no enough time and funding to study the behaviour of vector mosquitoes and vector resistance to insecticide. So, locally appropriate vector control strategy is needed to allow cost-effective vector control. The ITNs could be considered as an added tool in combating against malaria.<sup>3</sup>

Since prevention is more effective than treatment, we have to emphasize on community awareness on insecticide treated nets. Therefore, it is necessary to know the knowledge, attitudes and practices of population on ITN.<sup>4</sup>

Knowledge, attitude and practice study on malaria was conducted by ORISSA voluntary health association, India in 1999. This study included 799 participants. They found that 100% respondents know about a disease called malaria. The respondents had good knowledge of signs and symptoms of malaria : highest of 81.51% of respondents identified fever as a symptom of malaria followed by head and body ache 43.90%, chills and rigors 14.38%, sweating 12.97% others 12.84% and vomiting 7.96% respectively. This study also showed that 67.14% of the respondents identified the cause of malaria as Mosquito bite. They also had few answers like malaria parasite, unsanitary environment, drinking unsafe water and others.<sup>5</sup> A descriptive cross-sectional survey was undertaken in Swaziland by Khumbulani et al at 2009<sup>6</sup>. This study involved 320 randomly selected households. Of 320 households surveyed 289 (93.1%) of the respondents had heard about malaria with almost all of

them correctly associating malaria with mosquito bites. The respondents identified symptoms such as headache, high fever and chills were three most frequently mentioned signs and symptoms. Knowledge about malaria treatment was high with 91.8% of the respondents stating that they would seek treatment in health facilities. Knowledge about malaria prevention among participant was high. Most respondents knew that clinics and vector control were important for treating and preventing malaria. With regard to personal protective measures some participants stated that they use bed nets followed by mosquito coils and to a lesser extent the burning of cow dung/leaves, repellents sprays and lotion, but a substantial number of them did not use anything. In India during 2008, a cross-sectional survey interview on 1130, 1012 and 126 respondents showed that the net use rate were 80%, 74% and 55% in the cold, rainy and summer seasons, respectively. Since using ITNs, 74.5-76.6% of the respondents observed reduction of mosquito bites and 7.2-32.1% reduction of malaria incidence; 37% expressed willingness to buy ITNs if the cost was lower and they were affordable.<sup>7</sup>

## **Aim and Objectives**

### ***Aim***

To assess knowledge, attitude and practice on uses of Insecticide Treated Nets (ITNs) in Myanmar.

### ***Objectives***

- To assess knowledge about malaria, usefulness of bed net / ITNs, perception on uses of ITNs.
- To observe the ownership of bed net / ITNs.
- To identify treatment seeking behaviour for malaria.

## **Research Methodology**

***Study design:*** Cross-sectional study design was used in this study.

***Study area:*** This study was conducted in the area of Sa Lin Township, Magway division, Myanmar.

***Study population:*** The study population was all heads of the selected household or in the absence of head of household those adult members who had completed 18 years of age in the selected household was eligible for the study.

***Study period:*** Study period was in August, 2009.

**Sampling procedure:** Two stages sampling procedure was done.

First stage:

Cluster sampling was done in selection of (16) villages, based on 3 criteria. These criteria were *accessibility* i.e. able to access by car within one hour, *spread* i.e. there is sufficient distance among selected villages for possible application of GPS, to *include* both high and low prevalence villages.

Second stage:

Selection of 16 households from each village by systematic random sampling method.

**Sample size determination**

$$n = \left\{ z_{1-\frac{\alpha}{2}} \sqrt{P_o (1 - P_o)} + z_{1-\beta} \sqrt{P_a (1 - P_a)} \right\}^2 / (P_o - P_a)^2$$

$$90\% \text{ Power } z_{1-\beta} = 1.28$$

$$P_o = 0.7^{2,3}$$

$$P_a = 0.6^{2,3}$$

$P_o$  = observed prevalence

$P_a$  = expected prevalence

$$|P_a - P_o| = 0.1$$

$$n = \left\{ 1.96 \sqrt{0.3 (0.7)} + 1.28 \sqrt{0.6 (0.4)} \right\}^2 / (0.1)^2$$

$$n = 232.6$$

**Data collection method**

Data collection was conducted by face to face interview using the pre-tested semi-structured questionnaire. Questionnaires were developed from reviewing the literature. The questionnaires were pre-tested in Thanlyin Township. The respondents included in the study were first informed of the purpose of the research and the consent was taken prior to the interview. If the respondents did not agree to be

interviewed after the full comprehension of the research, they were excluded in this study.

### ***Data entry, cleaning and analysis***

Data entry and data cleaning were done by applying Epi-data version 3.2. Data analysis using chi-square test was done by Statistical Package for Social Science (SPSS) version 16.0 and Microsoft office excel.

## **Results**

### **Socio-demographic characteristics**

#### ***Socio-demographic characteristics of respondents***

Out of 256 respondents, 44.9% were males and 55.1% were females. The ages for the respondents in the selected households ranged from 18 years to 85 years with the mean, median and standard deviation of 44.5, 43 and 13.9 respectively.

