

ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING MALARIA  
PREVENTION TOWARDS INTERNAL MIGRANT POPULATION IN KAWTHOUNG TOWNSHIP,  
KAWTHOUNG DISTRICT, TANINTHARYI REGION, MYANMAR: A CROSS SECTIONAL STUDY



Mr. Sa Aung Hein

จุฬาลงกรณ์มหาวิทยาลัย

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การประเมินความรู้ เจตคติและการปฏิบัติตนเพื่อการป้องกันโรคมalariaเรียของกลุ่มผู้อพยพในเมืองกอดาวังอำเภอท่าวุ้ง เขตหะนินทะยี่ ประเทศเมียนมา ประเทศเมียนมา: การวิจัยภาคตัดขวาง



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By Mr. Sa Aung Hein

Field of Study Public Health

Thesis Advisor Assistant Professor Naowarat Kanchanakhan, Ph.D.

---

Accepted by the College of Public Health Sciences, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

.....Dean of the College of Public Health Sciences  
(Professor Sathirakorn Pongpanich, Ph.D.)

THESIS COMMITTEE

.....Chairman  
(Tepanata Pumpaibool, Ph.D.)

.....Thesis Advisor  
(Assistant Professor Naowarat Kanchanakhan, Ph.D.)

.....External Examiner  
(Nanta Auamkul, M.D., M.P.H.)

ชา อ่อง เทียน : การประเมินความรู้ เจตคติและการปฏิบัติตนเพื่อการป้องกันโรคมาลาเรียของกลุ่มผู้อพยพในเมืองกอดาว์จ้ออำเภอกอดาว์ เขตตะนินทะยี ประเทศเมียนมา ประเทศเมียนมา: การวิจัยภาคตัดขวาง (ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING MALARIA PREVENTION TOWARDS INTERNAL MIGRANT POPULATION IN KAWTHOUNG TOWNSHIP, KAWTHOUNG DISTRICT, TANINTHARYI REGION, MYANMAR: A CROSS SECTIONAL STUDY) อ.ที่ปริกษาวิทยานิพนธ์หลัก: ผ.ศ. เนาวรัตน์ กาญจนาคารปริญญาเอก, 119 หน้า.

มาลาเรียเป็นโรคที่สามารถป้องกันได้การวินิจฉัยที่รวดเร็วและการรักษาที่มีประสิทธิภาพจึงมีความจำเป็นอย่างยิ่งเพื่อให้ได้ผลลัพธ์ที่ดีที่สุดในการรักษา ประชากรที่อาศัยอยู่ในเขตที่มีการติดต่อกับโรคมาลาเรียสูงเช่นเมืองกอดาว์มีความจำเป็นที่จะต้องมีความรู้ เจตคติและการปฏิบัติตนในการป้องกันโรคมาลาเรียเป็นอย่างดี วัตถุประสงค์ของการวิจัยในครั้งนี้เพื่อประเมินและอธิบายความสัมพันธ์ระหว่างปัจจัยต่างๆ ได้แก่ ลักษณะทางสังคมของประชากร ความรู้ เจตคติต่อการปฏิบัติตนในการป้องกันมาลาเรียในกลุ่มประชากรผู้อพยพในเมืองกอดาว์ อำเภอกอดาว์ ประเทศเมียนมา การวิจัยครั้งนี้เป็นการวิจัยเชิงสำรวจภาคตัดขวางประชากรที่สำรวจมีจำนวนทั้งสิ้น 361 ราย มีช่วงอายุอยู่ระหว่าง 18 ถึง 65 ปี การรวบรวมข้อมูลโดยใช้แบบสอบถามด้วยการสัมภาษณ์และวิเคราะห์หาความสัมพันธ์ทางสถิติระหว่างตัวแปรอิสระและตัวแปรตามด้วย โค-สแควร์และการวิเคราะห์ถดถอยโลจิสติก จากผลการศึกษาพบว่า ประชากรร้อยละ 65.5 มีความรู้เกี่ยวกับโรคมาลาเรียในระดับดี ประชากรร้อยละ 17.4 มีเจตคติที่ดีต่อการปฏิบัติตนเพื่อป้องกันโรคมาลาเรีย และประชากรร้อยละ 49.1 มีการปฏิบัติตนอย่างถูกต้องเหมาะสมอยู่ในระดับดี นอกจากนี้ยังพบว่าการปฏิบัติตนเพื่อการป้องกันโรคมาลาเรียมีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับระดับความรู้และระดับเจตคติของประชากร ( $P < 0.001$ ) และยังพบปัจจัยที่มีความสัมพันธ์อย่างมีนัยสำคัญกับการปฏิบัติตนเพื่อป้องกันโรคมาลาเรีย ได้แก่ ช่วงอายุ 45-54 ปี ( $P = 0.004$ ,  $OR = 7.478$ ,  $95\% CI = 1.930-28.978$ ) การศึกษาระดับมัธยมศึกษาหรือสูงกว่า ( $P = 0.021$ ,  $OR = 11.363$ ,  $95\% CI = 1.454-88.814$ ) รายได้ของครอบครัวมากกว่า 2 แสนจ๊าดต่อเดือน ( $P < 0.001$ ,  $OR = 14.242$ ,  $95\% CI = 3.240-62.608$ ) มีสมาชิกในครอบครัวน้อยกว่า 3 คน ( $P = 0.005$ ,  $OR = 4.670$ ,  $95\% CI = 1.576-13.834$ ) การเข้าถึงสถานพยาบาลได้รวดเร็วกว่า 30 นาทีโดยรถมอเตอร์ไซด์ ( $P < 0.001$ ,  $OR = 122.092$ ,  $95\% CI = 20.339-732.915$ ) การได้รับข้อมูลจากเจ้าหน้าที่ของรัฐบาล ( $P = 0.010$ ,  $OR = 8.293$ ,  $95\% CI = 1.669-41.211$ ) และกลุ่มประชากรที่มีเจตคติระดับดี ( $P = 0.017$ ,  $OR = 6.089$ ,  $95\% CI = 1.387-26.739$ ) จากผลการวิจัยนี้มีข้อเสนอแนะว่าอาสาสมัครมาลาเรียและเจ้าหน้าที่ของรัฐบาลที่มีส่วนเกี่ยวข้องกับการควบคุมและป้องกันโรคมาลาเรียควรจัดกิจกรรมเคลื่อนที่ไปยังชุมชนต่างๆ เพื่อส่งเสริมความรู้เรื่องโรคมาลาเรีย เพิ่มความตระหนักเกี่ยวกับการปฏิบัติเพื่อการป้องกันโรคมาลาเรียอย่างถูกต้องและเหมาะสม

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ปีการศึกษา 2560

ลายมือชื่อนิสิต .....

ลายมือชื่อ อ.ที่ปริกษาหลัก .....

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SA AUNG HEIN: ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING MALARIA PREVENTION TOWARDS INTERNAL MIGRANT POPULATION IN KAWTHOUNG TOWNSHIP, KAWTHOUNG DISTRICT, TANINTHARYI REGION, MYANMAR: A CROSS SECTIONAL STUDY. ADVISOR: ASST. PROF. NAOWARAT KANCHANAKHAN, Ph.D., 119 pp.

Since malaria is preventable disease, early diagnosis and effective treatment of malaria is necessary for optimal outcome. For people living in high transmission of malaria areas such as in Kawthoung Township, it is crucial for them to have good knowledge, attitude and practice toward malaria prevention. This study was aimed to assess and describe the socio-demographic factors, knowledge, attitude and practice towards malaria prevention in internal migrant people, Kawthoung Township, Kawthoung District, Myanmar. Research design was cross-sectional study which Three hundred and sixteen respondents who age range from 18 to 65 years old were interviewed face to face with structure questionnaire and collected the data. Chi-square and logistic regression were used to analyze association between dependent and independent variable. From the results, it showed that 65.5% had good knowledge, 17.4% had good attitude and 49.1% had good practice for malaria prevention. Practice level was strongly associated with knowledge level and attitude level (P-value <0.001). Factors associated with good practice were respondents with age group 45 to 54 years (P-value = 0.004, AOR = 7.478, 95% CI: 1.930-28.978, high school or higher education (P = 0.021, AOR = 11.363, 95% CI: 1.454- 88.814) income more than 200000 kyats per month (P-value <0.001, AOR = 14.242, 95% CI: 3.240-62.608), less than 3 family members (P-value = 0.005, AOR = 4.670, 95% CI: 1.576- 13.834), accessibility to health facility with less than 30 minutes (P-value <0.001, AOR = 122.092, 95% CI: 20.339-732.915), source of information by government health staffs (P-value = 0.010, AOR = 8.293, 95% CI:1.669-41.211) and good attitude level (P-value = 0.017, AOR = 6.089, 95% CI:1.387-26.739). Community mobilization activities regarding malaria prevention through Volunteer Malaria Workers and government health staff were necessary in order to improve knowledge, attitude and practice regarding malaria prevention practice.

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Student's Signature .....

Advisor's Signature .....

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## LIST OF ABBREVIATION

ABER	Annual Blood Examination Rate
ACD	Active Case Detection
ACT	Artemisinin Combination Therapy
API	Annual Parasite Index
DOT	Directly Observed Treatment
G6PD	Glucose 6 Phosphate Dehydrogenase
GMS	Greater Mekong Sub-region
IPTi	Intermittent Preventive Treatment of Infants
IPTp	Intermittent Preventive Treatment of Pregnant
IRS	Indoor Residual Spraying
ITN	Insecticide Treated Net
IVM	Integrated Vector Management
KAP	Knowledge, Attitude and Practice
Kdr	Knock Down Resistance
LLIN	Long Lasting Insecticide Net
LSM	Larval Source Management
NGO	Non-Government Organization
NMCP	National Malaria Control Program
<i>P.f</i>	<i>Plasmodium falciparum</i>
<i>P.k</i>	<i>Plasmodium knowlesi</i>
<i>P.m</i>	<i>Plasmodium malariae</i>
<i>P.o</i>	<i>Plasmodium ovale</i>
<i>P.v</i>	<i>Plasmodium vivax</i>
RBC	Red Blood Cell
SEA	South East Asia
SMC	Seasonal Malaria Chemoprevention
TES	Therapeutic Efficacy Study

TPR

Test Positivity Rate

VBDC

Vector Borne Disease Control

WHO

World Health Organization



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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Background and Rationale**

Malaria is caused by a parasite which is transmitted through the bite of certain type of infected *Anopheles* female mosquito. Malaria parasite can cause serious health condition to host and if untreated can cause death. Common symptom of malaria infected people present with high fever with chills and rigor. Malaria parasites which can cause infection in human are: *Plasmodium falciparum* (*P.f*), *Plasmodium vivax* (*P.v*), *Plasmodium ovale* (*P.o*), *Plasmodium malariae* (*P.m*) and *Plasmodium knowlesi* (*P.k*). Without proper treatment, people who are infected severely with *P. falciparum* can result in death. Since malaria is preventable disease, certain types of prevention measures must be done to avoid incidence of the malaria. (1)

According to World Malaria report 2016, there were 212 million malaria cases in worldwide in 2015. Although reduction in incidence of malaria by 21% and mortality rate by 29% during the period of 2010 to 2015, malaria remained one of the major health problems especially in developing countries. For elimination of malaria, World Health Organization (WHO) developed global technical strategy for malaria 2016 – 2030. In order to eliminate malaria, prevention and control of vector, use of personal protection, chemoprevention and early diagnosis and effective treatments are necessary. For prevention and control of malaria, use of insecticide treated net (ITN) and indoor residual spraying (IRS) make important intervention. While controlling and preventing the malaria, it is also important to pay attention for insecticide and drug resistant malaria. These resistant problems can prevent the goals of achieving prevention and control of malaria. (2)

In order to achieve malaria elimination, it is crucial for countries to have strong leadership and capacity to reach fully to the community. Malaria elimination cannot be achieved without community participation. Community participation can be assessed

by knowledge, attitude and practice of population regarding malaria prevention and control. (3)

Approximately 1.4 billion people are living in South East Asia (SEA) Region with malaria risk while 1.5 million people had confirmed malaria cases and 620 cases of malaria death in 2015. (2)

Malaria is endemic in 5 out of 6 countries in Greater Mekong Sub (GMS) Region which are Myanmar, Lao People Democratic Republic, Vietnam, Thailand and Cambodia. These countries have more than 60% of malaria transmission areas individually. Migration between these countries is risk factor in controlling the malaria. For malaria elimination, national strategies of countries with malaria endemic areas need to work together. These strategies should focus on controlling *artemisinin* resistance malaria and malaria elimination in migrant population. (4)

GMS nations face challenge in malaria prevention and control with border areas which are high transmission areas. Drug resistant *P. falciparum* malaria becomes major problem between Thailand and Cambodia border. GMS nations need to work together on intercepting transmission of malaria including the drug resistant and to prevent reintroduction. (5)

Myanmar is largest country in mainland of South East Asia region. For geographic distribution, most of the area in Myanmar is covered with forests and costal which are favorable breeding sites for mosquitoes. In Myanmar, 43% of total population lives in malaria transmission area while 41% live in potential malaria transmission area. While increasing in annual blood examination rate (ABER) from 2005 to 2016, the test positivity rate (TPR) of malaria show decrease trend with 4.1 in 2016. Majority of malaria species are *P. falciparum* with 66% followed by *P. vivax* with 34%. Resistant malaria cases are found near Thailand – Myanmar border areas where 10 – 20 % of patients were found positive on third day after the treatment with Artemisinin combination therapy. (6) For intervention in control and prevention of malaria, Ministry of health and sport of Myanmar prevent and control malaria by distributing insecticide treated net (ITN), indoor residual spraying (IRS), larval control, , diagnosis and treatment of malaria together with surveillance. (2)

Kawthoung Township is located in southernmost part of Myanmar which is part of Tanintharyi Region. East of Kawthoung is adjacent with Ranong, Thailand while in the west, and south-west, the Andaman Sea and Bokpyin Township which is in the north. Total 116,980 people live in Kawthoung Township according to 2014 National Census Data. It has a tropical monsoon climate which is desirable for mosquito breeding.(7) 60% of total populations in Kawthoung Township work in agriculture, fishing and forestry which are easily susceptible for transmission of malaria. In addition, almost all of the workers are migrants from central part of the Myanmar. They tend to move one work place to another within 6 months or more according to their job nature. So, control and prevention of malaria for these migrants' people is challenging for implementing organizations. The department of health through National Malaria Control Program (NMCP) work together with Non-Government Organization (NGO) in control and prevention of malaria. According to previous studies in Kawthoung Township regarding malaria awareness showed interventions are necessary (8) Therapeutic efficacy test study (TES) in Kawthoung show that 4.8% had treatment failure with *Artemeter-Lumefentrine* while 19% had failure with *Dihydroartemisinin-Piperaquine*. (6) According to Vector Borne Disease Control (VBDC) Tanintharyi data, in Kawthoung Township, total 887 malaria positive cases were detected in 2015 with Annual Blood Examination Rate (ABER) of 23.3 and Annual Parasite Index (API) of 6.3.(9)So, knowledge, attitude and practice regarding malaria prevention in people living in these areas need to be good in order to implement malaria elimination practices which are the goal of National Malaria Control Program.

## 1.2 Problem statement

Since malaria is preventable disease, early diagnosis and effective treatment of malaria is necessary for optimal outcome. For people living in high transmission of malaria areas such as in Kawthoung Township, it is crucial for them to have good knowledge, attitude and practice toward malaria prevention. Therefore, it is reasonable to assess of knowledge, attitude, and practice regarding malaria prevention towards internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar where malaria cases are common and anti-malarial drug resistant area. In this study, we focus on internal migrant population from different part of

Myanmar as they are sometime left out in providing health services and due to their working nature they are more prone to malaria. There is no previous knowledge, attitude and practice (KAP) study regarding malaria prevention conducted in Kawthoung Township. So, there is no information on malaria KAP for policy maker to use. By conducting this study, we aim to strengthen the research gap.

### **1.3 Research questions**

- What are the knowledge, attitude and practice toward malaria prevention among the internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar?
- What malaria prevention practices are being used in migrant population?
- Is there any association between socio-demographic characteristic and malaria prevention practice?
- Is there any association between knowledge and malaria prevention practice?
- Is there any association between attitude and malaria prevention practice?

### **1.4 Research objectives**

#### **1.4.1 General objective**

- To assess the knowledge, attitude and practice toward malaria prevention among the internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.

#### **1.4.2 Specific objective**

- To describe the socio-demographic status, knowledge level, attitude level and practice level toward malaria prevention of internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.
- To assess association between socio-demographic status and practice level toward malaria prevention of internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.

- To assess association between knowledge and practice level toward malaria prevention of internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.
- To assess association between attitude and practice level toward malaria prevention of internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.

### 1.5 Research hypothesis

1. There is association between socio-demographic status and malaria prevention practice of internal migrant population.
2. There is association between knowledge level and malaria prevention practice of internal migrant population.
3. There is association between attitude level and malaria prevention practice of internal migrant population.

### 1.6 Operational Definitions

**Socio-demographic characteristics** are characteristics of age, gender, ethnicity marital status, education level, occupation, income, length of stay, family member and accessibility to health facility.

**Knowledge of Malaria** is the ability of person to have correct understanding about malaria regarding, vector, transmission, symptoms, diagnosis, prevention and control, drug resistant malaria and source of information where they get this malaria knowledge.

**Attitude toward malaria** is belief on susceptibility, seriousness/threat, prevention methods and treatment of malaria.

**Practices on malaria prevention** include protection from mosquito bite such as use of personal protection, use of bed net (ordinary and insecticide treated net), control of mosquito breeding sites and treatment seeking behavior.

**Length of stay** refers to duration of living in Kawthoung Township.

**Source of information** refers to source or channel that provides malaria knowledge to the people.

**Health facility** is the place that provides health care. It include hospital, clinic and health center

**Vector** refers to organism (mosquito) that transmits malaria infection to host.

**Transmission** refers to mode of transmission of malaria infection.

**Symptom** refers to common and severe symptoms of malaria infection.

**Diagnosis** refers to type of investigation of malaria infection.

**Drug resistant malaria** refers to resistance of malaria parasite to currently available antimalarial drugs

**Susceptibility** refers to individual personal feeling toward the malaria prevention and infection.

**Seriousness and threat** refers to severity extent of malaria and causation of social and financial risk.

**Treatment** refers to types of treatment given to malaria infected person and how they seek treatment when they get malaria.

**Treatment seeking behavior** means action made by an individual when he or she suspects malaria to correct the illness.

**An internal migrant** refers to Myanmar citizen who has migrated from one place to another inside the country and stay in migrated place for more than six months. In this study, a person who was not born at Kawthoung Township and migrated to Kawthoung Township while staying for more than six months.

## 1.7 Expected Outcomes and Benefits

1. The results can be used to know the effect of National Malaria Control Program interventions especially in elimination of malaria.
2. The results can help policy makers in deciding the effective health education methods for migrant population.