Half of the respondents (50%) had medium educational status which includes primary school passed and middle school passed. About 39% had low educational status which includes illiterate and read and write. About 11% of the respondents had high educational status which includes high school passed and graduated. More than half of the respondents were farmers. (Table 1)

### **Knowledge about Malaria**

#### ***Knowledge on awareness of Malaria***

Majority of the respondents 98.8% (n=253) had heard about Malaria and only 3 of them had not. (Table 2)

#### ***Knowledge about signs and symptoms of Malaria***

Chills and rigor and intermittent fever were the two most commonly mentioned signs and symptoms of Malaria 74.1% (n=189) and 60.4% (n=154) respectively. Only 10% and less were headache, fever, others and don't know about signs and symptoms of Malaria. (Figure 1)

#### ***Knowledge about complications of Malaria***

42.6% (n=103) of the respondents were aware of Cerebral Malaria as complication of Malaria. Fatigue, cyanosis and bleeding from nose were commonly mentioned responses in others category. 37.2% did not know complications of Malaria at all. (Figure 2)

#### ***Knowledge about mode of transmission of Malaria***

Majority of the respondents (83.1%, n=202) were aware that Malaria could be transmitted by mosquito bites. Only one respondent (0.4%) could answer that Malaria could be transmitted by blood transfusion. None of them knew that Malaria could be transmitted from pregnant mother to foetus. There were misconceptions regarding the mode of transmission of Malaria such as drinking of spring water, eating of banana and lack of personal hygiene. Most common responses in others category were drinking of unclean water and change in weather. (Table 3)

#### ***Knowledge on persons at risk of Malaria***

102 out of 256 respondents interviewed correctly stated that those persons travelling to Malaria endemic area were at risk of getting Malaria. Young children, weak persons and those who slept without bed nets were common responses in others category of high risk persons to Malaria. (Table 4)

#### ***Knowledge about methods of prevention from mosquito bite***

Knowledge about methods of prevention from mosquito bite was dichotomised into correct responses (which includes sleeping inside bed net, sleeping inside ITNs, using mosquito coils, using mosquito repellents, using spray, using fumigation) and incorrect responses (which includes drinking of boiled water, don't know, environmental factors and others).

Out of 256 respondents interviewed, 231 (90.9%) responded that sleeping inside bed net could prevent mosquito bite. 45.7% stated mosquito coils and 17.3% mentioned ITNs to prevent mosquito bite. Only 17.3% answered that they would sleep inside ITNs to prevent mosquito bite. (Table 5)

#### ***Knowledge about methods of prevention from Malaria***

Knowledge about methods of prevention from Malaria was dichotomised into correct response and incorrect response.

About 70% (n=168) of the respondents could correctly answer that Malaria could be prevented by sleeping inside bed net and only 11.2% (n=27) stated that ITN could be used to prevent Malaria. Majority of incorrect response was preventing Malaria by

drinking of boiled water 14.1% (n=34). Over 20% of respondents said that Malaria could be prevented by environmental measures such as regular change of water from flower pots and cleaning of bushes. (Table 6)

## **Knowledge on Insecticide Treated Nets**

### ***Knowledge on Insecticide Treated Nets (ITNs) and Insecticide Tablets***

Out of 256 respondents studied, 166 (64.8%) had heard about ITNs. Among them, 45.3% could answer the life span of ITNs. Although 174 (68.0%) of the respondents had heard about ITN tablets, most of the respondents did not know where they could buy the ITN tablets (83.6%). (Figure 3)

Responses to the life-span of ITNs were grouped into those stated as shorter than 6 months, 6-9 months (correct statement) and as above 6 months. 26.2% (n=67) of the respondents had stated that life-span of ITN was 6 months. One respondent stated as 60 months (maximum) and another one as zero month (minimum). Only 28.1% could correctly answer the life span of ITNs as 6-9 months. ( Figure 4)

## **Knowledge Level**

There were nine questions to study the knowledge status of respondents. We gave one score for each correct response. Possible total score was 28. Minimum score was 0 (zero), maximum score was 20, mean score was 7.9 and median score was 8. Most of respondents could answer up to score 8 (i.e. mode score is 8). Therefore, knowledge status of respondents was categorized into low knowledge level (knowledge score less than 8), medium knowledge level (knowledge score = 8) and high knowledge level (knowledge score above 8). In this study, 48% of the respondents had low knowledge and 38% of the respondents had high knowledge. (Table 7) and (Figure 5).

## **Attitude**

### ***Attitude on malaria prevention and ITNs***

Out of 256 respondents, 133(52.0%) correctly perceived that malaria could be prevented even if one is residing in malaria endemic area. 139 (54.3%) correctly perceived that malaria could be prevented if one is sleeping inside mosquito net. 221(86.7%) correctly believed that sleeping inside ITN at night reduces mosquito bite. 182 (71.1%) correctly perceived that sleeping inside ITN at night reduces bedbugs and lice. 192(75%) of the respondents expressed willingness to buy ITNs if they did not get free. (Table 8)

## 4.2 Attitude level

There were five questions to study the attitude status of respondents. We gave one score for each correct response. Possible total score was 5. Minimum score was 0 (zero), maximum score was 4, mean score was 2.5 and median score was 3. Most of respondents could answer up to score 3 (i.e. mode score is also 3). Therefore, attitude status of respondents was categorized into low attitude level (attitude score less than 3), medium attitude level (attitude score = 3) and high attitude level (attitude score above 3). Among 256 respondents, 45.3% got low score and 25% got high score. . (Table 9) and (Figure 6).

## V. Practice on prevention of malaria

### 5.1 Practice on use of bed nets and ITNs

97.7% of the respondents owned bed nets and 94% had habit of sleeping inside bed nets. Only 16% of total respondents had ITNs in their households and 88% of them had habit of sleeping inside ITNs (14.1% of total). (Figure 7)

Average ownership of bed nets was 3.1 and 0.35 ITNs per house hold. Average number of household members slept inside bed nets was 4.6 and that of household members slept inside ITNs was 0.6. (Table 10)

### 5.2 Practice level

There were five questions to assess the practice level of the respondents. We gave one score for each correct response. Possible total score was 4. Minimum score was 0 and maximum was 4. Mean score was 2.22 and medium was 2. Most of respondents (79.3%) could answer up to score 2(i.e. mode score is also 2). Therefore, practice status of respondents was categorized into low practice level (practice score less than 2), medium practice level (practice score = 2) and high practice level (practice score above 2). Among 256 respondents, 45.3% got low score and 25% got high score. (Table 11)

Table 12 shows relationship between history of malaria and bed net ownership. Out of 102 Malaria cases, 2 (2%) did not have bed nets. Although 86 (95.6%) of 90 Malaria cases did not have ITNs, there was no statistically significant association between ITN ownership and history of Malaria in the household ( $p = 0.538$ ).

Among 8 cases with history of Malaria in the family, 6 (75.0%) did not sleep under bed net last night. Among 88 cases with history of Malaria in the family, 87(98.9%) did not sleep inside ITNs last night. There was no statistically significant association between sleeping habit inside bed nets or ITNs and history of Malaria in the household. (Table13).



### **5.3 Reasons for not using ITN**

Out of 256, 221 (who were not using ITNs) gave reasons why they didn't use ITNs as follow: 69 (31.2%) did not know about ITNs, 67(30.3%) do not have ITNs, 32 (14.5%) could not afford to buy ITNs, 7(3.2%) were dislike to use. Most of others reasons were didn't know where they could buy ITN tablets and not having the habit of sleeping inside ITNs. (Figure 8)

### **Treatment seeking pattern on malaria**

#### *Treatment seeking pattern on malaria*

51.2% of the respondents answered that they would consult with basic health staffs (such as Midwife, Health Assistant, Station Medical Officer and Township Medical Officer) if there was any Malaria case in their families. The rest would consult with GP (23.1%), folk medicine (12.7%), traditional medicine (5.2%) and self treatment (7.7%). (Figure 9)

### **Association between Socio-demographic characteristics and KAP of respondents**

#### *Association between Socio-demographic characteristics and knowledge on malaria and ITN*

Table 14 shows association between Socio-demographic characteristics and knowledge on malaria and ITN.

Most of respondents with low educational status had low knowledge level on Malaria (46.9%) and those with high educational status had high knowledge level (64.3%). There was statistically significant association between educational status of respondents and knowledge ( $\chi^2 = 14.855$ ,  $p = 0.005$ ).

#### *Association between Socio-demographic characteristics and attitude on malaria prevention and ITN usage*

Most of respondents with low educational status had low attitude level on Malaria prevention and ITNs (57.0%) and there was statistically significant association between educational status of respondents and attitude ( $\chi^2 = 11.844$ ,  $p = 0.019$ ). (Table 15)

#### *Association between Socio-demographic characteristics and practice score*

There was no statistically significant association between socio-demographic characteristics and practice score. (Table 16)

#### *Association between respondents' knowledge and attitude*

Table (17) shows association between respondents' knowledge and attitude. There was statistically significant association between respondents' knowledge and attitude. ( $\chi^2 = 27.661$ ,  $p = 0.000$ ).

#### *Association between respondents' knowledge and practice*

Table (18) shows association between respondents' knowledge and practice. There was no statistically significant association between respondents' knowledge and attitude. ( $p = 0.541$ ).

#### *Association between respondents' attitude and practice*

Table (19) shows association between respondents' attitude and practice. There was no statistically significant association between respondents' attitude and practice. ( $p = 0.090$ ).

## **Discussion**

### *Knowledge status of respondents*

In this study, majority of the respondents had heard about malaria. But they had limited knowledge about signs and symptoms of malaria and the severe malaria. Most of them recognized chills and rigor and only a few of them could mention headache and sweating as signs and symptoms of Malaria. Their perceived severity regarding complications was mostly cerebral malaria and dead.

More than two-third (83.1%) of the study respondents were aware that mosquito bites as the mode of malaria transmission. However, there were misconceptions about mode of malaria transmission such as drinking of spring water, eating banana and lack of personal hygiene.

Although most of them (69.7%) believed that sleeping inside bed nets could prevent malaria, very few of them (11.2%) aware that sleeping inside ITNs could prevent malaria.

Although it seemed to be related that high income level and high knowledge level, there was no statistically significant association between income level and knowledge level ( $p=0.537$ ).

Education clearly influence the knowledge level on Malaria showing low educational status group had more proportion of low knowledge level (57%) and educated respondents had high knowledge level (64.3%). It is statistically significant ( $p=0.001$ ).

In this study, 48% of respondents had low knowledge level and 38% had high knowledge level. This might be due to low literacy rate of respondents because 50% of them had attained primary or middle school passed, 39.1% were illiterate or could read and write and only 10.9% were high school passed or university students or graduated.

#### *Attitude status of respondents*

During survey, positive attitude on malaria and ITNs was found in more than half of respondents. There is no statistically association between socio-demographic characteristics and using of ITNs, except in education. Although there was high proportion (45.8%) of low attitude status group in primary and middle school passed respondents, there was statistically significant association between education and attitude status. ( $p = 0.048$ )

#### *Practice on bed nets and ITNs*

Although ownership of bed net was high, ownership of ITN was relatively low. Sleeping under ITNs was relatively much lower than bed net. Among those who did not use ITNs, most common reasons were do not know and do not have ITNs.

There is no significant association between ownership of bed net, ITNs and Malaria, probable cause may be due to small sample size. There is no statistically significant association between history of fever and sleeping inside of bed nets or inside ITNs, but those who did not sleep inside ITNs suffered fever (4) times than who slept inside ITNs.

There is a need for improving the availability of information through the preferred community channels as well as professional health routes.

On interviewing treatment seeking behaviour, about half of respondents stated that they would consult with health personal for malaria.

### **Conclusion**

In conclusion, most respondents showed an understanding of malaria transmission. But there were significant misconceptions about modes of malaria transmission. Knowledge on ITNs as a tool for prevention of malaria was observed to be low (11.2%) among the study population.

In this study, most of the respondents had low attitude level about malaria and ITNs (75%). Although bed net ownership among the study population high, ITNs ownership was found to be low. Sleeping habit inside bed net was found to be high.

Major cause of low habit of sleeping inside ITNs was due to lack of awareness and due to unavailability to buy ITNs (nearly 30% each).

There was limited access to health information regarding ITNs, ITN tablets, their sources and life-span. These results call for targeted health education or communication to increase the population's knowledge on ITNs and ITN tablets.