## 1.8 Variable of the study

### Independent variables

#### 1. Socio Demographic characteristics

- Age
- Gender
- Ethnicity
- Marital status

- Education Level
- Occupation
- Income
- Length of stay
- Family member
- Accessibility to health facility

## **2. Knowledge of Malaria**

- Source of information
- Vector
- Transmission
- Symptom
- Diagnosis
- Treatment
- Prevention and control
- Drug resistant malaria

## **3. Attitude towards Malaria**

- Susceptibility
- Seriousness/threat
- Prevention methods
- Treatment

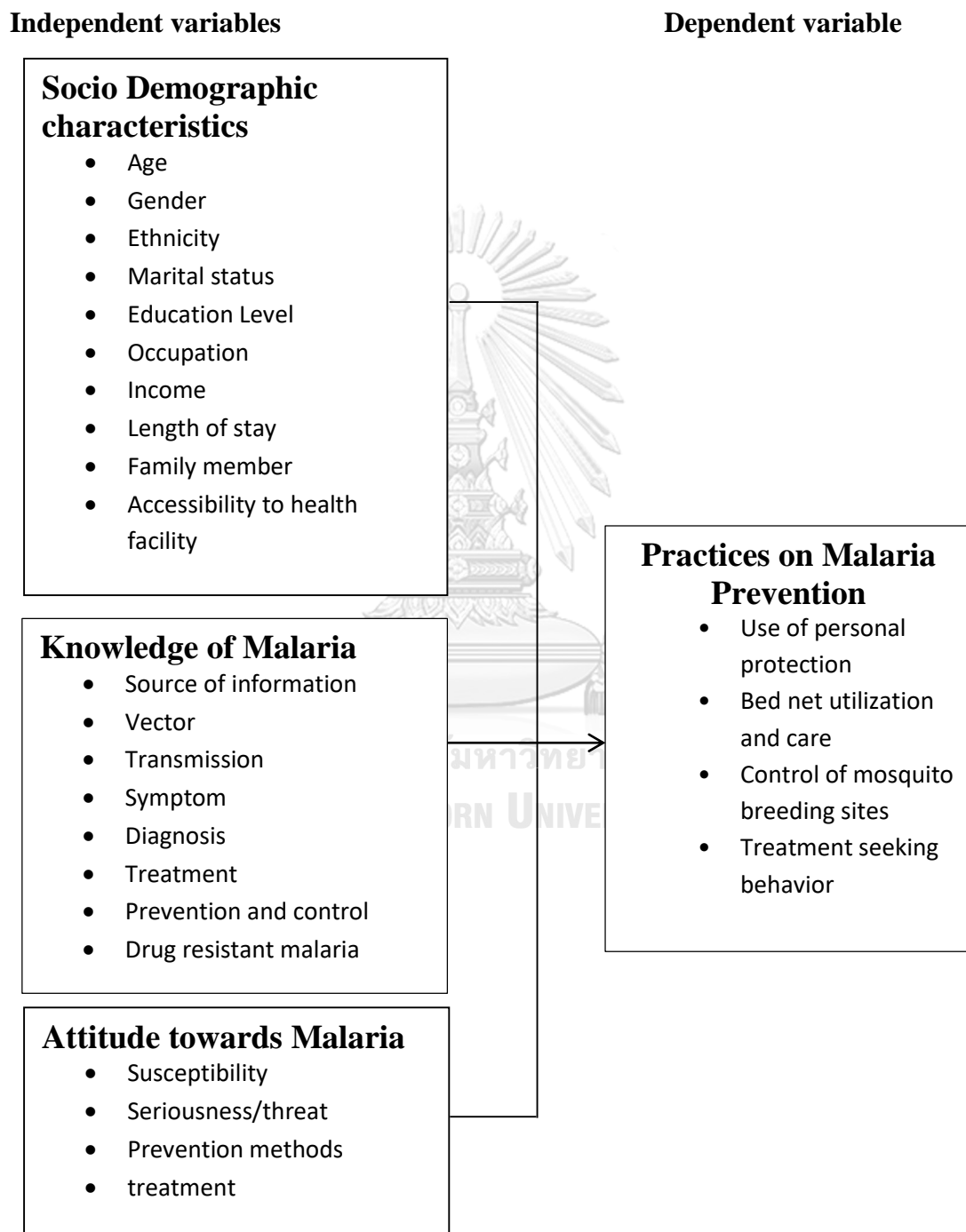
### **Dependent variable**

#### **1. Practices on Malaria Prevention**

- Use of personal protection
- Bed net utilization and care
- Control of mosquito breeding sites
- Treatment seeking behavior

## 1.9 Research Conceptual Framework

Figure 1 shows the factors affecting malaria preventive behaviors. Those factors include socio- demographic characteristics, knowledge of malaria and attitude toward malaria.



**Figure 1 Research Conceptual Framework**



## **CHAPTER 2**

### **LITERATURE REVIEW**

This chapter includes definition of malaria disease, malaria vector, behavior of malaria vector, mode of transmission, symptoms, prevention and control of malaria, people attitude toward malaria and internal migrants followed by reviews of previous relevant researches finding on knowledge level, attitude level and practice level toward malaria prevention.

#### **2.1 Malaria**

##### **2.1.1 Definition of malaria disease**

Malaria is an infection caused by *Plasmodium* parasite which is usually carried by infected *Anopheles* mosquito. Most of the people with malaria presented with fever, chill and rigor. Without treatment, complication of malaria can occur which may eventually cause death. About 212 million malaria cases occurred worldwide in 2015 and caused dead to 429,000 people, mainly in African Region. (1) Detection of malaria parasite in blood or tissues which is confirmed by diagnostic testing is known as malaria infection. (10)

##### **2.1.2 Types of malaria parasites**

*P. falciparum*, *P. vivax*, *P. malariae*, *P. ovale* and *P. knowlesi* cause malaria in human. From the five parasites, *P. falciparum* usually cause serious infection while *P. vivax* usually presented with recurrent infection.

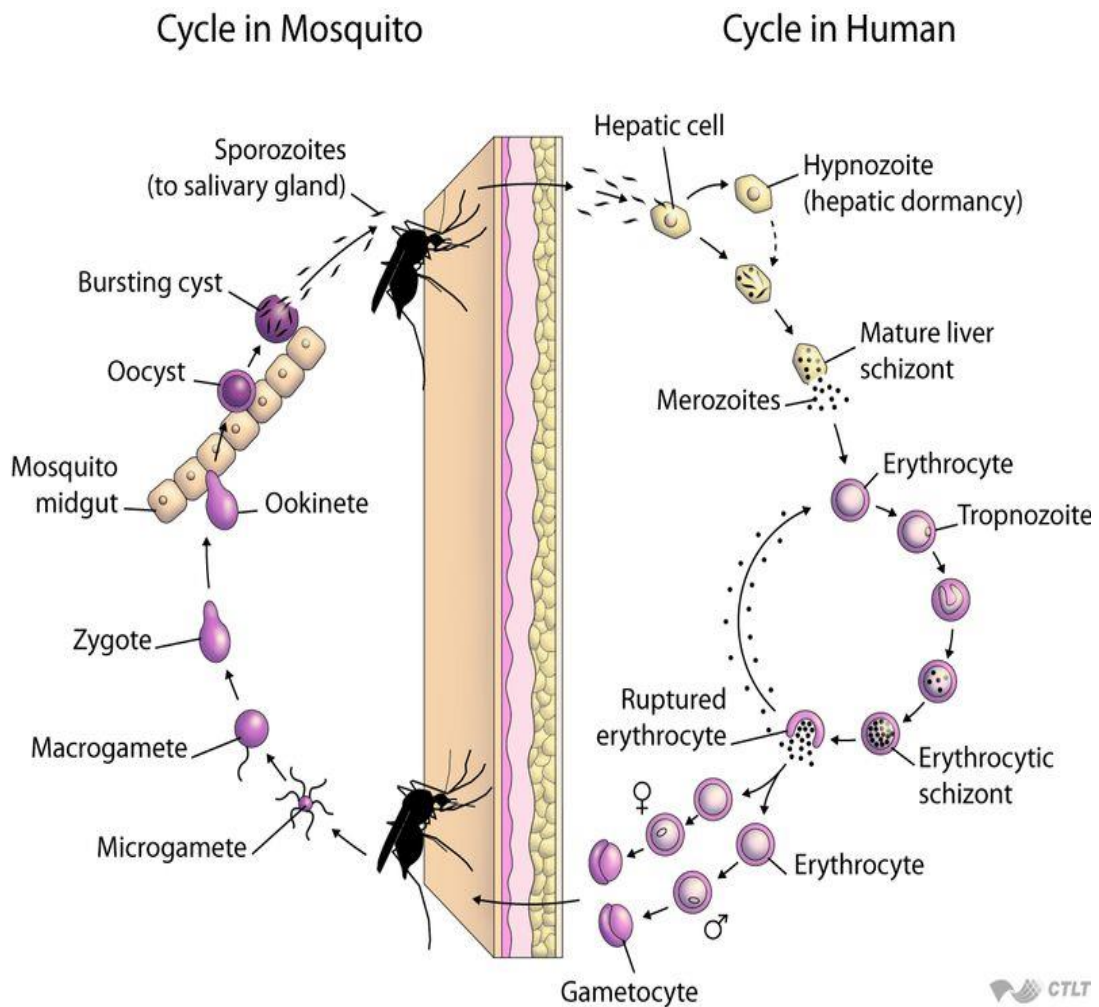
Due to ability of *P. falciparum* to multiply rapidly in red blood cells, it can cause serious complications such as anemia and cerebral malaria. *P. vivax* can transform into hypnozoites in liver and stay for a long period. After certain period, these hypnozoites can reactivate and cause malaria when they enter the blood stream. *P. knowlesi* usually does not cause infection in human. When it infect human, it is usually severe due to shorter replication life cycle (11)

### 2.1.3 Life cycle of malaria parasite

Life cycle of malaria parasite include two host. Infected female *Anopheles* mosquito carry the malaria parasite known as sporozoites. Sporozoites are injected into human blood by bite of female *Anopheles* mosquito which is infected with malaria parasite while blood sucking and together with mosquito saliva. After that, sporozoites went to liver. This stage is also known as exoerythrocytic phase which happen before parasite enters into erythrocyte or red blood cell (RBC). In the liver, the sporozoites transform into schizonts. Each of the schizonts gives birth to thousands of merozoites. In *P. vivax* and *P. ovale* infection, sporozoites may stay in liver as hypnozoites and cause the relapse.

The merozoites then went to blood stream and into the RBC then multiply and evolve into trophozoites. This stage is known as erythrocytic phase. Trophozoites then transform into erythrocytic schizonts. Schizonts again produce multiple merozoites which are able to infect other RBCs when the RBC ruptures. This type of multiplying several merozoites is called asexual reproduction or asexual cycle. This cycle is responsible for clinical symptoms of malaria. Some of the merozoites released by RBC during rupture are converted into male and female gametocytes in the blood stream.

The gametocytes are taken up by female mosquito during blood meal. Female *Anopheles* mosquito can infect another person only if it takes the gametocytes form from blood meal. The parasites continue to multiply in the mosquito and becomes microgametes (male) and macrogametes (female). This process is known as gametogenesis. These microgametes and macrogametes later produce zygotes. Zygote fertilized into ookinete when is then grow into oocyst. Sporozoites are released from oocyst, which go to salivary gland for infection of malaria (Fig:2 ) (12)



**Figure 2 Life cycle of malaria**

## 2.1.4 Behavior of malaria vector

### 2.1.4.1 Characteristics and position of biting

Malaria infected in human can mostly be transmitted by bite of infected female *Anopheles* mosquito. *Anopheles* mosquitoes are different from other mosquitoes because their pulps are as long as the proboscis and their wings have black and white scales. Regarding their resting position during bite, they rest with their abdomens sticking up in the air instead of parallel to the surface. (13)

### 2.1.4.2 Preferred sources of blood meals

The adult female mosquito feeds on both animals and humans. Most of them preferred both targets rather than exclusive feeding. Only female mosquito sucks blood

in order to fertilize its eggs by using protein and iron present in blood. Certain chemical such as lactic acid present in human sweat attract the mosquito for blood sucking. When concerning the type of host for blood meals, availability play important role. (13)

#### **2.1.4.3 Lifespan**

Malaria parasite takes 10 to 21 days for its development in mosquito. If, life span of malaria parasite is shorter than 10 days in mosquito, parasite cannot develop and spread the disease. Mosquito life cycle has four stages, namely eggs, larva, pupae and adult in order. Mosquito mate in a few days after it reaches the adult stage. Then female mosquito sucks blood in order to fertilize. After taking blood meal, the female mosquito rest for few days in order to digest blood and eggs development. When the eggs are developed, female mosquito lays the egg and seeks to mate again. The cycle goes on until the mosquito dies. Adult *Anopheles* mosquito can live up to one month. (13)

#### **2.1.4.4 Pattern of feeding and resting**

Most *Anopheles* mosquitoes are active at dusk to dawn. They feed and rest in either indoor or outdoor. Indoor mosquitoes can be prevented by use of Insecticide treated net or by using indoor residual spraying and prevention of mosquito entry by window screen. On the other hand, outdoor mosquito can be prevented by reduction of their sources. (13)

#### **2.1.4.5 Breeding site**

Female mosquito laid their egg on water surface. Then the egg develops into larvae. The larvae breathe through the surface of water and feed the contents in waters. Larvae breed in water such as irrigation system, manmade containers, seepage from dams and urban agriculture. Larval source management (LSM) can be done in breeding sites to control the mosquito larva. LSM include habitat modification, habitat manipulation, biological control and larviciding. Environmental management (habitat modification, habitat manipulation) is recommended if applicable. Male mosquito cannot fly as much as female mosquito. So, if high number of male mosquito can indicate close distance to breeding site. (14)

#### **2.1.4.6 Insecticide resistance**

Insecticide resistance means the property of mosquitoes to survive insecticide exposure as a result of physiological or behavioral adaptation. Regarding physiological adaptation, mosquito resist to insecticide when exposed to low dose of insecticide repeatedly. Behavior adaptation includes change in biting and resting behavior such as changing of indoor resting to outdoor resting of mosquito. (10) In order to prevent malaria, insecticide for mosquito need to be effective. Mosquito resist to insecticide by detoxification using certain enzymes or by mutation. For example, knock down resistance (kdr) mutation is mutation in target site for insecticide such as pyrethroids. Studying of insecticide resistance in mosquito is essential when conducting the indoor residual spraying and insecticide treated net usage.(15)

#### **2.1.5 Mode of transmission**

When malaria infected female *Anopheles* mosquito bite, malaria can be transmitted. Out of 400 *Anopheles* species, nearly 30 types are important malaria vector. The transmission intensity depends on parasite, vector, host and environment. If the vector has prolonged lifespan, parasite can develop in mosquito and transmit the disease. Regarding host, immunity plays an important role in malaria transmission. After prolong exposure of malaria parasite host may develop partial immunity to malaria. Climate can affect the breeding sites for malaria vector. Other modes of transmission are transfusion of blood, organ transplant and needle or syringes sharing which contain malaria infected blood. During child birth or before child birth, malaria can also be transmitted from a mother to her child.(13)

#### **2.1.6 Symptoms of malaria**

Symptoms of malaria can be absent, very mild to severe and death. According to symptoms, malaria can be differentiated into two groups, uncomplicated or severe (complicated). Before the first symptom appear, incubation period come first after the bite of infected *Anopheles* mosquito. The incubation period normally lasted from 7 days to 30 days. *P. falciparum* has the shorter periods compared to the longer ones with *P. malariae*. Typical malaria attack occurs 6 to 10 hours. The typical malaria attack contains a cold stage (cold sensation, shivering), a hot stage (fever, headaches,

vomiting; young children may experience seizure) and followed by a sweating stage (sweats, temperature return to normal, tiredness). Common presentation of malaria is fever, chill and rigor and headache. (13)

#### **2.1.6.1 Complication of malaria**

Severe malaria occurs when malaria infection cause failure of organ in body and occurrence of abnormalities in malaria patient blood. Severe malaria includes cerebral malaria, severe anemia, haemoglobinuria, acute respiratory distress syndrome, shock, acute renal failure and hypoglycemia. Severe malaria is life threatening and should be treated immediately.

Malaria relapses are seen in patient with *P. vivax* and *P. ovale* infections. This is due to reactivation of the residual malaria parasite in liver. (1)

#### **2.1.7 People attitude regarding malaria prevention**

It is believed by many malaria control programs that knowledge regarding malaria prevention plays an important role in achieving the successful practice of malaria prevention methods. Most of the implementers pay little attention to people attitude concerning with cultural, behavioral and operational causes. Approach on successful utilization of malaria prevention methods is different by unique cultural belief and community structures. One of the severe complications of malaria is cerebral malaria. Cerebral malaria can cause convulsion and acute mental change. So, some people believe that these signs and symptoms are caused by super natural conditions (witchcraft) rather than malaria. It is possible that malaria can be transmitted in a person who uses the prevention methods. It all depends on type of mosquito, parasite density and relapse or recrudescence of malaria infection. So, people may have different attitude depending on their personal experience. Some people believe malaria is not only caused by mosquito but also caused by getting wet in rain, eating contaminated food and lack of sleep. As a result, they do not believe that malaria can be prevented by avoiding the mosquito bites and they do not wish to participate in malaria control and prevention activities due to these reasons. Several studies on people knowledge on malaria breeding site show that they think mosquito can breed in any place in the environment. Therefore, most of the people believe that control of breeding sites such as standing water is ineffective. (16) In addition, most of the people believe that

malaria is life threatening disease. Although some people believe malaria is life threatening disease, they do not use prevention. Most people afraid to suffering of malaria symptoms, unable to do daily activity and cost of the treatment.(17)

### **2.1.8 Prevention and control of malaria**

Malaria parasite is transmitted to human host by mean of *Anopheles* mosquito vector. So, prevention and control of malaria activity should focus on each of disease triad.

#### **2.1.8.1 Man's role in malaria control**

For the prevention of mosquito bite to human person protection methods such as use of window screen, ITNs and mosquito repellent are useful methods. For individual protection, wearing long and light-colored clothes is necessary. Use of window screen in houses is one way of preventing mosquito bite in indoor. On the other hand, repellent can be used when staying at outdoor areas. The best and most convenient method to prevent malaria is using of insecticide treated net.(18)

#### **2.1.8.2 Mosquito control**

The essential part of malaria control and prevention is controlling the mosquito vector. When vector control coverage is sufficiently high, malaria transmission can be reduced. The use of long-lasting insecticide treated nets (LLINs) and indoor residual spraying (IRS) prove to be core methods in mosquito control.

Integrated vector management (IVM) approach should be used in controlling the malaria vector. IVM target for improvement in efficacy, cost-effectiveness, environmentally friendly and sustainable disease control of malaria. In order to implement IVM, continuous monitoring and evaluation entomological data are needed. These include vector load, behavior and insecticide susceptibility which are used in LLINs and IRS.(18)

#### **2.1.8.3 Parasite control**

WHO recommend using chemotherapies for prevention and control of malaria. For prevention of malaria intermittent preventive treatment of pregnant women (IPTp), intermittent preventive treatment of infants (IPTi), and seasonal malaria

chemoprevention (SMC) are recommended. These preventive measures can help people from getting malaria disease while facing the malaria risk.

Early diagnosis, prompt and effective treatment of malaria is very important as without receiving the treatment, uncomplicated malaria can progress quickly into severe malaria. This is more important in people with low or no immunity to malaria as they develop easily into severe malaria. To prevent drug resistant malaria, antimalarial drugs should only give to people with confirmed malaria. Also, malaria treatment should include antimalarial drugs with at least two different mechanism of action for prevention of drug resistant. The quality and dosage of antimalarial drug should be optimal in order to maximize the optimal therapeutic life and ensure all patients have equal chance of cure. Treatment is aimed for best clinical and parasitological cure with least transmission from treated infection which is important for successful parasite control. Dosage regimen should be based on patient weight so it can be used for effective concentration to eliminate the infection in all targeted population. (19)

### **2.1.9 Policy regarding malaria in Myanmar**

In Myanmar ITN and LLINs are distributed free of charge to all age group of the population. IRS is recommended to use in control of vector. No policy on mosquito larva control. Diagnosis of malaria is free of charge and all of the populations are accessible. Oral *Artemisinin* mono therapy is banned and *Artemisinin* combination therapy (ACT) is used together with *Primaquine* without testing for Glucose 6 phosphate deficiency (G6PD deficiency). Antimalarial treatment is given free of charge with provision of directly observed treatment with monitoring of adverse effect of antimalarial drugs. Intermittent preventive treatment of pregnant women (IPTp) is not used. For the surveillance of malaria, active case detection (ACD) is used. Mass screening of malaria infection is not practiced. Uncomplicated malaria infection is not routinely admitted in hospital. The government does not force mandatory malaria case reporting.

For the antimalarial treatment policy in uncomplicated *falciparum* malaria, the first line treatment includes giving ACT which are *Artemether* + *Lumefantrine*, *Artesunate* + *Mefloquine* and *Piperaquine* + *Dihydroartemisinin* with *Primaquine*. For



the treatment failure *P. falciparum* infection, combination of *Artesunate + Doxycycline* or *Artesunate + Tetracycline* is given. For the severe malaria, injection of *Artesunate* or *Artemeter* or *Qunine* is given. For *P.vivax* infection *Chloroquine* is given followed by *Prmaquine* for 14 days.(2)

## **2.2 Internal migration and malaria**

Internal migrant is a person who migrates or who has migrated from one place to another inside the country. (20) People moved from one place to another for different reasons. Reasons include climate change, economic reason, conflict and natural causes. These reasons are commonly see in poor people who lived in high malaria transmission areas. Due to people migration, areas where previously free of malaria may be reported with malaria case. (21) Migrant population can be forested population, seasonal agricultural worker, construction worker, forest worker, internally displace person or refugee, civil service officer, security forces and people who cross border. (22)Most of the internal migrants in Myanmar are workers who lived in malaria endemic areas. Some of them work in rubber plantation (need to work in night time which is malaria vector most active time) as in Kawthoung Township without using personal protection from malaria due to hot weather. The provision of malaria diagnosis and treatment is difficult in migrant population as they tend to move from one place to another. For the prevention of the drug resistant malaria, directly observed short course treatment (DOT) is needed to be applied in malaria infected person. In migrant population, it is hard to accomplish due to movement from one place to another without completing the treatment.(23)

## **2.3 Reviews of relevant research finding**

A descriptive cross-sectional KAP survey is conducted to assess the level of knowledge, attitude and practice in relation to malaria in Oo-do village, Yangon Region, Myanmar in 1995. Sample size was 82 households with 303 populations. 103 persons were interviewed while using structured questionnaires. Knowledge score are summed up and result were ranked into low and high using the mean score. Half of the respondents' gender was male. 79.6 % of the respondent can correctly respond ways of malaria transmission and 71.8% of the respondents know symptoms of malaria. Almost

the entire respondent had good attitude towards malaria prevention with almost 100%. 70% of the respondents used bed nets as prevention practice for malaria.(24)

An integrated approach using both qualitative and quantitative research on knowledge, attitude and practice with regard to malaria control in endemic rural areas which was in Teikkyi, Yangon, Myanmar. For the qualitative part, the study conducted 2 focus group sessions and for the quantitative part it included survey questionnaires with four sections assessing KAP toward malaria control. For the quantitative survey, it was conducted in 700 persons with 65% male. Regarding knowledge level 51.1% got average rank while 48.9 got low knowledge. For the attitude part, 95.4% had high level of attitude followed by 3.7% and 0.9% with average and low level of attitude. For the practice score, 90.1% had average practice level. 8.4 % had high practice score and 1.4 % had low practice score.(25)

A cross-sectional descriptive study regarding knowledge, attitude and practice on insecticide treated net in Myanmar was conducted in 16 villages of Sa lin Township, Magway Region with 256 randomly selected households in 2009. Two stage sampling procedure was done. They used pretested semi-structured questionnaires. Result of the study showed that 48%% of the respondent had low knowledge level of malaria and 45% of the population also had low attitude toward malaria. 94% of the respondents sleep under bed nets. 45.3% has low practice score. 25% had good practice score.00 Almost half of the respondents (46.9%) with low educational status had low malaria knowledge level while respondents with high educational status (64.3%) had high malaria knowledge level. Educational status and malaria knowledge show significant association with ( $\chi^2=14.885$ ,  $p < 0.0015$ ). Similarly, respondent with low education status had low attitude level on malaria prevention with (57.0%). There is significant relationship between education status and attitude toward malaria within the respondents ( $\chi^2= 11.844$ ,  $p= 0.019$ ). Regarding association between socio-demographic factors and practice score, there is no statically significant. Significant association is seen between the respondent's knowledge and attitude regarding malaria. ( $\chi^2= 27.661$ ,  $p < 0.001$ )(26).