Treatment seeking pattern on Malaria was found to be fair enough as the study participants answered that they would consult with Basic Health Staff if there was any Malaria case in their families (51.2%) and 23.1% with General Practitioner.

### **Recommendations**

Community awareness on mode of transmission of Malaria should be improved. Utilization of ITNs should be strengthened by means of regular and periodic health education and behavioral change communication on use of ITNs. The existing treatment seeking pattern on Malaria should be maintained and improved. Educational status of the community should be improved and the practice on use of ITNs should be empowered.

**Conflict of Interest:** None declared.

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Table (1) Socio-demographic characteristics of respondents in the study households

Characteristics	No (n= 256)	%
<b>Gender</b>		
• Male	115	44.9
• Female	141	55.1
<b>Age group</b>		
• <= 40 years	108	42.2
• > 40 years	148	57.8
<b>Race</b>		
• Bamar	253	98.8
• Others	3	1.2
<b>Marital status</b>		
• Single	31	12.1
• Married	221	86.3
• Others	4	1.6
<b>Education</b>		
Low	100	39.1
• Illiterate	15	5.9
• Read & write	85	33.2
Medium	128	50
• Primary school passed	89	34.8
• Middle school passed	39	15.2
High	28	10.9
• High School passed	13	5.1
• College/Graduated	15	5.9
<b>Occupation</b>		
• Farmer	139	54.3
• Dependent	27	10.5
• Small business	57	22.3
• Manual labour	23	9.0
Government staff	10	3.9

Table (2) Knowledge on awareness of Malaria

Heard about Malaria	No. (n=256)	%
Yes	253	98.8
No	3	1.2

Table (3) Knowledge about mode of transmission of Malaria

Mode of transmission	No.(n=256)	%
<b>Correct response</b>		
➤ Mosquito bite	202	83.1
➤ Blood Transfusion	1	0.4
➤ Mother to child transmission	0	0
<b>Incorrect response</b>		
➤ Drinking of Spring water	41	16.9
➤ Going into forest	24	9.9
➤ Eating Banana	15	6.2
➤ Lack of personal Hygiene	14	5.8
➤ Others	42	16.4
➤ Don't know	23	9.5

Note: Total percentage may be more than 100% due to multiple responses.

Table (4) Knowledge on persons at risk of Malaria

Risk persons	No.(n=256)	%
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<b>Correct response</b>		
➤ Travelling to malaria endemic area	102	39.8
➤ Travelling to forest/ mountainous area	88	34.4
<b>Incorrect response</b>		
➤ Others	72	28.1
➤ Don't know	55	21.5

Note: Total percentage may be more than 100% due to multiple responses.

Table (5) Knowledge about methods of prevention from mosquito bite

Methods	No.(n=256)	%
<b>Correct response</b>		
➤ Sleeping inside bed net	231	90.9
➤ Using the mosquito coils	116	45.7
➤ Sleeping inside ITNs	44	17.3
➤ Using fumigation	22	8.7
➤ Using spray	18	7.1
➤ Using mosquito repellent	12	4.7
<b>Incorrect response</b>		
➤ Environmental factors	51	20.1
➤ Drinking of boiled water	3	1.2
➤ Others	19	7.4
➤ Don't know	4	1.6

Note: Total percentage may more than 100 % due to multiple responses.

Table (6) Knowledge about methods of prevention from Malaria

Methods	No.(n=256)	%
<b>Correct response</b>		
➤ Sleeping with bed net	168	69.7
➤ Using the mosquito coils	38	15.8
➤ Sleeping with ITNs	27	11.2
➤ Using spray	9	3.7
➤ Using fumigation	8	3.3
➤ Using mosquito repellent	5	2.1
<b>Incorrect response</b>		
➤ Environmental factors	50	20.7
➤ Drinking of boiled water	34	14.1
➤ Others	38	14.8
➤ Don't know	46	19.1

Note: Total percentage may more than 100 % due to multiple responses.

Table (7) Knowledge level of respondents

Knowledge score on malaria and ITN	No.(n=256)	%
<b>Low (score &lt; 8)</b>	123	48
<b>Medium (score = 8)</b>	36	14
<b>High (score &gt; 8)</b>	97	38
<b>Total</b>	256	100

Table (8) Attitude on malaria prevention and ITNs

	Agree		Disagree		Don't know		Total	
	No.	%	No.	%	No.	%	No.	%
<b>Malaria could not be prevented if one is living in malaria endemic area</b>	73	28.5	133	52.0	50	19.5	256	100
<b>Sleeping inside mosquito nets at night does not prevent malaria</b>	84	32.8	139	54.3	33	12.9	256	100
<b>Sleeping inside ITNs at night reduces mosquito bite</b>	222	86.7	5	2.0	29	11.3	256	100



<b>Sleeping inside ITNs at night reduces bedbugs and lice</b>	<b>182</b>	<b>71.1</b>	11	4.3	63	24.6	256	100
<b>If ITN will not get free, I will buy</b>	<b>192</b>	<b>75</b>	36	14.1	28	10.9	256	100

Table (9) Attitude level of respondents on malaria prevention and ITNs

<b>Attitude score on malaria prevention and ITNs</b>	<b>No.(n=256)</b>	<b>%</b>
<b>Low (score ≤ 3)</b>	116	45.3
<b>Medium (score = 3)</b>	76	29.7
<b>High (score &gt; 3 )</b>	64	25.0
<b>Total</b>	256	100

Table (10) Ownership and use of bed net and ITNs

	<b>Mean ± SD</b>	<b>Range (min-max)</b>	<b>Median</b>
<b>No. of bed net</b>	3.1 ± 1.7	0 – 12	3
<b>No. of ITNs</b>	0.3 ± 0.9	0 – 5	0
<b>No. of household slept under bed net last night</b>	4.6 ± 2.2	0 – 12	5
<b>No. of household slept under ITNs last night</b>	0.6 ± 1.6	0 – 9	0

Table (11) Practice level of respondents on malaria prevention and ITNs

<b>Attitude score on malaria prevention and ITNs</b>	<b>No.(n=256)</b>	<b>%</b>
<b>Low (score ≤ 2)</b>	13	5.0
<b>Medium (score = 2)</b>	203	79.3
<b>High (score &gt; 2 )</b>	40	15.7
<b>Total</b>	256	100

Table (12) Relationship between history of Malaria in the household and bed net ownership

<b>Bed nets(+/-)</b>	<b>Malaria</b>			
	<b>Yes</b>		<b>No</b>	
	<b>No.</b>	<b>%</b>	<b>No</b>	<b>%</b>
<b>Yes</b>	100	98.0	150	97.4
<b>No</b>	2	2.0	4	2.6
<b>p = 0.548 (Fisher's exact probability test)</b>				
<b>ITNs(+/-)</b>				
<b>Yes</b>	4	4.4	7	5.1

<b>No</b>	86	95.6	129	94.9
<b>p = 0.538 (Fisher's exact probability test)</b>				

Table (13) Relationship between Malaria and sleeping inside bed-nets and ITNs

Sleeping with bed nets	Malaria			
	Yes		No	
	No.	%	No	%
<b>Yes</b>	2	25.0	3	25.0
<b>No</b>	6	75.0	9	75.0
<b>p = 0.704 (Fisher's exact probability test)</b>				
Sleeping with ITNs				
	Yes		No	
	No.	%	No	%
<b>Yes</b>	1	1.1	1	0.7
<b>No</b>	87	98.9	133	99.3
<b>p = 0.637 (Fisher's exact probability test)</b>				

Table (14) Association between socio-demographic characteristics of respondents and knowledge on Malaria and ITNs

Socio-demographic Characteristics of respondents	Knowledge (n=256)						x <sup>2</sup> Test
	Low(<8)		Median( = 8)		High(>8)		
	No.	%	No.	%	No.	%	
<b>Age</b>							p = 0.157
➤ ≤40yrs	45	41.7	15	13.9	48	44.4	
➤ > 40yrs	78	52.7	21	14.2	49	33.1	
<b>Gender</b>							p = 0.493
➤ Male	51	44.3	16	13.9	48	41.7	
➤ Female	72	51.1	20	14.2	49	34.8	
<b>Race</b>							p = 0.083
➤ Bamar	123	48.6	36	14.2	94	37.2	
➤ Others	0	0	0	0	3	100.0	
<b>Marital status</b>							p = 0.425
➤ Single	15	48.4	7	22.6	9	29.0	
➤ Married	105	47.5	29	13.1	87	39.4	
➤ Others	3	7.5	0	0	1	25.0	
<b>Educational status</b>							* <b>p=0.005</b> x <sup>2</sup> <b>=14.855</b>
➤ Low	57	57.0	16	16.0	27	27.0	
➤ Median	60	46.9	16	12.5	52	40.6	
➤ High	6	21.4	4	14.3	18	64.3	

<b>Occupation</b>							
➤ Currently working	109	47.6	31	13.5	89	38.9	p = 0.588
➤ Dependent	14	51.9	5	18.5	8	29.6	
<b>Annual family income</b>							
➤ ≤600,000kyats	64	48.1	21	15.8	48	36.1	p = 0.662
➤ > 600,000kyats	59	48.0	15	12.2	49	39.8	

Note: \* = Statistically significant at p = 0.05 level

Table (15) Association between socio-demographic characteristics and attitude score

Socio-demographic Characteristics of respondents	Attitude						x <sup>2</sup> Test
	Low(<3)		Median(3)		High(>3)		
	No.	%	No.	%	No.	%	
<b>Age</b>							
➤ ≤40yrs	46	42.6	32	29.6	30	27.8	p = 0.643
➤ > 40yrs	70	47.3	44	29.7	34	23.0	
<b>Gender</b>							
➤ Male	48	41.7	38	33	29	25.2	p = 0.5
➤ Female	68	48.2	38	27	35	24.8	
<b>Marital status</b>							
➤ Single	10	32.3	12	38.7	9	29.0	p = 0.13
➤ Married	102	46.2	64	29.0	55	24.9	
➤ Others	4	100	0	0	0	0	
<b>Educational status</b>							
➤ Low	57	57.0	26	26.0	17	17	*p = 0.019 x <sup>2</sup> = 11.844
➤ Median	50	39.1	38	29.7	40	31.2	
➤ High	9	32.1	12	42.9	7	25	
<b>Occupation</b>							
➤ Currently working	99	43.2	71	31.0	59	25.8	P=0.146
➤ Dependent	17	63.0	5	18.5	5	18.5	
<b>Annual family income</b>							
➤ ≤600,000kyats	62	46.6	41	30.8	30	22.6	P=0.642
➤ > 600,000kyats	54	43.9	35	34	34	27.6	

Note: \* = Statistically significant at p = 0.05 level

Table (16) Association between socio-demographic characteristics and practice score

Socio-demographic Characteristics of respondents	Practice (n=256)						x <sup>2</sup> Test
	Low(<2)		Median(2)		High(>2)		
	No.	%	No.	%	No.	%	
<b>Age</b>							p = 0.581
➤ ≤40yrs	7	6.5	86	79.6	15	13.9	
➤ > 40yrs	6	4.1	117	79.1	25	16.9	
<b>Gender</b>							p = 0.154
➤ Male	7	6.1	85	73.9	23	20.0	
➤ Female	6	4.3	118	88.7	17	12.1	
<b>Race</b>							p = 0.673
➤ Bamar	13	5.1	200	79.1	40	15.8	
➤ Others	0	0	3	100.0	0	0	
<b>Marital status</b>							p = 0.083
➤ Single	5	16.1	20	64.5	6	19.4	
➤ Married	8	3.6	180	81.4	33	14.9	
➤ Others	0	0	3	75.0	1	25.0	
<b>Educational status</b>							p = 0.564
➤ Low	7	7.0	78	78.0	15	15.0	
➤ Median	4	3.1	105	82.0	19	14.8	
➤ High	2	7.1	20	71.4	6	21.4	
<b>Occupation</b>							p = 0.413
➤ Currently working	12	5.2	179	78.2	38	16.6	
➤ Dependent	1	3.7	24	88.9	2	7.4	
<b>Annual family income</b>							p = 0.769
➤ ≤600,000kyats	8	6.0	104	78.2	21	15.8	
➤ > 600,000kyats	5	4.1	99	80.5	19	15.4	