Cross- sectional survey was conducted to 1,040 respondents in eight townships in Myanmar to assess the knowledge of malaria in Sun Primary Health (SPH, Malaria service provider) areas and non-service provision areas. According to this study,

respondents in the intervention areas had better malaria knowledge than the non-intervention areas. From, 1040 respondents, 321 respondents are from SPH areas and 719 are in non-service provision areas. There is no statically difference regarding socio-demographic characteristic of SPH and non-SPH areas. 33.33% in SPH area compared to 25.73% in non-service provision area have good knowledge about malaria prevention. ( $\chi^2=6.3529$ ,  $p= 0.012$ ) (27)

A cross-sectional survey method was conducted during June-July, 2016 among population in Palaw Township, Tanintharyi Region of Myanmar. Four hundred and thirty subjects aged between 18-64 were participated in this study. A structure questionnaire was used to gather the data through face-to-face interview. Chi-square and Fisher's exact test were used to determine the association between the variables. The results showed that 50.7% of respondents had good knowledge, 16.3% had good attitude while only 6.5% had good practice regarding malaria prevention. Moreover, we found that there was significant association between age group ( $p<0.001$ ), education level ( $p <0.001$ ), occupation ( $p <0.001$ ), monthly family income ( $p = 0.003$ ) and duration of stay ( $p = 0.002$ ) and practice on malaria and home environmental prevention. Association between knowledge about malaria and practices on malaria ( $p <0.001$ ) was statistically associated. Participants' attitude towards malaria was associated with practices on malaria and home environment prevention ( $p <0.001$ ). As a result of this study, health education program with direct interaction to community should be emphasized to increase participants' knowledge, attitude and practice about housing condition and housing structure for malaria prevention. (28)

A cross-sectional analytic study was conducted using pretested interview-administered questionnaires among internal migrants ( $n = 406$ ) in the malaria endemic townships of Shwegyin, Bago Region, Thanbyuzayat, Mon State and Kawthoung, Tanintharyi Region from August to November, 2015. Data were collected by well-trained Basic Health Staff members in study areas, and then analyzed by SPSS version 16.0 using Chi-square tests with significant level at 0.05. Majority of participants were male, Myanmar nationals, married and with primary basic education level and below. The mean duration of migratory work was 4.51 years. 43.1% of them gave definite previous history of malaria within last two years during migration. 92.9% (377/406) of them always used bed nets. Malaria determinants found were male gender (OR = 1.84,

95% CI:1.22–2.77;  $p = 0.0040$ ), habit of going out at dawn (OR = 2.36, 95% CI:1.58–3.52;  $p < 0.001$ ), usual sleeping indoors (OR = 2.14, 95% CI:1.04–4.42;  $p = 0.036$ ), torn bed net or net with large hole(s) (OR = 2.0, 95% CI:1.21–3.3;  $p = 0.006$ ), habit of not always sleeping under a bed net at night (OR = 2.02, 95% CI:1.15–3.52;  $p = 0.014$ ), alcohol drinking (OR = 2.71, 95% CI:1.73–4.26;  $p < 0.001$ ) and failure to attend malaria health talk (OR = 1.78, 95% CI:1.2–2.65;  $p = 0.004$ ). (29)

An intervention study was conducted in seven villages of Karen ethnic population residing in Thai- Myanmar border area. Interventions include diagnosis and treatment of malaria, health education and distribution of LLIN. This study measured the detection of malaria and knowledge, attitude and practice of malaria by using the structured questionnaire. Study start in February 2003 and end in January 2005. Regarding KAP study, it was done in base line and final period and compares the progress after intervention. The results show there is statistically significant improvement in knowledge, attitude and practice of malaria due to intervention while comparing baseline and final survey. (30)

KAP study of malaria was conducted in Cambodia. Research design was a cross sectional study. Study areas were chosen into three, two with high malaria risk area and another one with moderate risk area. Sample size population was 267. In these areas, majority of the people know the transmission of malaria (79.2% in high risk area, 86.9% in moderate risk area)  $p = 0.157$ . Over 90 % of people in both areas visit to nearest health facility when they suspect malaria  $p = 0.548$ . 86.8 % of people in high risk area and 68.2 of people in moderate risk area knew use of ITN can prevent malaria  $p = 0.007$ . For prevention of malaria in indoor both areas use ITN (93.5 % in moderate risk, 94.3 in high risk). For prevention of malaria in outdoor 75.5 % of high risk population done nothing while approximately 18 % in moderate risk area. (31)

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 Research design**

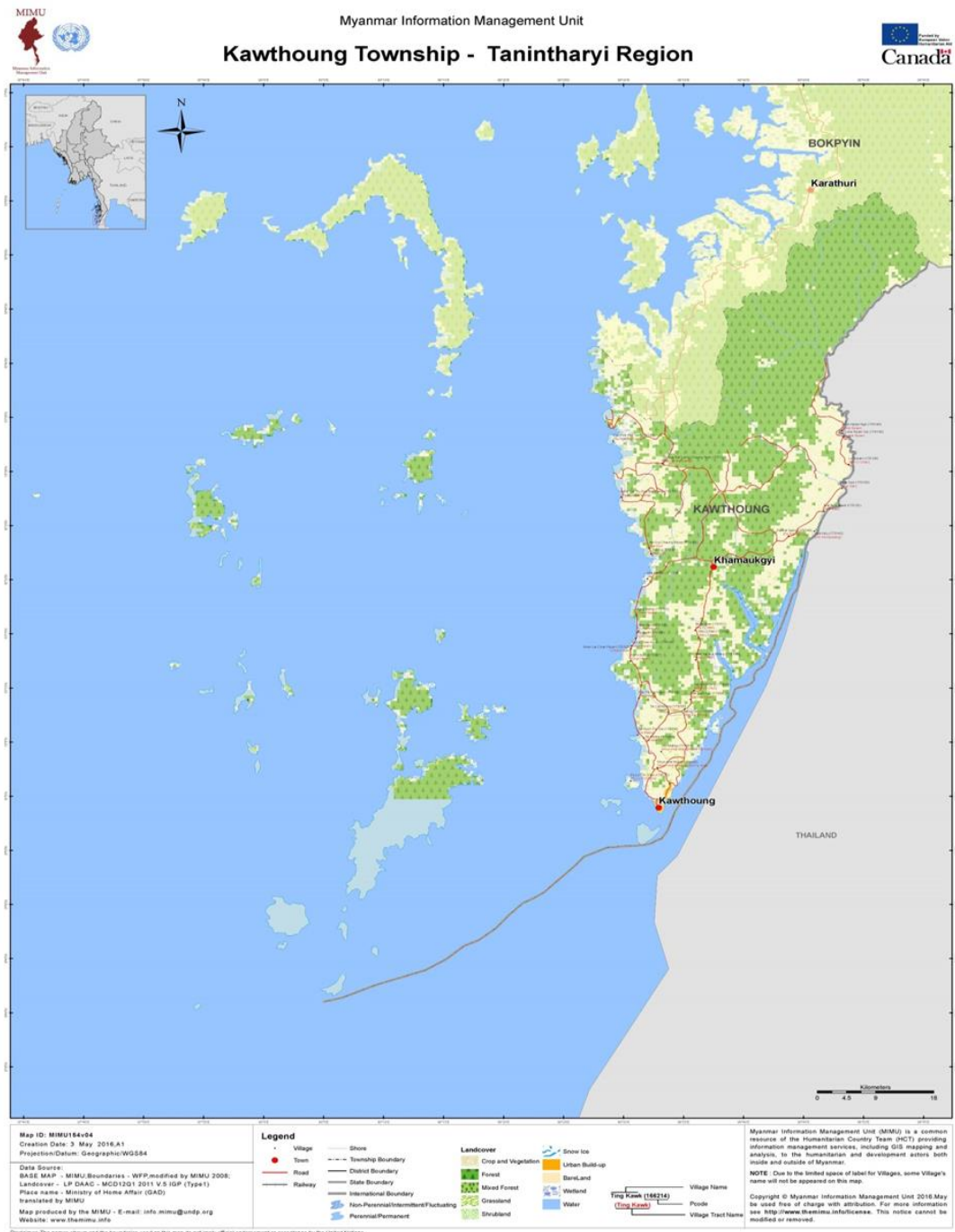
A cross-sectional study was done to identify the knowledge, attitude and practice regarding malaria prevention towards internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region together with socio-demographic factors.

#### **3.2 Study area**

The study was conducted among the internal migrant population in Kawthoung Township which is part of Kawthoung District and Tanintharyi Region. Most of the internal migrant population worked in agricultural and fishing places. This study was focused on agricultural worksites areas such as palm oil plantation and manufacturing, rubber plantation and also in developmental worksites such as road construction. Yuzana is the largest oil palm cultivation company in all of Tanintharyi Region and it is situated in Kawthoung Township with 222,737 acres of plantation stretching the landscape, and employing over 24,000 permanent and temporary workers. Survey was conducted in worksite areas shown in Table 2.

No.	Companies in Kawthoung District	Acres
1	Yuzana/ Anawartun/ Golden Land Yanadar consortium	222,737
2	Dagon Timber	18,601
3	Po Kaung	16,150
4	South Dagon	13,245
5	Amstrong	1,500
6	Aung Zinmar	10,000
7	Shwe Si Owne	3,500
8	Aung Yi Phyo	200
9	Shwe A Hone	50,000
10	Coastal Development/Kan Yoe Tan (Pyikyí Mandaing Sub TSP)	2,000
11	Royal Shwe Palal	100
12	Myanma Awba	18,500
13	MRPP	593
14	Ever Green	2,400
15	Super One	750
16	Myanmar Naing	10,000
17	Myanmar Auto Corporation	70
	Total	370,346

**Table 1 Company areas in Kawthoung District**



**Figure 3 Map of Kawthoung Township**  
**3.3 Study population**

This study targeted on internal migrant population, aged 18 – 65 both male and female whose are currently living in Kawthoung Township which is 20139, Kawthoung District, Tanintharyi Region(7)

### 3.4 Sample size

The sample of this research was calculated by using Cochran formula with 95% confidence level. The calculation formula of Cochran is presented as follows. (32)

$$N = (Z)^2 * (p) (q) / (d)^2$$

Where: **N**=the sample size,

**Z** = the value for the selected alpha level

**p**= the estimated proportion of an attribute that is present in the population. According to previous study conducted in Sa Lin Township, Magwey Division, Myanmar, good Malaria prevention practice score is 25% of total sample population(26)

**q**= 1-p.

**d**= the acceptable margin of error for proportion being estimated, so the confidence interval, in decimals.

Calculate the sample size by substitution in the formula

$$N = \frac{(1.96)^2 * (0.25 * 0.75)}{(0.05)^2}$$

$$N = 288$$

Sample size was 288 but 10% was added to avoid data loss.

Final sample size was 316 Respondents.

### 3.5 Inclusion and exclusion criteria

#### Inclusion criteria

- Respondents who were Myanmar internal migrant population
- Respondents who were aged between 18 and 65
- Respondents who were member of selected household
- Respondents who has been living in Kawthoung Township for more than six months
- Respondents who voluntarily agree to participate in the study
- Respondents who can communicate well in Myanmar language



## Exclusion criteria

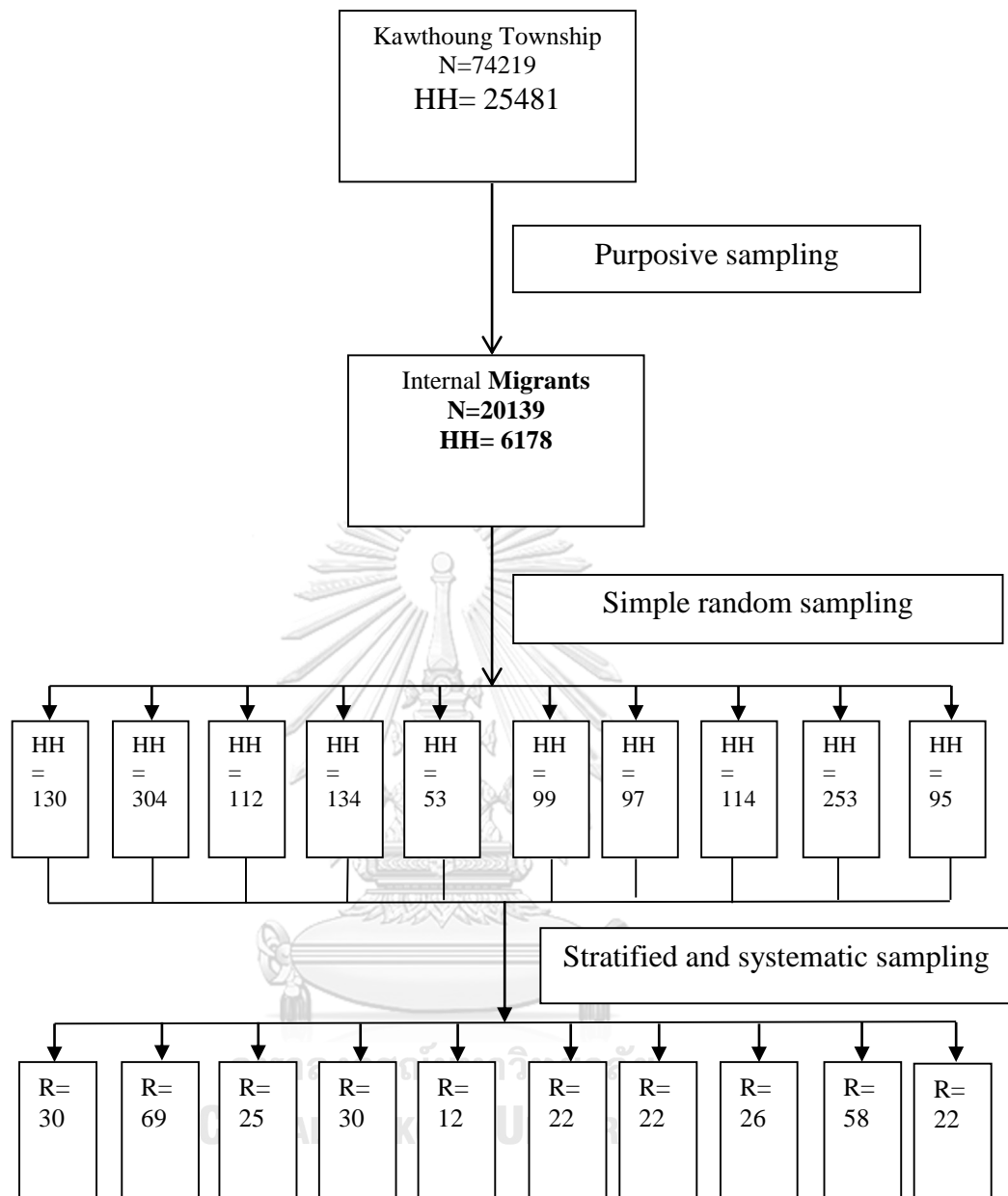
- Respondents who had mental illness

## 3.6 Sampling method

From 25,481 Households (HH) with population of 74,219, 6178 HH with 20139 populations were chosen with purposive sampling method to include the internal migrant population. Next, 10 villages/worksites were chosen with simple random sampling methods. After that, stratified and systemic sampling methods were used to get desired sample size. Sample households were selected according to a random starting point and a fixed periodic interval. The sampling interval was calculated by dividing the total household present in selected worksite by the desired sample size. If there were more than one person in selected household that met the inclusion and exclusion criteria, we chose the respondent using simple random sampling.

Villages/ Worksites	Household	Population	Sample population
A	130	461	30
Dagon 1	304	921	69
B1	112	387	25
TZK (malione)	134	461	30
E2	53	200	12
B2	99	358	22
HTOO HTOO TOE	97	421	22
J1	114	327	26
E1	253	791	58
C1	95	333	22
Total	1391	4660	316

**Table 2 List of selected worksites/ villages**



N= Total Population

HH = Households

R = Respondents

**Figure 4 Sampling procedure**

### **3.7 Research Instruments**

From the previous studies and articles regarding assessment of knowledge, attitude and practice on malaria, standardized questionnaire was developed for face to face interview. The questionnaire was aimed to gain information to check knowledge, attitude and practice on malaria and also the socio demographic factors. The English version questionnaire was translated into Myanmar by researcher and translated back to English again by Dr. Ye Hein Naing (Monitoring and Evaluation Director, Defeat Malaria Project) to ensure for maintenance of original meaning. The questionnaire was structured into four parts:

#### **Part A: Socio demographic characteristic**

This part of questionnaire included information regarding age, gender, marital status, education level, occupation, income, length of stay, family member and accessibility to health facility.

#### **Part B: Knowledge on Malaria**

This part of questionnaire included knowledge on malaria vector, transmission, symptoms, diagnosis, prevention and control, drug resistant malaria and source of information where they got malaria knowledge. After the interview, correct malaria knowledge and recommendation was given to participants.

#### **Part C: Attitude toward Malaria**

This part of questionnaire included belief on susceptibility, seriousness/threat, prevention methods and treatment.

#### **Part D Practice regarding Malaria prevention**

This part of questionnaire included malaria preventive practices by study population i.e., use of personal protection, bed net utilization and care, control of mosquito breeding sites and treatment seeking behavior.

### 3.8 Scoring and its classification

Scoring of the questionnaires was done to identify the variables for measurement.

#### Knowledge about malaria

For this section, when the respondent answered correct malaria knowledge, 1 score was given. On the other hand, if the answer was incorrect, 0 score was given. Total question for knowledge of malaria was 37. Knowledge score can be 0 to 37. If the respondent answer 80% correctly it was considered “Good knowledge”, if the respondent answer 60% to 80% correctly it was considered “Moderate knowledge” and if the respondent answer less than 60% correctly it was considered “Poor knowledge”(33) (Bloom’s cut off point).

#### Attitude towards malaria

For the attitude questions, respondent attitude toward malaria infection was questioned. The respondent can answer five options, strongly agree, agree, neutral, disagree and strongly disagree.

For positive attitude, score given was

“Strongly agree” 4 score

“Agree” 3 score

“Neutral” 2 score

“Disagree” 1 score

“Strongly Disagree” 0 score

For negative attitude, reverse scoring was given

“Strongly agree” 0 score

“Agree” 1 score

“Neutral” 2 score

“Disagree” 3 score

“Strongly Disagree” 4 score

There were total 15 questions. Therefore, attitude score can be 0 to 60. Attitude score was categorized into three attitude level using the mean score of respondents and standard deviation. Good or high attitude was categorized by score more than to mean plus standard deviation. Moderate attitude was categorized by score between mean plus standard deviation and mean minus standard deviation. Poor attitude was categorized by less than mean minus standard deviation.

### **Practice regarding Malaria Prevention**

For this part, the answers were always, sometime and never or non-applicable. For scoring, if the respondent answer always, 2 score was given. If the respondent answer sometime, 1 score was given. If the respondent answer never or non-applicable, 0 score was given. For incorrect practice reverse scoring was given. Total practice question was 13. So, practice score can be 0 to 26. For the data analysis, we used mean score to categorize practice level into two. Respondents who scored above the mean were considered as having good practice and less than the mean score as poor practice. (34)

### **3.9 Validity and Reliability**

To obtain validity of this study, consulting experts was 2 academic experts (Asst. Prof. Naowarat Kanchanakhan, Ph.D. and Tepanata Pumpaibool , Ph.D.) and 1 local expert (Prof. Saw Lwin, Deputy Chief of Party, Defeat Malaria Project). Also, review on literature, review on previous study and guidelines. Total Item-Objective Congruence Index: IOC was 0.97 and it was used as instrument to test validity.