Table (17) Association between respondents' knowledge and attitude

Knowledge	Attitude (n=256)			Total %
	Low (<3)	Medium(=3)	High(>3)	
<b>Low(&lt;8)</b>	58.5	26.8	14.6	100
<b>Medium(=8)</b>	50.0	30.6	19.4	100
<b>High(&gt;8)</b>	26.8	33.0	40.2	100

Table (18) Association between respondents' knowledge and practice

Knowledge	Practice (n=256)			Total %
	Low (<2)	Medium(=2)	High(>2)	
Low(<8)	6.5	77.2	16.3	100
Medium(=8)	2.8	75.0	22.2	100
High(>8)	4.1	83.5	12.4	100

Table (19) Association between respondents' attitude and practice

Attitude	Practice (n=256)			Total %
	Low (<2)	Medium(=2)	High(>2)	
Low(<3)	7.8	80.2	12.0	100
Medium(=3)	2.6	73.7	23.7	100
High(>3)	3.1	84.4	12.5	100

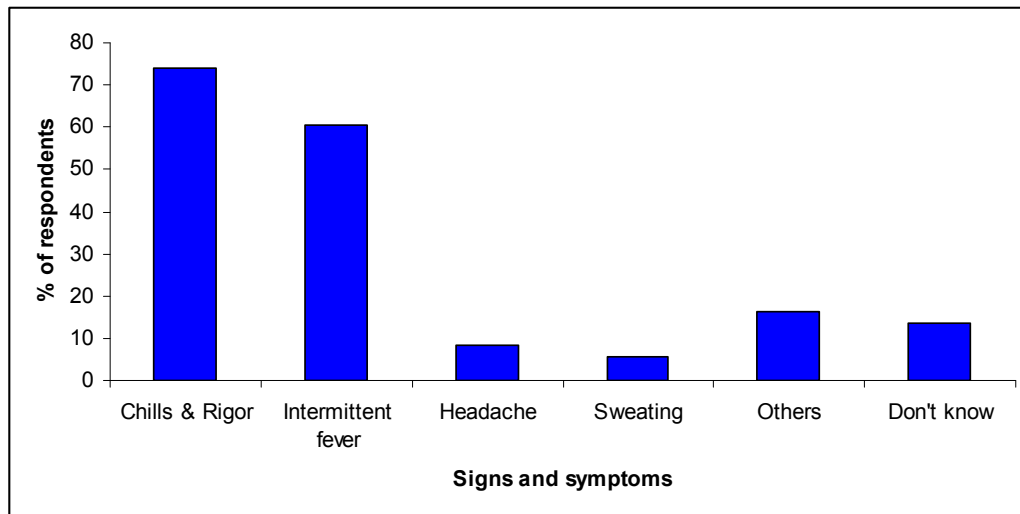


Figure (1) Knowledge about signs and symptoms of Malaria

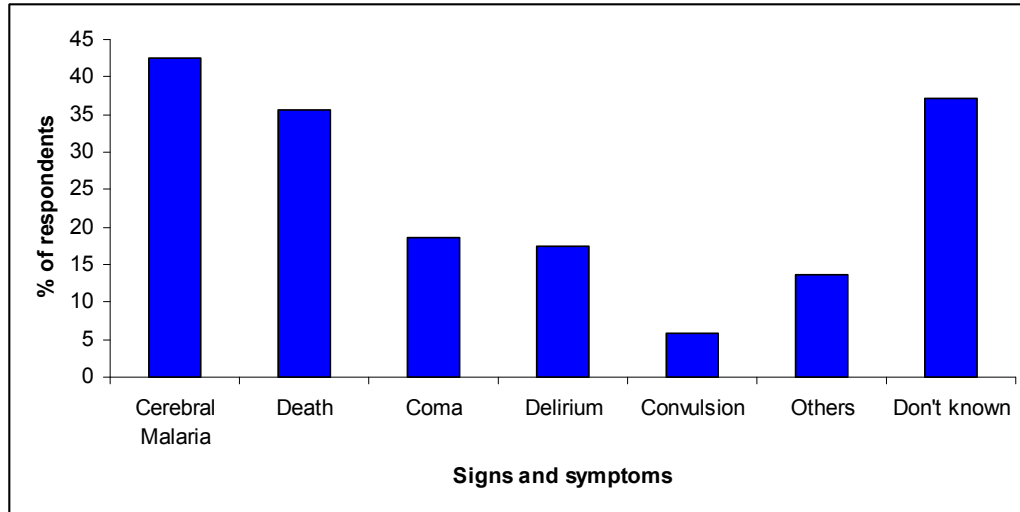


Figure (2) Knowledge about complications of Malaria

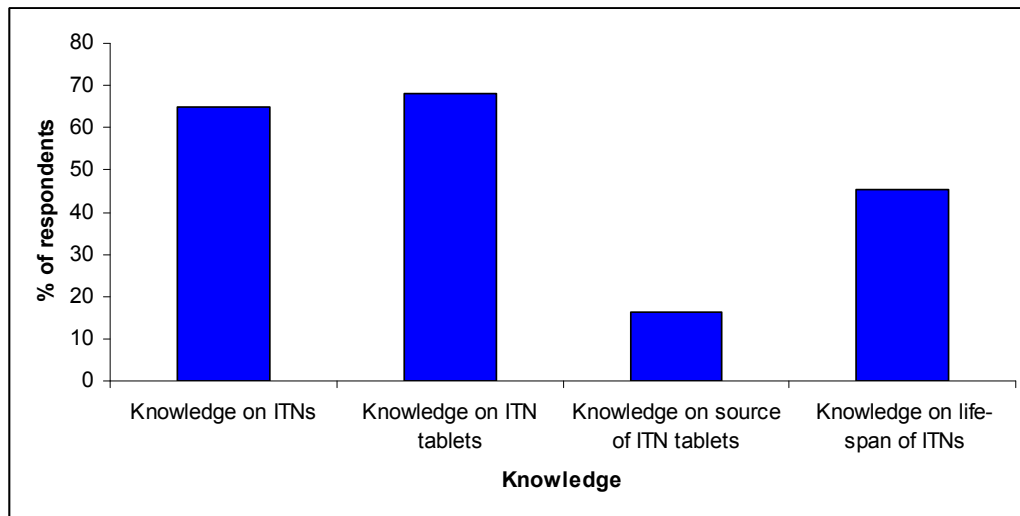


Figure (3) Knowledge on awareness of the existence of ITNs and Insecticide Tablets