To establish reliability, pilot study was done. The questionnaire was tested in 30 migrant populations in Kawthoung Township. For reliability, Kuder-Richardson-20 (KR-20) was used on knowledge questions and score was 0.913. Cronbach's alpha was used on attitude questions and score was 0.941.

### **3.10 Data Collection**

For the data collection, face to face interview method was used after getting approval from respective village/worksite authority. List of household and population was obtained from companies in Kawthoung Township. Upon reaching the sample village/ worksite, starting point was randomly chosen by village chief or worksite leader. Approach to participant was made through the respective village/worksite leader. Sampling interval was used according to total household data in respective village/ worksite to achieve random sampling. If more than one respondent eligible to answer the survey in selected household, respondent was chosen using random sampling. If randomly selected household has no eligible respondent, respondent who live next to the selected household was chosen. Four research assistants was selected and trained for one day about the objectives of the study, contents of questionnaire and

data collection process. Research assistant had qualifications such as ability to read, speak and write Myanmar language, knew the geography of study area, demonstrate understanding of the research in general and its objectives and has good malaria knowledge. Informed consent forms were given to participant with the information of ability to withdraw from the study anytime they want. Participant were explained about the survey verbally as well as written form by research assistant. Signature or finger print were obtained from participant after receiving the participant agreement. The interview took up to 30 minute, a bottle of drinking water and a pen with malaria messages was provided to participants as incentives.

### **3.11 Data Analysis**

After collection of data, a questionnaire was coded before entering into the SPSS version 22.

#### **a. Descriptive Statistics**

Descriptive statistics i.e. frequency, percentage, mean, standard deviation, range and normality test were used for analyzing the general characteristics of the respondents and knowledge, attitude and practice about malaria.

#### **b. Inferential Statistics**

Chi-Square test and Fisher's exact test were used to determine the association between the independent and dependent variables at 0.05 significant levels.

Logistic regression was used on the independent and dependent variables which had association at  $\leq 0.2$  significant levels with bivariate analysis.

### **3.12 Ethical Consideration**

For the ethical consideration, the research proposal was submitted to the Chulalongkorn University Research Ethics Review Committee. After receiving the approval from ethical committee on 21.3.2018, researcher began to collect data. The objective and purpose of this study were clearly explained to respondents before signing the consent form and voluntary participation. Every completed questionnaire was kept carefully and confidentially. The respondents could refuse to join this study and no need to explain for reasons. This data will be used only for this study and their information will be kept secretly.

## **CHAPTER 4**

### **RESULTS**

The study was cross-sectional analytic study which was focused to study about the characteristics of the socio-demographic status, source of malaria information, knowledge level, attitude level and practice level regarding malaria prevention in Kawthoung Township, Kawthoung district, Myanmar. In this chapter, the results of the study are observed and described. The results were presented in the following outlines:

1. Socio-demographic characteristic of the respondents.
2. Source of information for malaria prevention
3. Knowledge regarding malaria
4. Attitude toward malaria
5. Practice toward malaria prevention
6. Association between socio-demographic characteristic and knowledge level of malaria
7. Association between socio-demographic characteristic and attitude level toward malaria
8. Association between socio-demographic characteristic and practice level of malaria prevention
9. Association between source of information and knowledge level, attitude level and practice level of malaria prevention
10. Association (using multivariate model) between socio-demographic, trusted source of information, knowledge level, attitude level and practice level regarding malaria prevention

Three hundred and sixteen respondents participated in this study. The participants were chosen by inclusion and exclusion criteria with their consents. Table 3 showed lists of participants which were chosen in this study using the proportional sampling. Most of the selected study areas were worksites as most of the area in Kawthoung Township were populated with plantation worksite.

**Table 3 Frequency and percentage distribution of respondents by worksites/villages**

Villages/ Worksites	Frequency	Percentage
A	30	9.5
Dagon 1	69	21.8
B1	25	7.9
TZK (malione)	30	9.5
E2	12	3.8
B2	22	7.0
HTOO HTOO TOE	22	7.0
J1	26	8.2
E1	58	18.3
C1	22	7.0
<b>Total</b>	<b>316</b>	<b>100</b>



#### 4.1 Socio-Demographic Characteristic of the Respondents

Table 4 shows the socio-demographic characteristic of the studied population. Socio-demographic characteristic includes age group, gender, ethnicity, marital status, level of education, type of occupation, income, length of stay in Kawthoung Township, family member, accessibility to health facility.

For the age of the respondents, the youngest age was 18 years while the oldest was 65-year-old which were within the limit of inclusion criteria. The age groups were described in years. The average age was 36.64 years with the standard deviation of 12.506. The largest proportion of the age group was between 25-34 years with 25.9% followed by 35-44 years, 18-24 years and 45-54 years with 23.7%, 20.6% and 20.3% respectively. These four age groups showed approximately similar proportion. The smallest proportion is obtained by age group of more than 55 years old with 9.5% of total respondents. Regarding gender in the studied population, the proportion of male was 58.2% and the proportion of female was 41.8%. Regarding ethnicity of the respondents, almost all of them were Bamar with 96.9% with a small portion of Kayin (2.2%), Mon (0.6%) and Shan (0.3%).

For the marital status of the respondents, three quarters of total respondents are married with 75.6%. Being single came in second with 16.8% which are followed by separated and widowed with 4.1% and 3.5% respectively. For the education status, the highest education statuses of respondents were asked. More than half of the respondents attended the primary school with 57.0%. A quarter of the respondents attended the secondary school with 25.9%. Just 6% had attended the high school and the smallest group being respondents who attended the college/ university with only 2.2%. Just 8.6% had never attended the school and 0.3% had other education which was studied in monastic school. In description of occupation, majority of the respondents are palm oil plantation workers with 73.1%. While 18.8% of respondents were dependent and small portion of rubber plantation worker (0.9%), farmer (1.3%), forest worker (0.6%), fisherman (0.6%), vender (2.5%) and others which did not have regular jobs (2.2%). The occupations were classified further into forest related workers, non-forest related workers, dependent and others for analytic purpose. For occupation, 75.9% of total

respondents were forest related workers while 3.2% were non-forest related workers. Next, 18.7% were dependent and 2.2% had other jobs.

For the description of the income of the respondents, the incomes were grouped into monthly family income in Myanmar kyats. Just more than half of the respondents (51.6%) earned between 100,000 to 200,000 kyats. Then, 40.5% of the respondents earned between 200,000 to 300,000 kyats. Only 6.6% earned less than 100,000 kyats and 1.3% earned between 300,000 to 400,000 kyats. For the length of stay in Kawthoung Township, respondents were grouped into three groups with duration of less than or equal to 3 years, more than 3 years and did not remember. The largest proportion being 68.4 % had stayed in Kawthoung Township for more than 3 years and 30.5% had stayed for less than or equal to 3 years and 1.3 % had not remembered. Next, total family member in respondent household are calculated and grouped into less than or equal to 3 persons, 4 to 5 persons and more than or equal to 6 persons. Majority of the families had less than or equal to 3 members (44.0%). 38.6% had 3 to 4 persons and only 17.4% had more than or equal to 6 persons.

The respondents were asked about the accessibility to nearest health facility in motorcycle for accessibility to health facility. The responses were categorized into less than 30 minutes, between 30 to 60 minutes, 60 to 90 minutes, 90 to 120 minutes and more than 120 minutes. Around 40% took between 60 to 90 minutes to reach the nearest health facility followed by between 30 to 60 minutes, less than 30 minutes, between 90 to 120 minutes and more than 120 minutes with 32.0%, 13.9%, 13.6% and 0.6 % respectively. Lastly, respondents were asked about their most common use of transportation, 78% answered motorcycle while 13.9% answered car, 7.0% walking and 0.9% by boat.

**Table 4 Frequency and percentage distribution of respondents by socio-demographic characteristic (n=316)**

Socio-demographic characteristic	Frequency	Percentage
<b>Age groups(years)</b>		
18-24	65	20.6
25-34	82	25.9
35-44	75	23.7
45-54	64	20.3
55-64	27	8.6
65	3	0.9
<b>Mean = 36.64, SD = 12.506</b>		
<b>Range = 18 - 65</b>		
<b>Gender (n=316)</b>		
Male	184	58.2
Female	132	41.8
<b>Ethnicity (n=316)</b>		
Kayin	7	2.2
Mon	2	0.6
Bamar	306	96.9
Shan	1	0.3
<b>Marital status (n= 316)</b>		
Single	53	16.8
Married	239	75.6
Separated	13	4.1
Widowed	11	3.5

**Table 4 (continued) Frequency and percentage distribution of respondents by socio-demographic characteristic (n=316)**

<b>Socio-demographic characteristic</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Education level (n=316)</b>		
Never attend school	27	8.6
Primary school	180	57.0
Secondary school	82	25.9
High school	19	6.0
College/ University	7	2.2
Others <sup>1</sup>	1	0.3
<b>Occupation (n=316)</b>		
Housewife	59	18.8
Palm oil worker	231	73.1
Rubber plantation worker	3	0.9
Farmer	4	1.3
Forest worker	2	0.6
Fisherman	2	0.6
Vender	8	2.5
Others <sup>2</sup>	7	2.2
<b>Type of occupation (n=316)</b>		
Forest related workers	240	75.9
Non forest related workers	10	3.2
Dependent	59	18.7
Others <sup>2</sup>	7	2.2
<b>Income kyat/month/household (n=316)</b>		
<100000	21	6.6
100000 -200000	163	51.6
200000 - 300000	128	40.5
300000 -400000	4	1.3

**Table 4 (continued) Frequency and percentage distribution of respondents by socio-demographic characteristic (n=316)**

Socio-demographic characteristic	Frequency	Percentage
<b>Length of stay in Kawthoung Township (n=316)</b>		
Less than or equal to 3 years	96	30.4
More than 3 years	216	68.4
Do not remember	4	1.2
<b>Family members (n=316)</b>		
≤3 persons	139	44.0
4-5 persons	122	38.6
≥6 persons	55	17.4
Mean = 3.88, SD = 1.542		
Range = 1- 9		
<b>Accessibility to nearest health facility by motorcycle (n = 316)</b>		
Less than 30 minutes	44	13.9
Between 30 to 60 minutes	101	32.0
Between 60 min to 90 minutes	126	39.9
Between 90 minutes to 120 minutes	43	13.6
More than 120 minutes	2	0.6
<b>Mode of transportation (n =316)</b>		
Car	44	13.9
Motorcycle	247	78.2
Walking	22	7.0
Boat	3	0.9

1. Monasticism Education 2. Car driver, road construction worker

## 4.2 Source of Information Regarding Malaria Prevention

Table 5 shows the source of information regarding malaria prevention which the respondent trusted the most. From the table, the largest proportion of respondent trusted and received the information about malaria prevention from Volunteer Malaria Worker (VMW) with two-third (64.6%). Information given from government health staffs come in second with 19.3%. Information from pamphlets has 7.3 % while posters radio and television with small portion of 4.1%, 2.5% and 2.2% respectively.

**Table 5 Frequency and percentage distribution of respondents by most trusted source of information regarding malaria prevention (n=316)**

Source of information	Frequency	Percentage
Volunteer Malaria Workers	204	64.6
Government Health Staffs	61	19.3
Radio	8	2.5
Television	7	2.2
Posters	13	4.1
Pamphlets	23	7.3

## 4.3 Knowledge on malaria

Table 6 shows frequency and percentage of respondents who answer correctly to the knowledge questions regarding malaria. The first question of knowledge on malaria was about the vector of malaria. All of the respondents can answer correctly as mosquito with 100%. Similarly, almost all of the respondents can identify dog, rat and cockroach as negative statement with 99.1%, 98.7% and 97.8% respectively. For fly as the vector of malaria, 19.6% answer incorrectly. For vector most active time, 98.7% can answer correctly as night time while 66.5% answer that day time is incorrect response.

For the transmission of malaria infection, 99.7% give correct answer as bite of infected mosquito. Almost every respondent answer voodoo (98.1%) and contaminated air (95.9%). Nearly three-fourth of the respondents answer correctly to drinking contaminated water, eating unhealthy food, eating banana and bathing in streams with 73.1%, 78.5%, 75.3% and 76.9% respectively.

When the respondents were asked about the symptoms of malaria, most of people can answer fever and chills correctly with 95.9% and 99.7% respectively. More than half of the respondents answer correctly to headache, body ache and sweating with 65.8%, 59.8% and 63.0% respectively. Only 47.8% can identify tiredness as one of the symptoms of malaria. For the diagnosis of malaria, everyone answered blood test as diagnosis of malaria (100.0%). About 95.9% answered malaria cannot be diagnosed by measuring blood pressure and 18.9% answered malaria can be diagnosed by observing the fever symptoms.

For the prevention methods of malaria, almost everyone answers sleeping with bed net and Long Lasting Insecticide treated Net (LLIN) as correct method with 93.4% and 99.4% respectively. For the personal protection of malaria, three fourth of the respondent answer correctly about wearing long-sleeve cloths and mosquito repellent spray/cream with 73.1% and 75.6% respectively. Chemoprophylaxis is not encouraged in Myanmar but more than half (53.5%) of the respondent answered it as one of the prevention method. For the prevention of malaria in environment, 47.8% answered closing of window during night time, 69.6% answered clearing the bushes and 78.8% answered covering of water container.

In the knowledge questions, respondents were asked about the possible cause of drug resistant malaria. About 98.7% said that incomplete antimalarial course is one of the possible reasons for development of drug resistant malaria. More than half (62.2%) give taking fake drugs as answer for possible cause of drug resistant malaria. 59.8% know that drug resistant malaria can be developed by taking self-treatment.

For the appropriate treatment of malaria, 99.7% answered taking oral antimalarial drugs as appropriate treatment for malaria and 75.6% think taking antimalarial injection given by health staff is correct treatment. Almost everyone think that self-treatment is inappropriate treatments (99.1%).

**Table 6 Frequency and percentage distribution of respondents who give correct/right answers to knowledge questions regarding malaria**

Knowledge of malaria (n = 316)	Correct answer	
	Frequency	Percentage
<b>Vector of Malaria</b>		
<b>Mosquito</b>	316	100.0
<b>Rat*</b>	309	97.8
<b>Dog*</b>	313	99.1
<b>Fly*</b>	254	80.4
<b>Cockroach*</b>	312	98.7
<b>Active time of malaria mosquito</b>		
<b>Night time</b>	312	98.7
<b>Day time*</b>	210	66.5
<b>Malaria can be transmitted by</b>		
<b>Bite of infected mosquito</b>	315	99.7
<b>Drinking contaminated water*</b>	231	73.1
<b>Voodoo*</b>	310	98.1
<b>Eating unhealthy food*</b>	248	78.5
<b>Eating banana*</b>	238	75.3
<b>Bathing in streams*</b>	243	76.9
<b>Contaminated air*</b>	303	95.9



**Table 6 (Continued) Frequency and percentage distribution of respondents who give correct/right answers to knowledge questions regarding malaria**

Knowledge of malaria (n = 316)	Correct answer	
	Frequency	Percentage
<b>Symptoms of malaria</b>		
Fever	303	95.9
Chills	315	99.7
Headache	208	65.8
Body ache	189	59.8
Sweating	199	63.0
Tiredness	151	47.8
<b>Diagnosis of malaria</b>		
Blood test	316	100.0
Measuring blood pressure*	303	95.9
Fever symptoms*	253	80.1
<b>Prevention methods for malaria</b>		
Sleeping with bed net	295	93.4
Sleeping with Long Lasting Insecticide treated Net (LLIN)	314	99.4
Wearing long-sleeve cloth	231	73.1
Use mosquito repellent spray/cream	239	75.6
Take anti-malarial drugs before going into forest*	147	46.5
Closing of window during night time	151	47.8
Clearing the bushes	220	69.6
Try to cover the water containers	249	78.8

**Table 6 (Continued) Frequency and percentage distribution of respondents who give correct/right answers to knowledge questions regarding malaria**

Knowledge of malaria (n = 316)	Correct answer	
	Frequency	Percentage
<b>Drug resistant malaria can develop by</b>		
<b>Incomplete antimalarial course</b>	312	98.7
<b>Taking fake drugs</b>	193	61.1
<b>Self-treatment</b>	189	59.8
<b>Appropriate treatment of malaria</b>		
<b>Taking oral antimalarial drugs given by health staffs</b>	315	99.7
<b>Taking antimalarial injection by health staffs</b>	239	75.6
<b>Self-treatment*</b>	313	99.1

\*Negative statement

Table 7 shows the number and percentage of knowledge level which are categorized into three categories depending on the answer given by the respondents. For malaria knowledge, most of the respondents 65.5% had good knowledge followed by 17.4% with moderate knowledge. Only 17.1% had poor knowledge. Mean score of knowledge is 30.25 (SD-5.577) while maximum attainable score of 37. The range of score by the respondents was 16 to 37.

**Table 7 Frequency and percentage distribution of knowledge level regarding malaria (n=316)**

Knowledge level	Frequency	Percentage
	Poor Knowledge	54
Moderate Knowledge	55	17.4
Good Knowledge	207	65.5
<b>Mean = 30.25, SD = 5.577</b>		
<b>Range = 16 - 37</b>		

#### **4.4 Attitude on malaria**

Table 8 shows the frequency and percentage of responses made by respondents regarding their attitude on malaria. Attitude questions include both positive attitude/ good attitude as well as negative/ poor attitude. About 99% of the respondents agree that malaria is serious and life threatening disease. Majority of the respondents (75.3%) had no opinion on whether malaria is air-borne disease while 7.3% agree the fact. More than 90% of the respondents agree that without proper treatment malaria is fatal disease and only a small portion (2.2%) had different thought. Almost everyone (99.7%) agree that the best method to prevent malaria is to avoid the mosquito bite. A large portion of the respondents were disagreeing with prevention of malaria by sleeping under bed nets (82.6%) while only 17.4% agree on the fact. About 98.8% agree on the fact that if they went to forest area at night time they are more likely to get the malaria. More than half of the respondents (63.6%) disagree that children and pregnant woman are vulnerable for malaria with only 17.4% agreeing on the fact. For the attitude regarding environment protection from malaria by clearing the mosquito breeding sites, almost all (98.5 %) agree the statement. For self-treatment of malaria, 97.8 % disagree on the fact and state that self-treatment should not be performed. About 82.6% had poor attitude on malaria recovery without any treatment. Only 17.4% disagree on the recovery of malaria without treatment. All of the respondents (100.0%) agree on blood testing to diagnose malaria. About 70% of the total respondents disagree on stopping

antimalarial drugs when symptoms are relieved. Most of the respondents agree that drug resistant malaria can occur if complete course of antimalarial treatment is not taken. Majority of the respondents (82.6%) agree that antimalarial drugs are easily purchasable when malaria infection is suspected. All of the respondents agree on trusting the health staffs for their treatment.

**Table 8 Frequency and percentage distribution of attitude regarding malaria (n=316)**

**SA= Strongly agree, A= Agree, N = Neutral, D = Disagree, SD = Strongly Disagree**

<b>Statement</b>	<b>SA</b>	<b>A</b>	<b>N</b>	<b>D</b>	<b>SD</b>
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
<b>Malaria is serious and life-threatening disease</b>	238(75.3)	75(23.7)	0(0.0)	3(1)	0(0.0)
<b>Malaria can be transmitted through air*</b>	0(0.0)	23(7.3)	238(75.3)	49(15.5)	6(1.9)
<b>If malaria is not treated properly it can be life-threatening</b>	211(66.8)	96(30.4)	2(0.6)	6(1.9)	1(0.3)
<b>The best way to prevent malaria is to avoid mosquito bite</b>	207(65.5)	108(34.2)	0(0.0)	1(0.3)	0(0.0)

**Table 8 (Continued) Frequency and percentage distribution of attitude regarding malaria (n=316)**

SA= Strongly agree, A= Agree, N = Neutral, D = Disagree, SD = Strongly Disagree

Statement	SA	A	N	D	SD
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
<b>Malaria can be prevented by sleeping under bed nets</b>	6(1.9)	49(15.5)	0(0.0)	255(80.7)	6(1.9)
<b>If you go to forest area at night , you get more chance to get malaria</b>	183(57.9)	129(40.9)	2(0.6)	2(0.6)	0(0.0)
<b>Children and pregnant woman are at risk for malaria</b>	41(13.0)	14(4.4)	60(19.0)	179(56.6)	22(7.0)
<b>Malaria can be prevented by clearing the mosquito breeding sites</b>	168(53.2)	143(45.3)	3(0.9)	0(0.0)	2(0.6)
<b>You should do self-treatment when you got malaria*</b>	2(0.6)	4(1.3)	1(0.3)	96(30.4)	213(67.4)
<b>You can recover without any treatment when you get malaria*</b>	0(0.0)	261(82.6)	0(0.0)	35(11.1)	20(6.3)

**Table 8 (Continued) Frequency and percentage distribution of attitude regarding malaria (n=316)**

SA= Strongly agree, A= Agree, N = Neutral, D = Disagree, SD = Strongly

Disagree

Statement	SA	A	N	D	SD
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
<b>You should do blood test for diagnosis of malaria</b>	250(79.1)	66(20.9)	0(0.0)	0(0.0)	0(0.0)
<b>You can stop the antimalarial treatment after you relieve malaria symptom*</b>	95(30.0)	0(0.0)	0(0.0)	35(11.1)	186(58.9)
<b>Drug resistant malaria can happen if you do not take complete antimalarial drugs</b>	172(54.4)	120(38.0)	4(1.3)	8(2.5)	12(3.8)
<b>You can buy antimalarial drug by yourself in local drug store when you got malaria*</b>	82(25.9)	179(56.7)	0(0.0)	45(14.2)	10(3.2)
<b>You should trust health staff for treatment</b>	234(74.1)	82(25.9)	0(0.0)	0(0.0)	0(0.0)

\*Negative statement

Table 9 shows the total attitude level which are separated into three groups with poor, moderate and good attitude by using the mean score and standard deviation. Most

of the respondents had moderated attitude with 61.4%, 21.2% had poor attitude and 17.4% had good attitude regarding malaria. The average mark obtained was 42.87 with standard deviation of 7.818. The attitude score range from 29 to 60.

**Table 9 Frequency and percentage distribution of attitude level regarding malaria (n=316)**

Attitude level		
	Frequency	Percentage
Poor Attitude	67	21.2
Moderate Attitude	194	61.4
Good Attitude	55	17.4
<b>Mean = 42.87, SD = 7.818</b>		
<b>Range = 29 - 60</b>		

#### 4.5 Practice on malaria prevention

Table 10 shows the frequency and percentage of respondent with different practices on malaria prevention. Malaria prevention practices during the time period of previous one month were asked with the possible response of always, sometime and never or non-applicable. For the personal protection practice, respondents were asked about the wearing of the long-sleeves clothes when went to outside at night and 38.6% always done, more than half (55.7%) practice sometime and 5.7% had not done once.

For the question of usage on bed net, most of the respondents (94.3%) always sleep under bed net while 5.7% sometime sleep under bed net. For caring of bed net, just more than half (53.8%) had always checked and repair the holes in bed nets while 36.1% done sometime and 10.1 had never done it. For the forest goers, 39.6% had always taken their bed net and 29.1% took the bed net sometime. On the other hand, more than a quarter (31.3%) had never taken their bed nets when they went into forest. About 66.1% of the respondent always slept under bed net when they were at outdoor and 22.5% slept under bed net sometime at outdoor. Only small portion (11.4%) did not use bed net when they slept outdoor. For the type of bed net, almost all of the

respondents (96.2%) always used insecticide treated bed nets and 2.5% used sometime while 1.3% had never used it.

For the prevention of malaria in environment, 61.4% always clear bushes around the house while 36.1% clear sometime and only 2.5% had never done it. Similarly, 55.4% always clear the stagnant water around the house, 41.8% sometime clear the stagnant water and 2.8% had never done it.

When asking about the chemoprophylaxis of malaria, most of the respondent (71.2%) had never done it while 28.8 had done it. For usage of mosquito repellent spray/cream for personal protection, more than half (55.1%) had never used, 42.1% used occasionally while only 2.8% of the respondents had used it regularly. The poor practice of using the mosquito repellent coil is still widely used by the respondents with 44.0% always used, 50.3% used sometime and only 5.7% had never used it.

For diagnosis of malaria when suspecting malaria, majority of the respondents (95.6%) sought for diagnosis and only 4.4% had never sought for diagnosis. About 43.3% had always attended the malaria health education session which is followed by 53.5% (sometime) and only 3.2% had never attended the health education session.



**Table 10 Frequency and percentage distribution of practice regarding malaria prevention (n=316)**

<b>Statement</b>	<b>Always</b>	<b>Sometime</b>	<b>Never or Non-Applicable</b>
	Frequency (%)	Frequency (%)	Frequency (%)
<b>Wear long-sleeves clothes when you go outside at night time</b>	122(38.6)	176(55.7)	18(5.7)
<b>Sleep under bed net?</b>	298(94.3)	18(5.7)	0(0.0)
<b>Check and repair holes in your bed net</b>	170(53.8)	114(36.1)	32(10.1)
<b>Take bed net together with you when you go to forest</b>	125(39.6)	92(29.1)	99(31.3)
<b>Use bed net when you sleep outdoors</b>	209(66.1)	71(22.5)	36(11.4)
<b>Use insecticide treated bed net</b>	304(96.2)	8(2.5)	4(1.3)
<b>Clear the bushes around your house</b>	194(61.4)	114(36.1)	8(2.5)

**Table 10 (Continued) Frequency and percentage distribution of practice regarding malaria prevention (n=316)**

<b>Statement</b>	<b>Always</b>	<b>Sometime</b>	<b>Never or Non- Applicable</b>
	Frequency (%)	Frequency (%)	Frequency (%)
<b>Clear the stagnant water around your house</b>	175(55.4)	132(41.8)	9(2.8)
<b>Take antimalarial drugs when you go to forest*</b>	34(10.8)	57(18.0)	225(71.2)
<b>Use mosquito repellent spray/ cream</b>	9(2.8)	133(42.1)	174(55.1)
<b>Seek for diagnosis when you suspect malaria</b>	158(50.0)	144(45.6)	14(4.4)
<b>Use mosquito repellent coil*</b>	139(44.0)	159(50.3)	18(5.7)
<b>Attend the malaria health education session</b>	137(43.3)	169(53.5)	10(3.2)

\*Negative statement

Table 11 shows the frequency and percentage of practice level regarding malaria prevention. Mean score of 17.96 is observed regarding the total practice score of the entire respondent with standard deviation of 3.178 and range of 7 to 25. Then the level of practice is classified into poor and good practice with the cutoff point of average score. Just more than half (50.9%) of total respondents had poor practice and nearly half (49.1%) had good practice.

**Table 11 Frequency and percentage distribution of Practice level regarding malaria prevention (n=316)**

Practice level	Frequency Percentage	
	Frequency	Percentage
Poor Practice	161	50.9
Good Practice	155	49.1
<b>Mean = 17.96, SD = 3.178</b>		
<b>Range = 7 - 25</b>		

#### 4.6 Regrouping the variables for inferential analysis

For bivariate and multivariate analysis, variables were regrouped. 65 years old was added into 55 to 65 age group. For ethnicity, Kayin, Mon and Shan ethnics were added into other ethnicity to compare with Bamar. For educational level, respondents who attended high school, college and university were grouped into high school and higher education group and respondent who study at monastery was added to never attend school. For type of occupation, occupations were grouped into forest related workers and non-forested workers. For income groups, respondents who earned between 200000 – 300000 and between 300000 – 400000 kyat per month were grouped into more than 200000 kyats per month. For length of stay, respondents who do not remember exact years were considered living for more than 3 years. For accessibility to health facility, respondents who took between 90 – 120 minutes and more than 120 minutes by motorcycle were regrouped into more than 90 minutes. For the mode of transport, transport by car, walking and boat were grouped into other type to transport to compare with the most used type of transport which was motorcycle. For source of information, Radio, television, posters and pamphlets were grouped into media.

#### **4.7 Association between socio-demographic characteristic with knowledge level regarding malaria**

The calculation result of association between socio-demographic characteristic and knowledge level can be observed in table 12. It shows that marital status, education level, income, accessibility to nearest health facility and mode of transport are statically associated significantly (P-value <0.05) with chi-square test. It was found that association significant were marital status (P-value = 0.004), education level (P-value <0.001), income (P-value<0.001), accessibility to nearest health facility (P-value <0.001), mode of transport (P-value <0.001).

For the marital status, the proportion of good knowledge level is seen mostly in widowed with 81.8%. The proportion of poor knowledge is mostly seen in single.

Regarding education level, all of the high school and higher education level were in good knowledge level. The proportion of poor knowledge level was seen mostly in respondents who never attended school with 32.1%.

For the income of the respondents, the proportion of good knowledge is highest in income group of more than 200,000 kyats per month with 80.3%. The number of respondents who had poor knowledge was highest in income group of 100,000-200,000 kyats per month with total of 37 respondents.

Regarding accessibility to nearest health facility by motorbike, there is significant proportion of less than 30 minutes away from home to nearest health facility was seen with 84.1% in good knowledge category. In contrast, proportion of poor knowledge is highest in more than 90 minutes duration in compare to other groups with 31.1%.

For the mode of transport, proportion of good knowledge was seen mostly in other type of transport with just around 79%.

**Table 12 Association between socio-demographic characteristics and knowledge level regarding malaria (n=316)**

Socio-demographic characteristic	Total respondents (n)	Knowledge level n (%)			P-value
		Poor	Moderate	Good	
<b>Age group (years)</b>					
18-24	65	16(24.6)	5(7.7)	44(67.7)	0.081
25-34	82	16(19.5)	13(15.9)	53(64.6)	
35-44	75	7(9.4)	13(17.3)	55(73.3)	
45-54	64	11(17.2)	16(25.0)	37(57.8)	
55-65	30	4(13.3)	8(26.7)	18(66.0)	
<b>Gender</b>					
Male	184	38(20.7)	35(19.0)	111(60.3)	0.057
Female	132	16(12.1)	20(15.2)	96(72.7)	
<b>Ethnicity</b>					
Bamar	306	51(16.6)	55(18.0)	200(65.4)	0.242
Others <sup>1</sup>	10	3(30.0)	0(0.0)	7(70.0)	
<b>Marital status</b>					
Single	53	18(34.0)	4(7.5)	31(58.5)	0.004*
Married	239	31(13.0)	47(19.6)	161(67.4)	
Separated	13	4(30.8)	3(23.1)	6(46.1)	
Widowed	11	1(9.1)	1(9.1)	9(81.8)	
<b>Education level</b>					
Never attend school	28	9(32.1)	4(14.3)	15(53.6)	<0.001*
Primary school	180	40(22.2)	33(18.3)	107(59.5)	
Secondary school	82	5(6.0)	18(22.0)	59(72.0)	
High school and higher education	26	0(0.0)	0(0.0)	26(100.0)	

**Table 12 (Continued) Association between socio-demographic characteristics and knowledge level regarding malaria (n=316)**

Socio-demographic characteristic	Total respondents (n)	Knowledge level n (%)			P-value
		Poor	Moderate	Good	
<b>Type of occupation</b>					
Forest related workers	240	45(18.8)	41(17.1)	154(64.1)	0.378
Non forest related workers	76	9(11.9)	14(18.4)	53(69.7)	
<b>Income (kyats/month)</b>					
<100000	21	1(4.8)	5(23.8)	15(71.4)	<0.001*
100000 - 200000	163	37(22.7)	40(24.5)	86(52.8)	
>200000	132	16(12.1)	10(7.6)	106(80.3)	
<b>Length of stay (years)</b>					
≤3	96	22(22.9)	13(13.6)	61(63.5)	0.135
>3	220	32(14.5)	42(19.1)	146(66.4)	
<b>Family members (person)</b>					
≤3	139	22(15.8)	22(15.8)	95(68.4)	0.079
4-5	122	22(18.0)	29(23.8)	71(58.2)	
≥6	55	10(18.2)	4(7.3)	41(74.5)	
<b>Accessibility to nearest health facility(minutes by motorcycle)</b>					
<30	44	0(0.0)	7(15.9)	37(84.1)	<0.001*
30-60	101	11(10.9)	30(29.7)	60(59.4)	
60-90	126	29(23.0)	17(13.5)	80(63.5)	
>90	45	14(31.1)	1(2.2)	30(66.7)	

**Table 12 (Continued) Association between socio-demographic characteristics and knowledge level regarding malaria (n=316)**

Socio-demographic characteristic	Total respondents (n)	Knowledge level n (%)			P-value
		Poor	Moderate	Good	
<b>Mode of transport</b>					
Motorcycle	247	42(17.0)	53(21.5)	152(61.5)	0.001*
Others <sup>2</sup>	69	12(17.4)	2(2.9)	55(79.7)	

\*Significant by chi-square Test 1. Kayin, Mon, Shan 2. Car, boat, walking

#### **4.8 Association between socio-demographic characteristic with attitude level regarding malaria**

Table 13 shows the association between socio-demographic characteristic with level of attitude regarding malaria. There is significantly association between marital statuses, educational level, income, length of stay in Kawthoung Township, accessibility to nearest health facility by motorcycle and attitude level of malaria. The association significant shows marital statuses (P-value = 0.007), educational level (P-value <0.001), income (P-value <0.001), length of stay in Kawthoung Township (P-value <0.001) and accessibility to nearest health facility by motorcycle (P-value <0.001) using the chi-square test.

Regarding marital status and attitude toward malaria, good attitude proportion is mostly around 20% in all the marital statuses. Most of the marital statuses are in moderate attitude group with nearly half of each group. In separated and widowed groups, poor attitude is around 40% of each respective group.

For the education level, Good attitude is significantly high in high school and higher education groups with more than half of each group respondents. In contrast, secondary school and lower education level show less than 20% on good attitude level. It is observed that almost all of the respondents who never attended the school had moderate or poor attitude toward malaria.

Regarding grouping into income group, Majority of all groups had moderated knowledge with more than 50% within each group. The proportion of good attitude was seen more in higher income group such as 200000 when compare to their respective poor attitude.

For the length of stay, people who stayed in Kawthoung for not more than 3 years have total of 87.6% in moderate and poor attitude while 12.4% had good attitude. In other group which stayed in Kawthoung Township for more than 3 years, good attitude was seen as 19.5% and poor attitude with 11.4%.

In the statement of accessibility to nearest health facility by motorcycle, travelling time of less than 30 minutes groups had largest proportion of good attitude. The proportion of good attitude was lowest in respondents who had to travel for more than 90 minutes with only 8.9%.

**Table 13 Association between socio-demographic characteristics and attitude level regarding malaria (n=316)**

Socio-demographic characteristic	Total respondents (n)	Attitude level n (%)			P-value
		Poor	Moderate	Good	
<b>Age group (years)</b>					
18-24	65	15(23.1)	37(56.9)	13(20.0)	0.101
25-34	82	24(29.3)	43(52.4)	15(18.3)	
35-44	75	8(10.7)	50(66.7)	17(22.6)	
45-54	64	13(20.3)	43(67.2)	8(12.5)	
55-65	30	7(23.3)	21(70.0)	2(6.7)	
<b>Gender</b>					
Male	184	37(20.1)	117(63.6)	30(16.3)	0.637
Female	132	30(22.7)	77(58.4)	25(18.9)	



**Table 13 (Continued) Association between socio-demographic characteristics and attitude level regarding malaria (n=316)**

Socio-demographic characteristic	Total respondents (n)	Attitude level n (%)			P-value
		Poor	Moderate	Good	
<b>Ethnicity</b>					
<b>Bamar</b>	306	66(21.6)	187(61.1)	53(17.3)	0.678
<b>Others<sup>1</sup></b>	10	1(10.0)	7(70.0)	2(20.0)	
<b>Marital status</b>					
<b>Single</b>	53	15(28.3)	24(45.3)	14(26.4)	0.007*
<b>Married</b>	239	42(17.6)	160(66.9)	37(15.5)	
<b>Separated</b>	13	5(38.5)	7(53.8)	1(7.7)	
<b>Widowed</b>	11	5(45.4)	3(27.3)	3(27.3)	
<b>Education level</b>					
<b>Never attend school</b>	28	13(46.4)	14(50.0)	1(3.6)	<0.001*
<b>Primary school</b>	180	46(25.6)	109(60.6)	25(13.8)	
<b>Secondary school</b>	82	7(8.5)	61(74.4)	14(17.1)	
<b>High school and higher education</b>	26	1(3.8)	10(38.5)	15(57.7)	
<b>Type of occupation</b>					
<b>Forest related workers</b>	240	53(22.1)	149(62.1)	38(15.8)	0.395
<b>Non forest related workers</b>	76	14(18.4)	45(59.2)	17(22.4)	

**Table 13 (Continued) Association between socio-demographic characteristics and attitude level regarding malaria (n=316)**

Socio-demographic characteristic	Total respondents (n)	Attitude level n (%)			P-value
		Poor	Moderate	Good	
<b>Income(kyats/month)</b>					
< 100000	21	4(19.0)	16(76.2)	1(4.8)	<0.001*
100000 - 200000	163	49(30.1)	84(51.5)	30(18.4)	
>200000	132	14(10.6)	94(71.2)	24(18.2)	
<b>Length of stay (years)</b>					
≤ 3	96	42(43.8)	42(43.8)	12(12.4)	<0.001*
> 3	220	25(11.4)	152(69.1)	43(19.5)	
<b>Family members(person)</b>					
≤3	139	35(25.2)	83(59.7)	21(15.1)	0.085
4-5	122	23(18.8)	81(66.4)	18(14.8)	
≥6	55	9(16.4)	30(54.5)	16(29.1)	
<b>Accessibility to nearest health facility(minutes by motorcycle)</b>					
<30	44	9(20.5)	14(31.8)	21(47.7)	<0.001*
30-60	101	5(5.0)	80(79.2)	16(15.8)	
60-90	126	34(27.0)	78(61.9)	14(11.1)	
>90	45	19(42.2)	22(48.9)	4(8.9)	

**Table 13 (Continued) Association between socio-demographic characteristics and attitude level regarding malaria (n=316)**

Socio-demographic characteristic	Total respondents (n)	Attitude level n (%)			P-value
		Poor	Moderate	Good	
<b>Mode of transport</b>					
<b>Motorcycle</b>	247	59(23.9)	149(60.3)	39(15.8)	0.056
<b>Others<sup>2</sup></b>	69	8(11.6)	45(65.2)	16(23.2)	

\*Significant by chi-square Test 1. Kayin, Mon, Shan 2. Car, boat, walking

#### **4.9 Association between socio-demographic characteristic with practice level regarding malaria prevention**

When analyzing the association between socio-demographic characteristic and practice level of malaria prevention, there is statically significant association between practice level and education level, type of occupation, income, length of stay and accessibility to nearest health facility (minutes by motorcycle). Using chi-square, there is significant association in education level (P-value < 0.001), type of occupation (P-value = 0.042), income (P-value = 0.002), length of stay (P-value = 0.007) and accessibility to nearest health facility (minutes by motorcycle) (P-value < 0.001).

Regarding education level and practice level, higher proportion of good practice was seen in respondents who had more than secondary school level with approximately 70%. Primary school level had 60% and respondents who never attended school had 89.3% of poor practice in their respective education category.

In case of type of occupation, good practice is seen in non-forest related workers with 59.2% and 40.8 % with poor practice. For the forest related workers poor practice was seen more with 54.2%.

Regarding income, comparatively higher income group of more than 200,000 kyats per month have higher proportion of good practice with 60.6%. In lower income

group such as 100,000 to 200,000 kyats per month and less than 100,000 kyats per month had higher percentage of poor practice with 58.9% and 61.9% respectively in their groups.

For length of stay in Kawthoung Township, respondents who live more than 3 years had higher percentage in good practice with 54.1%. Respondents who lived less than or equal to 3 years had higher proportion of poor practice with 62.5%.

In case of accessibility to nearest health facility, 90.9% of less than 30 minutes duration had good practice. The proportion of good practice is higher than poor practice in 30 to 60 minutes with 61.4%. Poor practice is seen more in more than 60 minutes travelling time group than the good practice of malaria prevention.

**Table 14 Association between socio-demographic characteristics and practice level regarding malaria prevention (n=316)**

Socio-demographic characteristic	Total respondents (n)	Practice level n (%)		P-value
		Poor	Good	
<b>Age group (years)</b>				
18-24	65	41(63.1)	24(36.9)	0.189
25-34	82	40(48.8)	42(51.2)	
35-44	75	34(45.3)	41(54.7)	
45-54	64	29(45.3)	35(54.7)	
55-65	30	17(56.7)	13(43.3)	
<b>Gender</b>				
Male	184	98(53.3)	86(46.7)	0.332
Female	132	63(47.7)	69(52.3)	

**Table 14 (Continued) Association between socio-demographic characteristics and practice level regarding malaria prevention (n=316)**

Socio-demographic characteristic	Total respondents (n)	Practice level n (%)		
		Poor	Good	P-value
<b>Ethnicity</b>				
Bamar	306	155(50.7)	151(49.3)	0.750**
Others <sup>1</sup>	10	6(60.0)	4(40.0)	
<b>Marital status</b>				
Single	53	31(58.5)	22(41.5)	0.132
Married	239	115(48.1)	124(51.9)	
Separated	13	10(76.9)	3(23.1)	
Widowed	11	5(45.5)	6(54.5)	
<b>Education level</b>				
Never attend school	28	25(89.3)	3(10.7)	<0.001*
Primary school	180	108(60.0)	72(40.0)	
Secondary school	82	23(28.0)	59(72.0)	
High school and higher education	26	5(19.2)	21(80.8)	

**Table 14 (Continued) Association between socio-demographic characteristics and practice level regarding malaria prevention (n=316)**

Socio-demographic characteristic	Total respondents (n)	Practice level n (%)		
		Poor	Good	P-value
<b>Type of occupation</b>				
Forest related workers	240	130(54.2)	110(45.8)	0.042*
Non forest related workers	76	31(40.8)	45(59.2)	
<b>Income (kyats/month)</b>				
< 100000	21	13(61.9)	8(38.1)	0.002*
100000 - 200000	163	96(58.9)	67(41.1)	
>200000	132	52(39.4)	80(60.6)	
<b>Length of stay (years)</b>				
≤ 3	96	60(62.5)	36(37.5)	0.007*
> 3	220	101(45.9)	119(54.1)	
<b>Family members(person)</b>				
≤3	139	63(45.3)	76(54.7)	0.186
4-5	122	69(56.6)	53(43.4)	
≥6	55	29(52.7)	26(47.3)	

**Table 14 (Continued) Association between socio-demographic characteristics and practice level regarding malaria prevention (n=316)**

Socio-demographic characteristic	Total respondents (n)	Practice level n (%)		
		Poor	Good	P-value
<b>Accessibility to nearest health facility(minutes by motorcycle)</b>				
<30	44	4(9.1)	40(90.9)	<0.001*
30-60	101	39(38.6)	62(61.4)	
60-90	126	80(63.5)	46(36.5)	
>90	45	38(84.4)	7(15.6)	
<b>Mode of transport</b>				
Motorcycle	247	132(53.4)	115(46.6)	0.094
Others <sup>2</sup>	69	29(42.0)	40(58.0)	

\*Significant by chi-square Test \*\*Fisher's exact test 1. Kayin, Mon, Shan 2. Car, boat, walking

#### **4.10 Association between source of information with knowledge level regarding malaria**

Table 15 shows there is no statistically significant association between sources of information and knowledge level of malaria.