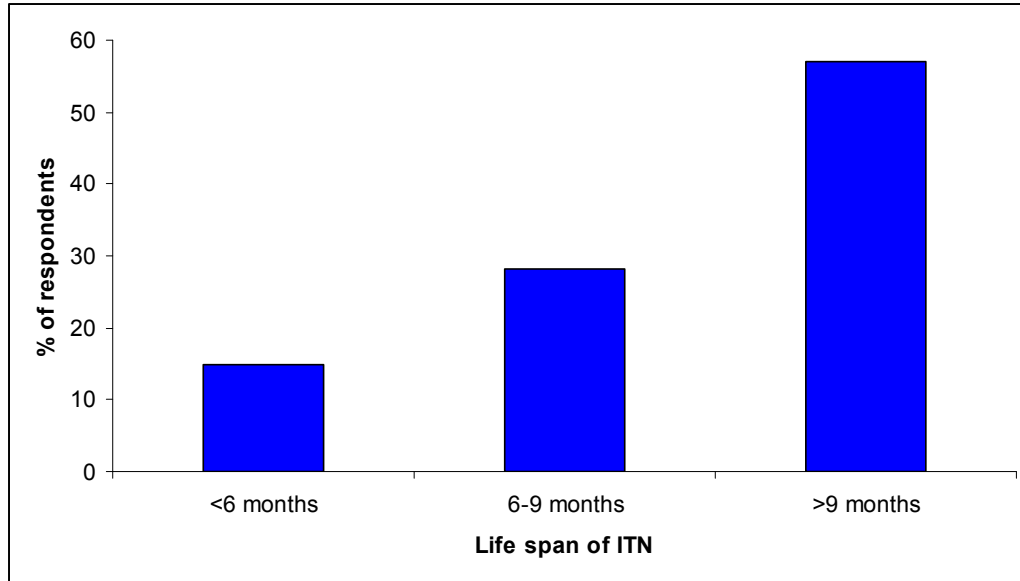


Figure (4) Knowledge on life-span of ITNs

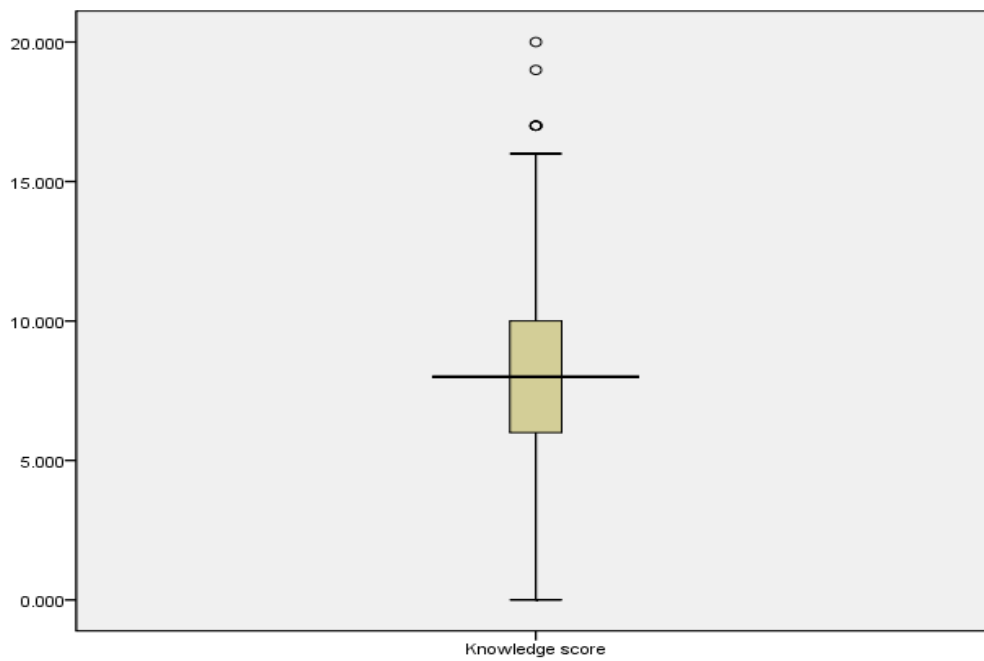


Figure (5) Box and plot of Knowledge score

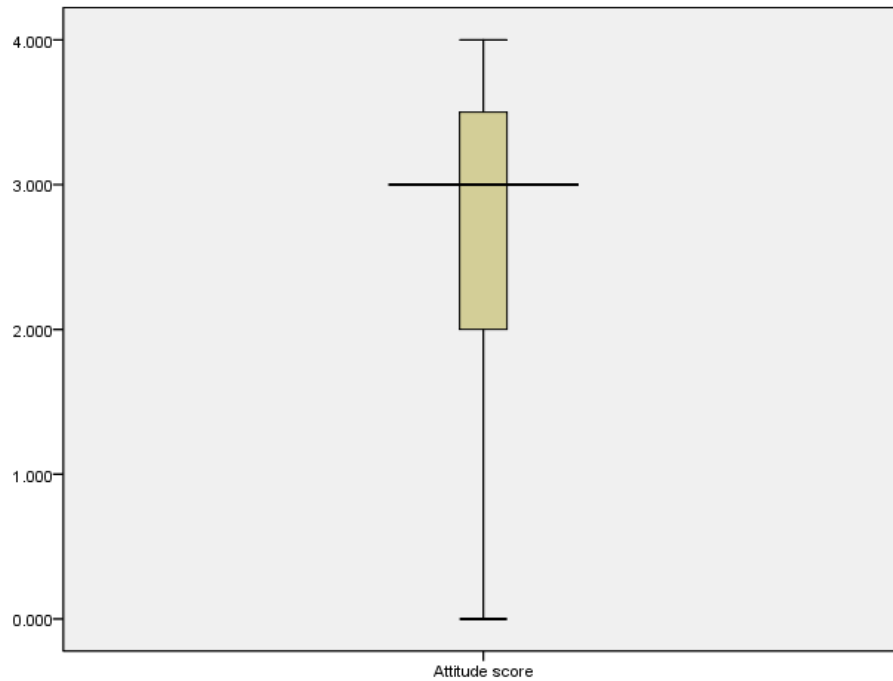


Figure (6) Box and plot of Attitude score