**Table 15 Association between most trusted source of information and knowledge level regarding malaria (n=316)**

Source of information	Total respondents (n)	Knowledge level n (%)			P-value
		Poor	Moderate	Good	
Volunteer Malaria Workers	204	30(14.7)	42(20.6)	132(64.7)	0.180
Government Health Staffs	61	13(21.3)	9(14.8)	39(63.9)	
Media	51	11(21.6)	4(7.8)	36(70.6)	

#### **4.11 Association between source of information with attitude level regarding malaria**

In table 16, the Chi-square test shows that there is significant association between source of information of malaria knowledge and attitude level of respondents for malaria prevention. (P-value 0.001) Significant proportion of good attitude was associated with people who get by media. Generally, moderate attitude was seen more in respondents who got malaria related information from volunteer Malaria workers, government health staffs and media.

**Table 16 Association between most trusted source of information and attitude level regarding malaria (n=316)**

Source of information	Total respondents (n)	Attitude level n (%)			P-value
		Poor	Moderate	Good	
Volunteer Malaria Workers	204	50(24.5)	126(61.8)	28(13.7)	0.001*
Government Health Staffs	61	14(23.0)	38(62.3)	9(14.7)	
Media	51	3(5.9)	30(58.8)	18(35.3)	



\*Significant by Chi-square test

#### 4.12 Association between source of information with practice level regarding malaria prevention

Table 17 shows there is no statistically significant association between sources of information and practice level of malaria prevention.

**Table 17 Association between most trusted source of information and practice level regarding malaria prevention (n=316)**

Source of information	Total respondents (n)	Practice level n (%)		P-value
		Poor	Good	
Volunteer Malaria Workers	204	112(54.9)	92(45.1)	0.160
Government Health Staffs	61	26(42.6)	35(57.4)	
Media	51	23(45.1)	28(54.9)	

#### 4.13 Association between knowledge level and attitude level regarding malaria

From the table 18, there is statically significant association between knowledge level and attitude level using the Chi-square test (P-value <0.001). Compare to other groups, the proportion of good knowledge was seen more in moderate attitude group (55.1%). Respondents who had both moderate knowledge and attitude level were seen as 90.9%. Respondents with poor knowledge were seen mostly in poor and moderate attitude groups with total of 98.2%

**Table 18 Association between knowledge level and attitude level regarding malaria (n=316)**

Knowledge level	Total respondents (n)	Attitude level n (%)			P-value
		Poor	Moderate	Good	
Poor	54	23(42.6)	30(55.6)	1(1.8)	<0.001
Moderate	55	2(3.6)	50(90.9)	3(5.5)	*
Good	207	42(20.3)	114(55.1)	51(24.6)	

\*Significant by Chi-square test

#### **4.14 Association between knowledge level and practice level regarding malaria prevention**

Table 19 shows the association between knowledge level and practice level regarding the malaria prevention. There is significant association between knowledge level and practice level with P-value <0.001. All of the poor knowledge level had poor practice level. Good practice level is slightly higher in moderate knowledge level than poor practice level. Almost 60% of respondents who had good knowledge also had good practice.

**Table 19 Association between knowledge level and practice level regarding malaria prevention (n=316)**

Knowledge level	Total respondents (n)	Practice level n (%)		P-value
		Poor	Good	
Poor	54	54(100.0)	0(0.0)	<0.001*
Moderate	55	24(43.6)	31(56.4)	
Good	207	83(40.1)	124(59.9)	

\*Significant by Chi-square test

#### 4.15 Association between attitude level and practice level regarding malaria prevention

For the association between attitude level and practice level of malaria prevention, there is significant association between these two (P-value <0.001) in table 20. Respondents with good attitude who also had good practice are 76.4% when compared to those with poor practice. Respondents with moderate attitude were slightly higher (52.6%) when compare to those with poor practice (47.4%). Respondents with poor attitude were higher in poor practice groups with 83.6%.

**Table 20 Association between attitude level and practice level regarding malaria prevention (n=316)**

Attitude level	Total respondents (n)	Practice level n (%)		P-value
		Poor	Good	
Poor	67	56(83.6)	11(16.4)	<0.001*
Moderate	194	92(47.4)	102(52.6)	
Good	55	13(23.6)	42(76.4)	

\*Significant by Chi-square test

#### 4.16 Association (multivariate model) between socio-demographic, trusted source of information, knowledge level, attitude level and practice level regarding malaria prevention

For the multivariable model, binary logistic regression test was used to test the association. Variables with P-value less than 0.2 in association using Chi-square test with practice level were used to include in this model. The test shows the association between socio-demographic, trusted source of information, knowledge level, attitude level and practice level regarding malaria prevention. For age group, the reference group was youngest group who ages were between 18 to 24 years old. Compare to reference group, age group of 25 to 34 years done the good practice 6.101 times the reference group (P-value = 0.006, adjusted OR = 6.101, 95% CI). There was

significantly difference in age group 35 to 44 years, 45 to 54 years and 55 to 65 years with reference group which were 4.300 times (P-value = 0.022, adjusted OR = 4.300, 95% CI), 7.478 times (P-value = 0.004, adjusted OR = 7.478, 95% CI) and 5.824 times (P-value = 0.034, adjusted OR = 5.824, 95% CI) to do the good practice respectively.

Regarding marital status, respondents who were single are categorized as reference group. In separated group, good practice was done 0.061 times than single. (P-value = 0.020, adjusted OR = 0.061, 95% CI)

For the education level, respondents who never attended school were categorized as reference group. Respondents who attended secondary school done 6.351 time good practice than reference group (P-value = 0.038, adjusted OR= 6.351, 95% CI). Respondents with high school or higher education done good practice 11.363 times than uneducated group (P-value = 0.021, adjusted OR= 11.363, 95% CI).

For the type of occupation, there is no statically significant association between type of occupation at all level and practice level. Forest related workers were use as reference in type of occupation.

Regarding the income, respondents who earned less than 100,000 kyats per month was used as reference. Respondents who earned between 100000 and 200,000 were 4.594 times done the good practice than lesser income group. (P-value = 0.043, adjusted OR = 4.594, 95% CI) As the income increase, the respondents who earned more than 200,000 kyats per month were 14.242 times done good practice than the less than 100,000 kyats income groups. (P-value <0.001, adjusted OR = 14.242, 95% CI)

When concerning about length of stay in Kawthoung Township, respondents who stayed for less than and equal to 3 years were set up as reference group. The test shows no significant difference between respondents who stayed less than and equal to 3 years and more than 3 years.

For number of family member, families more than or equal to 6 members were marked as reference group. Family members with less than or equal to 3 people were 4.670 time done good practice than the least member group. (P-value = 0.005, adjusted OR = 4.670, 95% CI)

Regarding accessibility to nearest health facility by mean of motorcycle, time taken to reach was standardized to ask the distance. More than 90 minutes travel time

was used as the reference group. Respondents who took less than 30 minutes done good practice 122.092 time than reference group. (P-value <0.001, adjusted OR = 122.092, 95% CI) Respondents who had to travel for 30 to 60 minutes had done good practice 5.356 time those with more than 90 minute traveling time group. (P-value = 0.011, adjusted OR = 5.356, 95% CI)

For most common mode of transport from home to nearest health facility, motorcycle was used as reference. The test shows no significant difference.

For source of information of malaria related messages, media was regarded as reference group. Respondents who received malaria messages through government health staff done good practice 8.293 times than those who received through media. (P-value = 0.010, adjusted OR = 8.293, 95% CI)

There is no significant association between knowledge and practice when using the binary logistic regression model. For the attitude level, poor attitude was set up as reference. Respondents with moderate attitude level had done good practice 6.063 times than poor attitude group. (P-value = 0.009, adjusted OR = 6.063, 95% CI) For the respondents with good attitude level, they practice good malaria prevention methods with 6.089 times than poor attitude groups. (P-value = 0.017, adjusted OR = 6.089, 95% CI)

**Table 21 Association (multivariate model) between socio-demographic, trusted source of information, knowledge level, attitude level and practice level regarding malaria prevention (n=316)**

Variables	Poor practice	Good practice	Adjusted OR	95%CI		P-value
				Lower	Upper	
<b>Age group (years)</b>						
18-24**	41	24	1			
25-34	40	42	6.101	1.676	22.210	0.006*
35-44	34	41	4.300	1.230	15.038	0.022*
45-54	29	35	7.478	1.930	28.978	0.004*
55-65	17	13	5.824	1.145	29.629	0.034*
<b>Marital status</b>						
Single**	31	22	1			
Married	115	124	0.266	0.069	1.030	0.055
Separated	10	3	0.061	0.006	0.645	0.020*
Widowed	5	6	0.278	0.024	3.198	0.305
<b>Education level</b>						
Never attend school**	25	3	1			
Primary school	108	72	2.084	0.401	10.837	0.383
Secondary school	23	59	6.351	1.111	36.314	0.038*
High school and higher education	5	21	11.363	1.454	88.814	0.021*

**Table 21 (Continued) Association (multivariate model) between socio-demographic, trusted source of information, knowledge level, attitude level and practice level regarding malaria prevention (n=316)**

Variables	Poor practice	Good practice	Adjusted OR	95%CI		P-value
				Lower	Upper	
<b>Type of occupation</b>						
Forest related workers**	130	110	1			
Non forest related workers	31	45	1.668	0.670	4.149	0.271
<b>Income(kyats/month)</b>						
< 100000**	13	8	1			
100000 - 200000	96	67	4.594	1.049	20.144	0.043*
>200000	52	80	14.242	3.240	62.608	<0.001

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CHULALONGKORN UNIVERSITY

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**Table 21 (Continued) Association (multivariate model) between socio-demographic, trusted source of information, knowledge level, attitude level and practice level regarding malaria prevention (n=316)**

Variables	Poor practice	Good practice	Adjusted OR	95%CI		P-value
				Lower	Upper	
<b>Length of stay (years)</b>						
Less than and equal to 3 years**	60	36	1			
More than 3 years	101	119	1.887	0.797	4.472	0.149
<b>Family members (persons)</b>						
≤3	63	76	4.670	1.576	13.834	0.005*
4-5	69	53	1.272	0.446	3.627	0.653
≥6**	29	26	1			
<b>Accessibility to nearest health facility(minutes by motorcycle)</b>						
<30	4	40	122.092	20.339	732.915	<0.001*
30-60	39	62	5.356	1.460	19.645	0.011*
60-90	80	46	2.076	0.594	7.25	0.252
>90**	38	7	1		1	



**Table 21 (Continued) Association (multivariate model) between socio-demographic, trusted source of information, knowledge level, attitude level and practice level regarding malaria prevention (n=316)**

Variables	Poor practice	Good practice	Adjusted OR	95%CI		P-value
				Lower	Upper	
<b>Mode of transport</b>						
Motorcycle**	132	115	1			
Others <sup>1</sup>	29	40	1.246	0.476	3.257	0.654
<b>Source of information</b>						
Volunteer Malaria Workers	112	92	2.820	0.783	10.153	0.113
Government Health Staffs	26	35	8.293	1.669	41.211	0.010*
Media**	23	28	1			
<b>Knowledge level</b>						
Poor	54	0	0.000	0.000		0.996
Moderate	24	31	0.860	0.322	2.297	0.764
Good**	83	124	1			
<b>Attitude level</b>						
Poor**	56	11	1			
Moderate	92	102	6.063	1.556	23.632	0.009*
Good	13	42	6.089	1.387	26.739	0.017*

\*Significant by binary logistic regression \*\* Reference group 1 Car, boat, walking

## **CHAPTER 5**

### **DISCUSSION**

In this chapter, discussion, limitations, conclusion and recommendations of researched finding will be presented. The study design for this paper was cross-sectional study which was used to find out about the knowledge, attitude and practice regarding malaria prevention and their association in internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar. The study population was internal migrant populations who are within the age limit of 18 to 65 years old and lived in Kawthoung Township for more than six months. The total number of respondents was 316.

The general objective of this study is to assess the knowledge, attitude and practice toward malaria prevention among the internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.

Specific objective of the study includes:

- To describe the socio-demographic status, knowledge level, attitude level and practice level toward malaria prevention of internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.
- To assess association between socio-demographic status and practice level toward malaria prevention of internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.
- To assess association between knowledge and practice level toward malaria prevention of internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.
- To assess association between attitude and practice level toward malaria prevention of internal migrant population in Kawthoung Township, Kawthoung District, Tanintharyi Region, Myanmar.

## 5.1 Discussion

### 5.1.1 Socio-demographic characteristic

When analyzing about the first variable of the socio demographic factor which is age groups of the respondents, the frequency of age groups was distributed equally from 18 to 54 years old. When the age was added into multivariate model, age groups from 25 to 65 showed that they were more likely to do the good practice. (P-value = 0.006, adjusted OR = 6.101, 95% CI) (P-value = 0.022, adjusted OR = 4.300, 95% CI) (P-value = 0.004, adjusted OR = 7.478, 95% CI) (P-value = 0.034, adjusted OR = 5.824, 95% CI). This result was similar with study conducted in Ethiopia, Africa where age group of 18 to 24 was set as reference and age group 25 to 34 had more likely usage of malaria prevention measure (P-value < 0.05, adjusted OR = 1.41, 95% CI) (35)

Regarding gender of the respondents, male was slightly more than female with 58%. There were no association between knowledge level, attitude level, practice level and gender. For the ethnicity, majority of the respondents are Bamar with 96.8%. Ethnicity of Myanmar people in this study showed no association with knowledge, attitude and practice level. Regarding marital status, majority of the respondents were married with 75.6%. There was significant association between knowledge level (P-value=0.004), attitude level (P-value=0.007) and marital status. This result was similar with study conducted in LAO PDR where marital status was significantly associated with knowledge level. (P-value = 0.007) (34) When analyzed in multivariable analysis, separated respondents were less likely to do the good practice than single status respondent (P-value=0.020, Adjusted OR = 0.061, 95% CI).

For the education level, 91.4% of the respondents had lower than high school level as many of the respondents were manual laborers. Education level is significantly associated with knowledge level (P-value < 0.001), attitude level (P-value < 0.001) and practice level (P-value < 0.001). This result was similar with study conducted in Madagascar, Africa where knowledge level of malaria was associated with education level (P-value < 0.001) (36) As the education level increase, respondents were more likely to do the good practice (P-value= 0.038, Adjusted OR = 6.351, 95% CI), (P-value= 0.021, Adjusted OR = 11.361, 95% CI) 75.9% of respondent in this study were forest related workers which were high risk group of malaria. There was association

between type of occupation and practice of malaria prevention. (P-value = 0.042) The result was similar with study conducted in Cambodia where malaria prevention practice was significantly associated with type of occupation (P-value = 0.003) (37)

For the income, 92.1% earned between 100000 to 300000 kyats per month by all of family members. Income was significantly associated with knowledge, attitude and practice level of malaria prevention (P-value <0.05). When the income of less than 100000 kyats was marked as reference group, income group of 100000 to 200000 done good practice 4.594 time (P-value = 0.043, Adjusted OR = 4.594, 95%CI) and income group of more than 200000 done good practice 14.242 time (P-value <0.001, Adjusted OR = 14.242, 95%CI). This result was similar with study conducted in South Ethiopia where low income was set as reference, middle income had 1.46 time done good practice (P-value < 0.001, Adjusted OR = 1.460, 95%CI) and high income group had 2.350 time done good practice (P-value <0.001, Adjusted OR = 2.350, 95%CI).(38)

For the duration of stay in Kawthoung Township more than half (68.4%) of the respondents had stayed for more than 3 years. It showed association with attitude level and practice level (P-value < 0.001 and 0.007 respectively). As Kawthoung Township was malaria risk area, respondents who had lived for longer duration had better chance to attend the health education session and received bed nets given by the government and non-government organizations. As a result, their attitude and practice were associated with length of stay. Almost half of the respondents had family member of less than 3 persons in their household. When family member of equal or more than 6 was set as reference, respondents with family member of less than 3 was done more good practice. (P-value = 0.005, Adjusted OR = 4.670, 95%CI). The presence of enough bed nets may play a role in this situation. Study conducted in Congo showed availability of bed net was strongly associated with bed net usage (P-value < 0.001)(39)

For the accessibility to nearest health facility by motor cycle, 71.9 % took between 30 to 90 minutes. The distance showed significant association with knowledge level, attitude level and practice level (P-value <0.05). Respondents who took less than 90 minutes to reach the nearest health facility (<30 minutes P-value <0.001, Adjusted OR = 122.092, 95%CI, 30-60 minutes P-value = 0.011, Adjusted OR = 5.356, 95%CI) do more good practice than those who took more than 90 minutes. A study conducted in Kenya showed protective efficacy increased as duration of travelling time decrease.

From Kenya study, longest duration of more than 120 minutes was set as reference group and risk of developing malaria was set to analyze and respondents who had to travel for less than 30 minutes had least likely to suffer from malaria with 0.52 time chance. (P-value <0.05, OR = 0.52, 95%CI) (40) 78.2 % of the respondents used motorcycle as their primary way to transport to health facility.

### **5.1.2 Source of information**

For the source of information regarding malaria prevention, most sources were coming from the volunteer malaria workers (64.6 %) and followed by government health staffs (19.3). Therefore, it is very important to give proper and correct malaria knowledge and facts to them when giving the training and refresher courses as they are the main source of information. The attitude level of malaria was significantly associated with the source of information (P-value = 0.001). When the media was set up as reference, respondents who got malaria prevention information from government health staff do good practice 8.293 time (P-value = 0.010, Adjusted OR = 8.293, 95%CI). Giving malaria related messages by face to face method seemed effective method in community mobilizing activities. An intervention study conducted in Uganda, Africa showed the behavioral change communication activities done by health staffs and community health worker improved malaria knowledge from 76.6% to 90% in school children, bed net utilization rate from 51% to 74.4% in children who are under 5 years old and from 24% to 78% in pregnant women which are malaria risk groups.(41)

### **5.1.3 Knowledge of malaria**

The knowledge of the studied respondents was mostly in good knowledge level with 65.5%. Poor and moderate knowledge groups show similar proportion with around 17%. When the respondents were asked about the vector of malaria, all of them can correctly identify the mosquito as vector of malaria. However, 19.6% of the respondent answered flies as vector of malaria. When the malaria related messages are need to give to the community, it is important to mention that incorrect vector of malaria. In the question of malaria vector most active time, most of the respondents answered correctly. 33.5% also answered day time is most active time. Although it was incorrect response, usage of protection method in day time may protect other infection such as dengue hemorrhagic fever. 99.7% answered correctly on how malaria can be

transmitted. Incorrect mode of transmission such as drinking contaminated water, eating unhealthy food, eating banana and bathing in steams still remain in the mind of some respondents with around 75% can correctly answered these questions. When the symptoms of the malaria were asked above 95% can answered fever and chills. Around 60% can identify other symptoms. It is important for community to know other symptoms of malaria for receiving early diagnosis and effective treatment. For diagnosis of malaria, all of the respondents answered blood test as correct method of diagnosis. 19.9% thought malaria can be diagnosed by fever symptoms. This may lead to wrong diagnosis of malaria and subsequently wrong treatment. Taking of unnecessary pills may lead to negative consequences for the people. Regarding, protection from malaria, almost all of the respondents know sleeping with bed net and long lasting insecticide treated net can prevent malaria. For the personal protection, around 75% know about how to do the personal protection. More than half of the respondents (53.5%) thought of taking anti-malarial drugs before going into forest was correct prevention method. As Kawthoung Township is malaria drug resistant area, such knowledge should be clarified as wrong method from all the available source of information. For environmental protection, only 47.8 % knew closing of window during night time is correct method however, around 75% knew to clear the bushes and cover the water container for malaria prevention. For the question on cause of drug resistant malaria, most of the people can answer taking antimalarial drugs incompletely may cause malaria. Around 40 % cannot answer taking fake drugs and self-treatment as possible cause of drug resistant malaria. These messages are important to be delivered to community especially in drug resistant area like Kawthoung Township. When respondents were asked about appropriate treatment of malaria, nearly all of them answered taking oral antimalarial drugs given by health staffs as correctly. Only 75.6% thought taking antimalarial injection given by health staffs as correct way. Community need to know more about the correct methods in order for them to receive the appropriate treatment. When checking for association, knowledge levels of respondents were associated with attitude and practice for malaria prevention (P-value <0.001). Same result was seen in study conducted in Lao PDR with association between knowledge level and attitude and practice level.(34)

#### **5.1.4 Attitude of malaria**

Majority of the respondents had moderate attitude on malaria. Poor attitude was second with 21.2% while good attitude was only 17.4%. Almost everyone agree that malaria is life threatening disease. When asked about malaria can transmitted through air, 75.3% cannot give the definite opinion. So, the correct messages need to reach the community as they were still confused. Almost everyone agree that malaria can be avoided by mosquito bite (99.7%). Surprisingly, respondents were disagreeing on fact that malaria can be prevented by sleeping under bed net with 82.6 %. Health educators need to persuade more on better usage of bed net to prevent malaria. Most of the respondent thought when they went to forest area; they were more likely to receive malaria (98.7%). When asked for high risk group, only 17.4% agree and identify the risk group. Respondents need more knowledge about the high risk groups. 98.5 % agree on clearing the mosquito breeding sites can prevent malaria. Most of the respondents disagree on getting self-treatment when malaria occur (97.8%). All of them agree that they should do blood test for diagnosis of malaria. 30.1% thought that they can stop antimalarial treatment when they relieve the symptoms. This attitude need to be changed as it may cause drug resistant and recrudescence. Most of them agree that drug resistant malaria can happen if they do not take complete treatment. 82.5 % agree that they can buy antimalarial drug in drugstore if they got malaria. As malaria drug were over the counter drug, it is easily available and freely purchasable by everyone without diagnosis. All of the respondents agree to trust the health staffs for treatment of malaria. From this study, it showed the attitude level is significantly associated with knowledge and practice level (P-value <0.001). In multivariate model, it showed respondents with moderate attitude level was 6.063 times more likely to do the good practice (P-value = 0.009, Adjusted OR = 6.063, 95%CI) and good attitude level respondents tend to do good practice 6.089 times than respondents with poor attitude on malaria (P-value = 0.017, Adjusted OR = 6.089, 95%CI).

#### **5.1.5 Practice on malaria prevention**

The practice level shows similar proportion of poor and good practice with 49.1% and 50.9% of respondents respectively. When asking for practice questions about malaria prevention, more than half of the respondents sometime wear the long-sleeves clothes when going outside at night. As Myanmar is tropical country, hot

weather is common and people are less likely to wear the long-sleeves clothes. Nearly the entire respondent said they always sleep under bed net (94.3%). As for care of bed net, only 53.8% of respondents always check and repair holes. For the continuous usage of effective prevention method, care of bed net is necessary. Mosquitoes can still transmit malaria while sleeping under bed net with holes. 39.6% always took bed net when they go to forest. Forest goers can be carrier of malaria infection even though the place they lived is malaria free when they came back from forest to their respective village. So, bed nets need to take every time people went to forest. 66.1% of respondents used bed net when they sleep outdoors. Most of the people in villages sleep outdoor because of the hot weather. As a result, beds net is not likely to be used. 96.2 % of respondents used insecticide treated bed net. The distribution from government and non-government organizations of insecticide treated net at free of charge seem to have a good net utilization rate. More than 50% of respondents had always done the environmental malaria prevention activities such clearing bushes and stagnant water. More people need to practice these activities not only for protection of malaria but also from other vector borne diseases. 28.8% of respondents took antimalarial drugs when they go to forest. According to Myanmar National Malaria Treatment guideline, chemoprophylaxis is not encouraged to avoid resistance and side effects. Community need to know about these practices is not allowed. Only 2.8% of respondents had always used the mosquito repellent spray/cream and 55.1% of respondents had never used it. Mosquito repellent spray/cream was effective method when other prevention method is not using. For rubber plantation workers, who had to work at night, wearing long-sleeves clothes while working is difficult. Therefore, using the mosquito repellent spray/cream can be used as alternative. As repellent spray/cream was not easily available and user had to buy it, it was not used widely by the community. In contrast, mosquito repellent coils were easily available in community markets; the use of mosquito repellent coils was high with 94.3% usage. 50% of respondents always seek for diagnosis when they suspect malaria while 45.6% sometime seek for diagnosis. Respondents tend to diagnose by themselves without seeking proper diagnosis can result in wrong treatment and possibly suffer from drug side effects. Almost everyone tends to attend the malaria health education session with 96.9%. As the attendance rate was high, effective and correct malaria knowledge needs to be given in order for better



malaria prevention practice as the practice level in this study is significantly associated with knowledge level and attitude level. (P-value <0.001) The results are similar with previous studies in Palaw Township, Myanmar with malaria prevention practice significantly associated with knowledge and attitude level (P-value < 0.001).(28)

## **5.2 Limitation**

Time limitation is one of the barriers to find out about the reason behind the incorrect knowledge, attitude and practice. As the study was cross-sectional, it was difficult to determine between causal factor and effect. For more accurate representation of malaria prevention practices, observation of prevention activities such as care of bed net and environmental conditions need to be observed.

As it is observed at one point, we cannot determine the respondent practice in long period. Some of the malaria messages were not known by the significant portion of the respondents. The study cannot determine this was due to lack of information from health educator or from the respondents who did not remember the malaria related messages.

## **5.3 Conclusion**

This study research design was cross-sectional study which was aimed to assess and describe the socio-demographic factors, knowledge, attitude and practice towards malaria prevention in internal migrant people, Kawthoung Township, Kawthoung District, Myanmar. The aim of the study is to find the association between the socio-demographic factors, knowledge, attitude and practice towards malaria prevention in internal migrant people

### **5.3.1 Socio-demographic characteristic of respondents**

The respondents age range from 18 to 65 years old. The mean age was 36.64. The age group of the respondent distribute similarly with around 20% from 18-24, 25-34, 35-44 and 45-54. Male were more participated in this study with 58.2%. 96.8% of the ethnic was Bamar. Respondents were mostly married with 75.6%. 57.0% of the respondents had largest proportion in education level with highest education of primary school. 73.1% of the participants were palm oil workers. Majority of the respondents were malaria risk group which were related with forest (75.9%). Just more than 50%

earned between 100,000 and 200,000 kyats per month per household. Larger portion of respondent had lived in Kawthoung Township for more than 3 years with 68.4%. Number of family member in each household was highest in less than 3 persons with 44%. Most common duration to go nearest health facility from home to nearest health facility by motorcycle was between 60 to 90 minutes with 39.9%. Respondents use motorcycle as their main transport from home to nearest health facility (78.2%).

### **5.3.2 Source of information of malaria prevention knowledge**

Most of the information relating to malaria prevention knowledge where received through volunteer malaria worker with 64.6%. Government health staffs came in second with 19.3%.

### **5.3.3 Knowledge of malaria**

All of the respondents can answer correctly to vector of malaria which is mosquito. Majority of the respondent can answer correctly to vector most active time and cause of malaria with over 98%. Most of the respondents answered the common signs and symptoms of malaria (>95%). All of them can identify the correct diagnosis method. Over 90% respondents know sleeping with bed net can prevent malaria. Incomplete malaria treatment was known most by the respondents as the cause of drug resistant malaria with 98.7%. Most accepted way of treating malaria was by taking oral antimalarial drugs given by health staff (99.7%). Overall 17.1% had poor knowledge, 17.4% had moderate knowledge and 65.5% had good knowledge. Mean score of knowledge was 30.25 with range of 16-37.

### **5.3.4 Attitude of malaria**

61.4% of the respondents had moderate attitude, 21.2% had poor attitude and 17.4% had good attitude. Mean score of attitude was 42.87 with range of 29-60. Most of the respondent had good attitude on seriousness of malaria disease and prevention methods while found some negative attitude on treatment of malaria.

### **5.3.5 Practice of malaria prevention**

Most of the respondent had poor practice on use of personal protection. Bed net utilization and care seem to be good. Control of mosquito breeding sites was done

sometime and treatment seeking behavior show good practice. The percentage of poor practice was 50.9% while the percentage of good practice was 49.1%.

### **5.3.6 Association between socio-demographic characteristic, knowledge, attitude and practice regarding malaria prevention**

For association of socio-demographic characteristic and knowledge toward malaria, there was significant association in marital status (P-value=0.004), education level (P-value <0.001), income (P-value <0.001), accessibility to nearest health facility by motorcycle (P-value <0.001), mode of transport (P-value = 0.001) with knowledge level. For association of socio-demographic characteristic and attitude toward malaria prevention there was significant association in marital status (P-value = 0.007), education level (P-value <0.001), income (P-value <0.001), length of stay in Kawthoung Township (P-value <0.001), accessibility to nearest health facility by motorcycle (P-value <0.001) with attitude level. For association of socio-demographic characteristic and practice toward malaria prevention, there was significant association in education level (P-value <0.001), type of occupation (P-value = 0.042) income (P-value = 0.002), length of stay in Kawthoung Township (P-value = 0.007) accessibility to nearest health facility by motorcycle (P-value <0.001) with practice level.

Source of information was strongly associated with attitude level of malaria prevention (P-value = 0.001). Knowledge level was strongly associated with attitude level and practice level (P-value <0.001). There is also significant association between attitude level and practice level of malaria (P-value <0.001)

When using the binary logistic regression model, variables with P-value less than 0.2 in association using Chi-square test with practice level were used to include in this model. Compare to reference group, age group of 25 to 34 years done the good practice 6.101 times the reference group (P-value = 0.006, adjusted OR = 6.101, 95% CI). There was significant difference in age group 35 to 44 years, 45 to 54 years and 54 to 65 years with reference group which were 4.300 times (P-value = 0.022, adjusted OR = 4.300, 95% CI), 7.478 times (P-value = 0.004, adjusted OR = 7.478, 95% CI) and 5.824 times (P-value = 0.034, adjusted OR = 5.824, 95% CI) to do the good practice.

Regarding marital status, respondents who were single are categorized as

reference group. In separated group, good practice was done 0.061 times than single. (P-value = 0.020, adjusted OR = 0.061, 95% CI).

For the education level, respondents who never attended school were set as reference. Respondent who attended secondary school done good practice 6.351 times (P-value = 0.038, adjusted OR = 6.351, 95%CI) and high school and higher education group done good practice 11.363 time (P-value = 0.021, adjusted OR = 11.363, 95%CI) than the reference group.

Regarding the income, respondents who earned less than 100000 kyats per month was used as reference. Respondents who earned between 100000 and 200000 were 4.594 times done the good practice than lesser income group. (P-value = 0.043, adjusted OR = 4.594, 95% CI) As the income increase, the respondents who earned more than 200000 were 14.242 times done good practice than the less than 100000 kyats income groups. (P-value <0.001, adjusted OR = 14.242, 95% CI)

For number of family member, families with more than or equal to 6 members was marked as reference group. The model shows that family member of less than 3 respondents were 4.670 times done good practice. (P-value = 0.005, adjusted OR = 4.670, 95% CI)

Regarding accessibility to nearest health facility by mean of motorcycle, time taken to reach was standardized to ask the distance. Nearest distance of more than 90 minutes travel time was used as the reference group. Respondents who took less than 30 minutes done good practice 122.092 times than respondents who took more than 90 minutes group. (P-value < 0.001, adjusted OR = 122.092, 95% CI) Respondents who had to travel for 30 to 60 minutes had done good practice 5.356 times those with more than 90 minutes traveling time group. (P-value = 0.011, adjusted OR = 5.356, 95% CI)

For source of information of malaria related messages, media was regarded as reference group. Respondents who received malaria messages through government health staffs were 8.293 time more likely to do the good practice than those who received through media. (P-value = 0.010, adjusted OR = 8.293, 95% CI)

For the attitude level, poor attitude was set up as reference. Respondents with moderate attitude level had done good practice 6.063 times than poor attitude group. (P-value = 0.009, adjusted OR = 6.063, 95% CI) For the respondents with good attitude

level, they practice good malaria prevention methods with 6.089 times than poor attitude groups. (P-value = 0.017, adjusted OR = 6.089, 95% CI)

#### **5.4 Recommendation**

- Most of the sources of information from the studied population were derived from Volunteer Malaria Workers and government health staffs. Community can access to Volunteer Malaria Workers and government health staff more easily than other source. Other source may need accessibility and availability such as television and radio. Health system decision makers should focus on capacity building and make motivation for health workers. The number of village malaria workers and government health staffs need to cover the appropriate proportion of population for adequate service provision and health education.
- Knowledge about malaria especially on vector most active time, mode of transmission, symptoms of malaria, personal protection from mosquito, environmental activities for removing mosquito breeding space, antimalarial resistant malaria and appropriate treatment should be included more specifically when doing the health education session. As Kawthoung Township is antimalarial drug-resistant area, messages should include more about drug resistant malaria. From the results of this study, above mentioned information were not known by all of the respondents. So, it is necessary for people who give malaria health education to include and emphasize on these.
- Attitude on malaria by the community should be improved by conducting focus group discussion session whenever possible. Reasons for incorrect practice of malaria prevention need in depth analysis through the focus group discussion to know more about the respondents' attitude and find ways to correct the attitude. As the malaria case decrease, community awareness may also decrease. Health service providers should raise community awareness through activities for sustainability of good malaria prevention practice.

- Although respondents used bed net, usage on personal protection seem to be low. Some of the jobs such as rubber plantation workers need to work at night. Personal protection measure needs to make more available to risk group. Government and Non-government organizations should try to provide not only bed nets but also personal protective measures.
- Transportation and access to health facility need to be easier for the best practice. Appointing adequate number of village malaria workers and government health staffs can help to increase access and coverage to health facility by the community.
- Practices which involve environmental management of malaria control should be done through community mobilization activities. In this study, the malaria prevention done by managing the environment and clearing breeding sites of mosquito was still low. So, it is necessary for health policy maker to promote these activities.

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**CHULALONGKORN UNIVERSITY**

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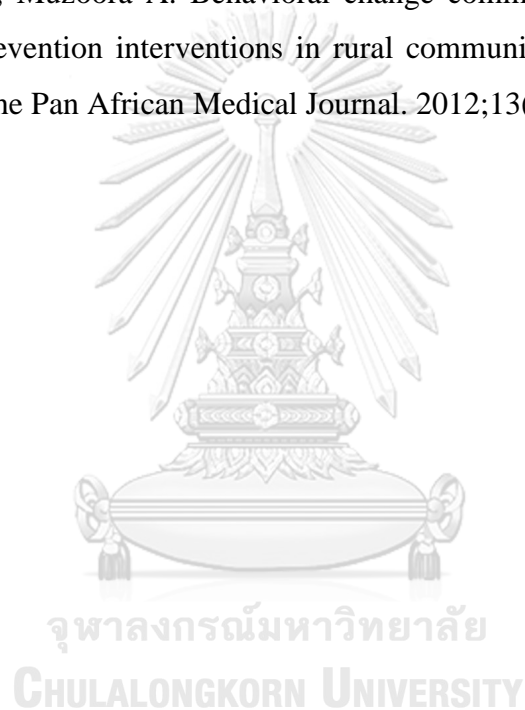
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## APPENDIX

**Questionnaire – Survey tool use for data collection**

Code Number.....

Date of Interview.....

**Section A General Characteristic**

1 Respondent age ..... Years

2 Gender

2.1 Male

2.2 Female

3. Ethnicity

3.1 Kachin

3.2 Kayar

3.3 Kayin

3.4 Chin

3.5 Mon

3.6 Bamar

3.7 Rakhine

3.8 Shan

3.9 Others .....

4 What is your marital status?

4.1 Single

4.2 Married

4.3 Divorced

4.4 Separated

4.5 Widowed

- 5 What is your highest education?
- 5.1 Never attend school
  - 5.2 Primary school
  - 5.3 Secondary school
  - 5.4 High school
  - 5.5 College/ University
  - 5.6 Others.....
- 6 What is your current occupation?
- 6.1 Housewife
  - 6.2 Palm oil worker
  - 6.3 Rubber plantation worker
  - 6.4 Farmer
  - 6.5 Forest worker
  - 6.6 Fisherman
  - 6.7 Merchant
  - 6.8 Vender
  - 6.9 Others.....
- 7 What is your family average income?
- 7.1 Less than 100000 kyat/month/household
  - 7.2 Between 100000 and 200000 kyat/month/household
  - 7.3 Between 200000 and 300000 kyat/month/household
  - 7.3 Between 300000 and 400000 kyat/month/household
  - 7.4 More than 400000 kyat/month/household
- 8 How long have you been here (Kawthoung Township)?
- 8.1 Less than 6 months
  - 8.2 Between 6 months and 1 year
  - 8.3 1 to 3 years
  - 8.4 More than 3 years
  - 8.5 Don't remember

- 9 How many family members in your family including you?  
.....persons
- 10 How long does it take from your home to nearest health facility?
- 10.1 Less than 30 minutes
  - 10.2 Between 30 to 60 minutes
  - 10.3 Between 60 min to 90 minutes
  - 10.4 Between 90 minutes to 120 minutes
  - 10.5 More than 120 minutes
- 11 What mode of transport do you use to get nearest health facility?
- 11.1 Car
  - 11.2 Motorcycle
  - 11.3 Walking
  - 11.4 Boat
  - 11.4 Others.....

### Section B Knowledge of Malaria

1	What is the source of your malaria knowledge?		
	1.1 Volunteer Malaria Workers		
	1.2 Government Health Staffs		
	1.3 Drug sellers		
	1.4 Religious leaders		
	1.5 Family members		
	1.6 Radio		
	1.7 Television		
	1.8 Posters		
	1.9 Pamphlets		
	1.10 Employer		
	1.11 Others.....		
		Yes	No
2	What is vector of malaria?		
	2.1 Mosquito	[ ]	[ ]
	2.2 Rat	[ ]	[ ]
	2.3 Dog	[ ]	[ ]
	2.4 Fly	[ ]	[ ]
	2.5 Cockroach	[ ]	[ ]
3	What is the most active time for malaria vector?		
	3.1 Night time	[ ]	[ ]
	3.2 Day time	[ ]	[ ]
4	How malaria can be transmitted?		
	4.1 Bite of infected mosquito	[ ]	[ ]
	4.2 Drinking contaminated water	[ ]	[ ]
	4.3 Voodoo	[ ]	[ ]
	4.4 Eating unhealthy food	[ ]	[ ]
	4.5 Eating banana	[ ]	[ ]
	4.6 Bathing in streams	[ ]	[ ]
	4.7 Contaminated air	[ ]	[ ]

	Yes	No
5 What are the symptoms of malaria?		
5.1 Fever	[    ]	[    ]
5.2 Chills	[    ]	[    ]
5.3 Headache	[    ]	[    ]
5.4 Body ache	[    ]	[    ]
5.5 Sweating	[    ]	[    ]
5.6 Tiredness	[    ]	[    ]
<hr/>		
6 How can you diagnose malaria?		
6.1 Blood test	[    ]	[    ]
6.2 Measuring Blood pressure	[    ]	[    ]
6.3 Fever Symptoms	[    ]	[    ]
<hr/>		
7 How malaria can be prevented?		
7.1 Sleeping with bed net	[    ]	[    ]
7.2 Sleep with <i>Long Lasting Insecticide treated Net</i>	[    ]	[    ]
7.3 Wearing long-sleeve cloth	[    ]	[    ]
7.4 Use mosquito repellent spray/cream	[    ]	[    ]
7.5 Take anti-malarial drugs before going into forest	[    ]	[    ]
7.6 Closing of window during night time	[    ]	[    ]
7.7 Clearing off the bushes	[    ]	[    ]
7.8 Try to cover the water containers	[    ]	[    ]
<hr/>		
8 How drug resistant malaria can develop?		
8.1 Incomplete antimalarial course	[    ]	[    ]
8.2 Taking fake drugs	[    ]	[    ]
8.3 Self-treatment	[    ]	[    ]
<hr/>		
9 What method of treatment is appropriate for malaria?		
9.1 Taking oral antimalarial drugs given by health staffs	[    ]	[    ]
9.2 Taking antimalarial injection by health staffs	[    ]	[    ]
9.3 Self-treatment	[    ]	[    ]



### Section C Attitude toward Malaria

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		4	3	2	1	0
1	How far do you agree malaria is serious and life-threatening disease?	[   ]	[   ]	[   ]	[   ]	[   ]
2	How far do you agree malaria can be transmitted through air?	[   ]	[   ]	[   ]	[   ]	[   ]
3	How far do you agree that if malaria is not treated properly it can be life-threatening?	[   ]	[   ]	[   ]	[   ]	[   ]
4	How far do you agree that the best way to prevent malaria is to avoid mosquito bite?	[   ]	[   ]	[   ]	[   ]	[   ]
5	How far do you agree that malaria can be prevented by sleeping under bed nets?	[   ]	[   ]	[   ]	[   ]	[   ]
6	How far do you agree that if you go to forest area in night, you get more chance to get malaria?	[   ]	[   ]	[   ]	[   ]	[   ]

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		4	3	2	1	0
7	How far do you agree children and pregnant woman are at risk for malaria?	[ ]	[ ]	[ ]	[ ]	[ ]
8	How far do you agree malaria can be prevented by clearing the mosquito breeding sites?	[ ]	[ ]	[ ]	[ ]	[ ]
9	How far do you agree you should do self-treatment when you got malaria?	[ ]	[ ]	[ ]	[ ]	[ ]
10	How far do you agree you can recover without any treatment when you get malaria?	[ ]	[ ]	[ ]	[ ]	[ ]
11	How far do you agree you should do blood test for diagnosis of malaria?	[ ]	[ ]	[ ]	[ ]	[ ]

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		4	3	2	1	0
12	How far do you agree you can stop the antimalarial treatment after you relieve malaria symptom?	[ ]	[ ]	[ ]	[ ]	[ ]
13	How far do you agree drug resistant malaria can happen if you do not take complete antimalarial drugs?	[ ]	[ ]	[ ]	[ ]	[ ]
14	How far do you agree you can buy antimalarial drug by yourself in local drug store when you got malaria?	[ ]	[ ]	[ ]	[ ]	[ ]
15	How far do you agree you should trust health staff for treatment?	[ ]	[ ]	[ ]	[ ]	[ ]

### Section D Practice Regarding Malaria Prevention

(Practice questions need to asked about previous one month duration actions)		Always	Sometime	Never or Non-Applicable
		2	1	0
1	How often do you wear long-sleeves clothes when you go outside at night time?	[ ]	[ ]	[ ]
2	How often do you sleep under bed net?	[ ]	[ ]	[ ]
3	How often do you check and repair holes in your bed net?	[ ]	[ ]	[ ]
4	How often do you take bed net together with you when you go to forest?	[ ]	[ ]	[ ]
5	How often do you use bed net when you sleep outdoors?	[ ]	[ ]	[ ]
6	How often do you use insecticide treated bed net?	[ ]	[ ]	[ ]
7	How often do you clear the bushes around your house?	[ ]	[ ]	[ ]
8	How often do you clear the stagnant water around your house?	[ ]	[ ]	[ ]

	Always	Sometime	Never or Non- Applicable
	2	1	0
9 How often do you take antimalarial drugs when you go to forest?	[ ]	[ ]	[ ]
10 How often do you use mosquito repellent spray/ cream?	[ ]	[ ]	[ ]
11 How often do you seek for diagnosis when you suspect malaria?	[ ]	[ ]	[ ]
12 How often do you use mosquito repellent coil?	[ ]	[ ]	[ ]
13 How often do you attend the malaria health education session?	[ ]	[ ]	[ ]

Questionnaire (Myanmar Version)

စစ်တမ်းကောက်မေးခွန်းလွှာ

အမှတ်စဉ် ..... ရက်စွဲ .....