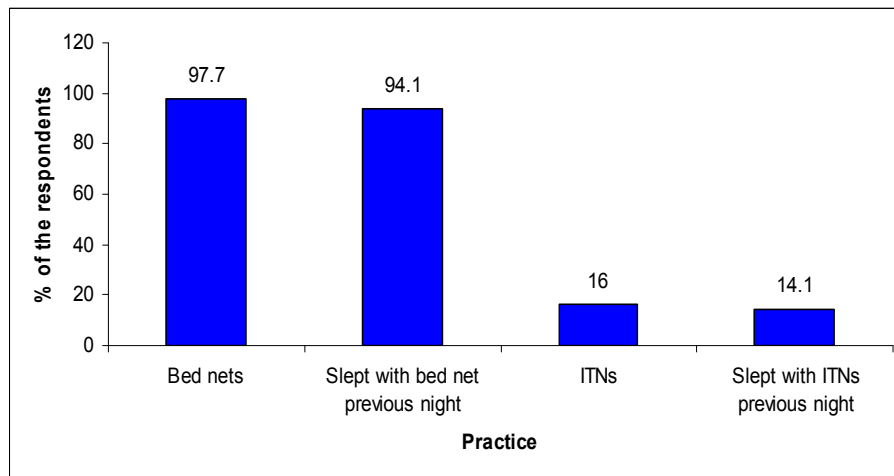


Figure (7) Practice on use of bed nets and ITNs



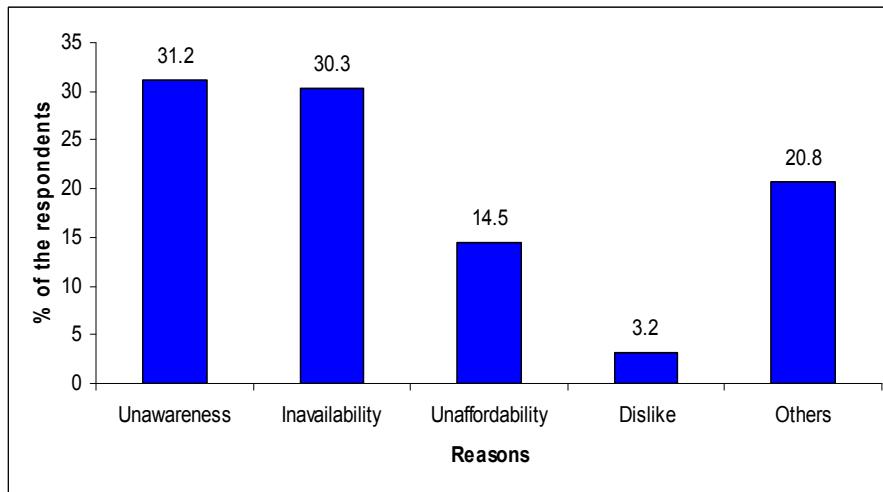


Figure (8) Reasons for not using ITNs

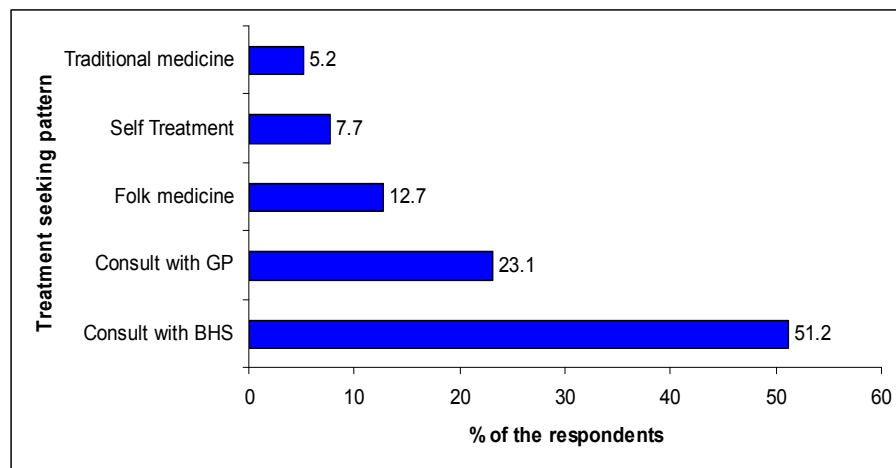


Figure (9) Treatment seeking behaviour of Malaria