အပိုင်း (၁) အခြေခံအချက်အလက်များ

၁ သင့်အသက် ဘယ်လောက်ပြည့်ပြီလဲ။ ..... နှစ်

၂ လိင်

၂.၁ ကျား

၂.၂ မ

၃. လူမျိုး

၃.၁ ကချင်

၃.၂ ကယား

၃.၃ ကရင်

၃.၄ ချင်း

၃.၅ မွန်

၃.၆ ဗမာ

၃.၇ ရခိုင်

၃.၈ ရှမ်း

၃.၉ အခြား (ရှိလျှင် ဖော်ပြရန်) .....

၄ ယခု လက်ရှိ သင် သည်အိမ်ထောင်ရှိပါသလား။

၄. ၁ လူလွတ်

၄. ၂ အိမ်ထောင်သည်

၄.၃ ကွာရှင်း

၄.၄ အိမ်ထောင်ကွဲ

၄.၅ မှဆိုးဖို/မ

၅ သင်တက်ခဲ့ဖူးသော အမြင့်ဆုံး ပညာရေး (သို့) အတန်းပညာမှာ အဘယ်နည်း။

၅. ၁ ကျောင်းမနေဖူးပါ။

၅. ၂ မူလတန်းပညာ (Grade ၁-၄)

၅.၃ အလယ်တန်းပညာ(Grade ၅-၈)

၅.၄ အထက်တန်းပညာ(Grade ၉-၁၀)

၅.၅ ဘွဲ့ရပညာ နှင့် ဘွဲ့လွန်ပညာ

၅.၆ အခြား (ရှိလျှင် ဖော်ပြရန်) .....

၆ သင်၏ အဓိကလုပ်ငန်း အလုပ်အကိုင် အဘယ်နည်း။

၆. ၁ အိမ်ရှင်မ

၆. ၂ ဆီအုန်းလုပ်ငန်း လုပ်ကိုင်သူ

၆.၃ ရော်ဘာလုပ်ငန်း လုပ်ကိုင်သူ

၆.၄ လယ်လုပ်ငန်း လုပ်ကိုင်သူ

၆.၅ တောတွင်း သစ်ခုတ်ဝါးခုတ် လုပ်ကိုင်သူ

၆.၆ ရေလုပ်သား

၆.၇ ကုန်သည်

၆.၈ ဈေးရောင်းသူ

၆.၉ အခြား (ရှိလျှင် ဖော်ပြရန်).....

၇ မိသားစု တစ်လဝင်ငွေ ပျမ်းမျှအားဖြင့် မည်မျှရှိသနည်း။

၇. ၁ ၁ သိန်းကျပ်အောက်

၇. ၂ ၁ သိန်းမှ ၂ သိန်းကြား

၇.၃ ၂ သိန်းမှ ၃ သိန်း ကြား

၇.၃ ၃ သိန်းမှ ၄ သိန်းကြား

၇.၄ ၄ သိန်းနှင့် အထက်

၈ ကော့သောင်းမြို့တွင် နေထိုင်သည်မှာ မည်မျှ ကြာပြီလဲ။

၈. ၁ ၆ လ အောက်

၈. ၂ ၆လမှ ၁နှစ်ကြား

၈.၃ ၁နှစ်မှ ၃နှစ်ကြား

၈.၄ ၃နှစ်နှင့် အထက်

၈.၅ မမှတ်မိပါ

၉ သင့်အိမ်တွင် အတူနေထိုင်သူ မိသားစုဝင် ဘယ်နှစ် ယောက်ရှိပါသလဲ

..... ယောက်



၁၀ သင်၏နေအိမ်မှ နီးစပ်ရာ ကျန်းမာရေးစောင့်ရှောက်ရာ နေရာသို့ သွားလျှင် အချိန်မည်မျှ ကြာသနည်း။

- ၁၀.၁ မိနစ် ၃၀ အောက်
- ၁၀.၂ ၃၀ မိနစ်မှ ၆၀မိနစ်
- ၁၀.၃ ၆၀ မိနစ်မှ ၉၀ မိနစ်
- ၁၀.၄ ၉၀ မိနစ်မှ ၁၂၀ မိနစ်
- ၁၀.၅ ၁၂၀ မိနစ် အထက်

၁၁ သင် နီးစပ်ရာ ကျန်းမာရေး စောင့်ရှောက်ရာ နေရာသို့ သွားလျှင် မည်သည့်နည်းလမ်းဖြင့် သွားသနည်း။

- ၁၁.၁ ကား
- ၁၁.၂ မော်တော်ဆိုင်ကယ်
- ၁၁.၃ ခြေလျင်
- ၁၁.၄ မော်တော်ဘုတ်
- ၁၁.၄ အခြား (ရှိလျှင် ဖော်ပြရန်) .....

အပိုင်း (၂) ငှက်ဖျားရောဂါ အသိပညာ မေးခွန်းများ

၁ ငှက်ဖျားရောဂါဆိုင်ရာ အသိပညာကို မည်သည့်နည်းလမ်းဖြင့် ကြားဖူးခဲ့သလဲ။

၁. ၁ ငှက်ဖျားစေတနာ ဝန်ထမ်း

၁. ၂ အစိုးရ ကျန်းမာရေး ဝန်ထမ်း

၁.၃ ဆေးရောင်းချသူများ

၁.၄ ဘာသာရေးဆိုင်ရာ ပုဂ္ဂိုလ်များ

၁.၅ မိသားစုဝင်များ

၁.၆ ရေဒီယို

၁.၇ တီဗွီ

၁.၈ ပိုစတာ

၁.၉ လက်ကမ်းစာစောင်များ

၁. ၁ ၀ အလုပ်ရှင်

၁. ၁ ၁ အခြား (ရှိလျှင် ဖော်ပြရန်).....

	ဟုတ်	မဟုတ်
၂		
၂.၁ ခြင်	[ ]	[ ]
၂.၂ ကြွက်	[ ]	[ ]
၂.၃ ခွေး	[ ]	[ ]
၂.၄ ယင်ကောင်	[ ]	[ ]
၂.၅ ပိုးဟပ်	[ ]	[ ]
၃		
၃.၁ ညဘက်	[ ]	[ ]
၃.၂ နေ့ခင်းဘက်	[ ]	[ ]
၄		
၄.၁ ခြင်ကိုက်လို့	[ ]	[ ]
၄.၂ ရေမသန့်တာသောက်လို့	[ ]	[ ]
၄.၃ တောဖမ်းစားလို့	[ ]	[ ]
၄.၄ အစာမသန့်လို့	[ ]	[ ]
၄.၅ ငှက်ပျော်သီးစားခြင်း	[ ]	[ ]
၄.၆ စိမ့်စမ်းရေချိုးခြင်း	[ ]	[ ]
၄.၇ လေမသန့် လို့	[ ]	[ ]
၅		
၅.၁ ကိုယ်ပူခြင်	[ ]	[ ]
၅.၂ ချမ်းတုန်ခြင်း	[ ]	[ ]
၅.၃ ခေါင်းကိုက်ခြင်း	[ ]	[ ]
၅.၄ တစ်ကိုယ်လုံးကိုက်ခဲခြင်း	[ ]	[ ]
၅.၅ ချွေးထွက်ခြင်း	[ ]	[ ]
၅.၆ မောပန်းနွမ်းနယ်ခြင်း	[ ]	[ ]
၆		
၆.၁ သွေးဖောက်စစ်ဆေးခြင်း	[ ]	[ ]
၆.၂ သွေးပေါင်ချိန်ခြင်း	[ ]	[ ]
၆.၃ ဖျားနာ ရောဂါ လက္ခဏာ ကြည့်ခြင်း	[ ]	[ ]

		ဟုတ်	မဟုတ်
၇	လူတွေ့ငှက်ဖျား မဖြစ်အောင် ဘယ်လို ကာကွယ်မလဲ		
	၇. ၁ ခြင်ထောင်နဲ့ အိပ်ပါ	[ ]	[ ]
	၇. ၂ ဆေးစိမ်ထားတဲ့ ခြင်ထောင်နဲ့ အိပ်ပါ	[ ]	[ ]
	၇.၃ အင်္ကျီလက်ရှည်ဝတ်ပါ	[ ]	[ ]
	၇.၄ ခြင်နိုင်ဆေးလိမ်းပါ	[ ]	[ ]
	၇.၅ ငှက်ဖျားကာကွယ်ဆေးသောက်ပါ	[ ]	[ ]
	၇.၆ အိမ်ပြတင်းပေါက်များညာအခါတွင်ပိတ်ထားခြင်း	[ ]	[ ]
	၇.၇ အိမ်ပတ်ဝန်းကျင်ခြုံရှင်းပါ	[ ]	[ ]
	၇.၈ ရေအိုးများကို ဖုံးအုပ်ခြင်း	[ ]	[ ]
၈	ဆေးမတိုး ငှက်ဖျား ဘာကြောင့် ဖြစ်သလဲ။		
	၈. ၁ ငှက်ဖျား ဆေးပတ်မလည်သောကြောင့်	[ ]	[ ]
	၈. ၂ ဆေးအတု သောက်သောကြောင့်	[ ]	[ ]
	၈.၃ မိမိဘာသာ ငှက်ဖျားဆေး သောက်သောကြောင့်	[ ]	[ ]
၉	မည်သည့် ကုသခြင်းသည် မှန်ကန်သော ငှက်ဖျားကုသခြင်း ဖြစ်သနည်း။		
	၉.၁ ကျန်းမာရေးဝန်ထမ်းမှပေးသော ငှက်ဖျားဆေးသောက်ခြင်း	[ ]	[ ]
	၉. ၂ ကျန်းမာရေးဝန်ထမ်းပေးသော ငှက်ဖျားဆေးထိုးခြင်း	[ ]	[ ]
	၉.၃ မိမိဘာသာကုသခြင်း	[ ]	[ ]

အပိုင်း ၃. ၎က်ဖျားရောဂါနှင့်ပက်သက်သော ထင်မြင်ယူဆချက်များ

		လုံးဝ သဘော တူသည်	သဘော တူသည်	ထင်မြင် ယူဆချက် မရှိပါ	သဘော တူပါ	လုံးဝ သဘော မတူပါ
		၄	၃	၂	၁	၀
၁	၎က်ဖျားရောဂါသည်ဆိုးဝါး၍အသက်အန္တရာယ် ခြိမ်းခြောက်နိုင်သည်ကို မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၂	၎က်ဖျားရောဂါသည်လေမှကူးစက် နိုင်သည်ကိုမည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၃	၎က်ဖျားအား သေချာစွာ မကုသလျှင် အသက်အန္တရာယ်ရှိနိုင်သည်ကို မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၄	၎က်ဖျားရောဂါ မဖြစ်စေရန် ခြင်ကိုက်ခြင်းမှ ခြင်ကိုက်ခြင်းမှကာကွယ်ခြင်းသည် အကောင်းဆုံးဖြစ်သည်ကိုမည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၅	၎က်ဖျားရောဂါ မဖြစ်စေရန် ခြင်ထောင်ဖြင့် အိပ်ခြင်းဖြင့် ကာကွယ်နိုင်သည်ကို မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၆	ညအခါတွင် တောထဲသို့ သွားပါက ၎က်ဖျားရောဂါဖြစ်နိုင်ချေပိုမိုများပြား နိုင်သည်ကိုမည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]

		လုံးဝ သေ ဘာ တူသ ည်	သေ ဘာ တူသ ည်	ထင်မြ င်ယူ ဆ ချက် မရှိပါ	သေ ဘာမ တူပါ	လုံးဝ သ ဘောမ တူပါ
		၄	၃	၂	၁	၀
၇	ကလေးများနှင့် ကိုယ်ဝန်ဆောင်များသည် ငှက်ဖျားရောဂါ ပိုမို ကူးစက်နိုင်သည်ကို မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၈	ငှက်ဖျားခြင်ပေါက်ဖွားနိုင်သော နေရာများကို ရှင်းလင်းခြင်းဖြင့်ငှက်ဖျားရောဂါ ကာကွယ်နိုင်သည်ကိုမည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၉	ငှက်ဖျားရောဂါဖြစ်လျှင်မိမိဘာသာ ကု သင့်သည်ကိုမည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၁၀	ငှက်ဖျားရောဂါဖြစ်လျှင် ကုသမှုမခံယူဘဲ အလိုအလျောက် ကောင်းလာနိုင်သည်ကို မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၁၁	ငှက်ဖျားရောဂါကိုစစ်ဆေးချင်လျှင် သွေးဖောက်စစ်ဆေးသင့်သည်ကို မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]
၁၂	ငှက်ဖျားဆေးသောက်သုံးနေစဉ်အ တွင်းရောဂါလက္ခဏာသက်သာပါ ကသောက်သုံးနေသောငှက်ဖျား ဆေးကို ရပ်ပစ်ခြင်းကို မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]

			လုံးဝ သဘော တူသည်	သဘော တူသည်	ထင်မြဲ ယူဆချက် မရှိပါ	သဘော တူပါ	လုံးဝ သဘောမ တူပါ
			၄	၃	၂	၁	၀
၁၃	ငှက်ဖျားဆေးကိုဆေးပတ်လည် အောင်မသောက်ပါကဆေးမတိုး ငှက်ဖျားဖြစ်နိုင်သည်ကိုမည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
၁၄	ငှက်ဖျားဖြစ်ပါက နီးစပ်ရာ ဆေးဆိုင်မှ မိမိကိုယ်တိုင် ငှက်ဖျားဆေးဝယ်ခြင်းကို မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
၁၅	ငှက်ဖျားကုသမှု ခံယူရန် ကျန်းမာရေး ဝန်ထမ်းများကို ယုံကြည်ရန် မည်မျှ သဘောတူပါသနည်း။	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

အပိုင်း ၄ ငှက်ဖျားရောဂါ ကာကွယ်ခြင်းဆိုင်ရာလက်တွေ့လုပ်ဆောင်မှု

	(ကျန်းမာရေးဆိုင်ရာ ကျင့်သုံးမှုနှင့် အမှုအကျင့် မေးခွန်းများကို မေးရာတွင် လွန်ခဲ့သော တစ်လအတွင်းမှ လုပ်ဆောင်ချက်များကို မေးမြန်းရန် လိုအပ်ပါသည်။)	အမြဲတမ်း	တခါတရံ	လုံးဝ
		၂	၁	၀
၁	သင်ညဘက်တွင် အပြင်သွားပါက အင်္ကျီလက်ရှည်၊ ဘောင်းဘီရှည် မကြာခဏ မည်မျှ ဝတ်လေ့ ရှိသနည်း။	[ ]	[ ]	[ ]
၂	သင် ခြင်ထောင်ဖြင့် မကြာခဏ မည်မျှ အိပ်လေ့ ရှိသနည်း။	[ ]	[ ]	[ ]
၃	သင့် ခြင်ထောင်တွင် အပေါက်အပြဲများကို ရှာဖွေခြင်း၊ ဖာထေးခြင်းများ မကြာခဏ မည်မျှ လုပ်လေ့ ရှိသနည်း။	[ ]	[ ]	[ ]
၄	သင်တောထဲသို့ သွားပါက ခြင်ထောင်ကို မကြာခဏ မည်မျှ ယူသွားလေ့ ရှိသနည်း။	[ ]	[ ]	[ ]
၅	သင်အိမ်အပြင်ဘက်တွင် အိပ်ပါက ခြင်ထောင်အသုံးပြု၍ မကြာခဏ မည်မျှ အိပ်လေ့ရှိသနည်း။	[ ]	[ ]	[ ]
၆	သင်သည်တာရှည်ခံဆေးစိမ်ခြင် ထောင် အောက်တွင် မကြာခဏ မည်မျှအိပ်လေ့ ရှိပါသနည်း။	[ ]	[ ]	[ ]
၇	သင့် အိမ်အနီးနားရှိ ခြံပုတ်များ မကြာခဏ မည်မျှ ရှင်းလေ့ရှိသနည်း။	[ ]	[ ]	[ ]



		အမြဲတမ်း	တခါတရံ	လုံးဝ
		၂	၁	၀
၈	သင့် အိမ်အနီးနားရှိ ရေသေကို ရေစီးရေလာကောင်းအောင် မကြာခဏ မည်မျှ ပြုလုပ်လေ့ရှိသနည်း။	[ ]	[ ]	[ ]
၉	သင်တောထဲသို့ သွားလျှင် ငှက်ဖျားဆေးကို မကြာခဏ မည်မျှ ယူသွားလေ့ရှိသနည်း။	[ ]	[ ]	[ ]
၁၀	သင် ခြင်ပြေးဖြန်းဆေး၊ လိမ်းဆေးကို မကြာခဏ မည်မျှ သုံးလေ့ရှိသနည်း။	[ ]	[ ]	[ ]
၁၁	သင် ငှက်ဖျားဟု သံသယရှိပါက ရောဂါရှာဖွေရန် မကြာခဏမည်မျှ ပြုလုပ်လေ့ရှိသနည်း။	[ ]	[ ]	[ ]
၁၂	သင် ခြင်ဆေးခွေကို မကြာခဏ မည်မျှ သုံးလေ့ရှိသနည်း။	[ ]	[ ]	[ ]
၁၃	သင် ငှက်ဖျားရောဂါဆိုင်ရာ ပညာပေး ဟောပြောပွဲများကို မကြာခဏ မည်မျှ တက်ရောက်နားထောင်လေ့ ရှိသနည်း။	[ ]	[ ]	[ ]

**VITA**

Dr. Sa Aung Hein

M.B., B.S (Ygn)

No. (9/C), High school Street, Taung Thu Gone Quarter,

Insein Township, Yangon, Myanmar

E - Mail Address : saunghein.hein@gmail.com

Phone Number : +95 95191435

**Brief Profile**

I am a medical doctor holding MBBS Degree graduated from University of Medicine (I), Yangon, Myanmar. I am a registered doctor with SAMA 36022 from Myanmar Medical Council. I had 3 years of extensive clinical experience in Public Hospitals and 3 years of field and research experience in Public Health Sectors related to Malaria Projects of Myanmar Medical Association and Defeat Malaria Project.

**Educational Qualifications**

1. Certification in Leadership and Team Building Training in 2011
2. Certification in Project Cycle Management Training in 2011
3. Bachelor of Medicine and Bachelor of Surgery (M.B., B.S) from University of Medicine (I) in 2011



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