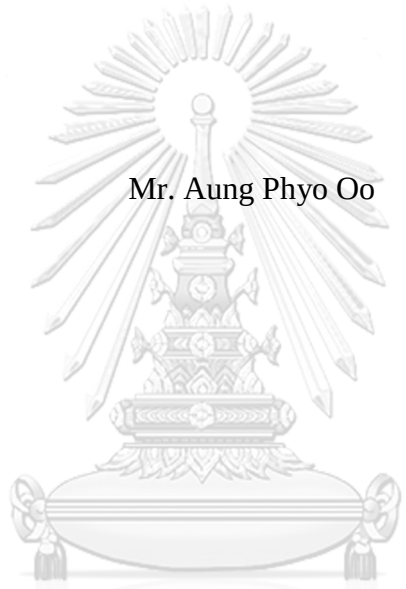
KNOWLEDGE, ATTITUDE AND CULTURAL FACTORS TOWARDS UTILIZATION OF INSECTICIDE TREATED NETS (ITNS) AMONG RAKHINE ETHNIC GROUP IN ANN TOWNSHIP, RAKHINE STATE, MYANMAR

Mr. Aung Phyo Oo



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ความรู้เจตคติและ ปัจจัยทางวัฒนธรรมที่ เกี่ยวข้องกับการ ป้องกัน โรคมาลาเรียโดยการใช้มุ้งชุบสารกำจัดแมลงของชนกลุ่มน้อยยะไข่ เมืองแอน รัฐยะไข่ ประเทศเมียนมา

นายอ่อง เพียว โอ

จุฬาลงกรณ์มหาวิทยาลัย
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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
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อ่อง เพียว โอ : ความรู้เจตคติและ ปัจจัยทางวัฒนธรรมที่ เกี่ยวข้องกับการ ป้องกัน โรคมาลาเรียโดยการใช้มุ้งชุบสารกำจัดแมลงของชนกลุ่มน้อยยะไข่ เมืองแอน รัฐยะไข่ ประเทศเมียนมา (KNOWLEDGE, ATTITUDE AND CULTURAL FACTORS TOWARDS UTILIZATION OF INSECTICIDE TREATED NETS (ITNS) AMONG RAKHINE ETHNIC GROUP IN ANN TOWNSHIP, RAKHINE STATE, MYANMAR) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ศ. ดร. สถิรกร พงศ์พานิช, 94 หน้า.

การศึกษานี้เป็นการหาความสัมพันธ์ระหว่างลักษณะทั่วไปความรู้ทัศนคติและปัจจัยทางวัฒนธรรม กับการ ป้องกัน โรคมาลาเรียโดยการใช้มุ้งชุบสารกำ จัดแมลงของชนกลุ่มน้อยยะไข่ ในเมืองแอน รัฐยะไข่ ประเทศเมียนมา การศึกษาแบบภาคตัด ขวางนี้ทำการเก็บข้อมูล โดยใช้การสัมภาษณ์ จากชนเผ่ายะไข่จำนวน 420 คน มีอายุมากกว่า 18 ปีขึ้น ที่อาศัยใน 10 หมู่บ้านในเมืองแอน ผลการศึกษาพบว่า เพียงร้อยละ 3.6 ของผู้ให้ข้อมูลมีความรู้ในระดับสูง ร้อยละ 19 มีทัศนคติที่ดี และร้อยละ 38.8 มีพฤติกรรมที่ดีในการใช้มุ้งชุบสารกำจัดแมลง เพศหญิงมี พฤติกรรมในการใช้มุ้งชุบสารกำจัดแมลงที่ดีกว่าเพศชาย 8.015 เท่า (p-value<0.001, AOR 8.015, 95%CI=3.395-18.923)ผู้ที่มีการศึกษา ในระดับมัธยมศึกษามีการ ใช้มุ้งชุบสารกำจัดแมลงในระดับที่ดีกว่า ผู้ที่มีการ ศึกษา ต่ำกว่าถึง 14.518 เท่า (p-value<0.001, AOR 14.518, 95%CI=4.642-45.408) ผู้ที่มีสถานะสมรส (p-value<0.001, AOR 13.753, 95%CI=4.371-43.267) และผู้เป็นม่าย (p-value=0.039, AOR 5.403, 95%CI=1.085-26.909) มีพฤติกรรมในการใช้มุ้งชุบสารกำ จัดแมลงที่ดีกว่าผู้ที่มีสถานะโสด 13.753 และ 5.403 เท่าตามลำดับเมื่อพิจารณาปัจจัยทางวัฒนธรรม ผู้ให้ข้อมูลที่ ทำงาน ในช่วง ตั้งแต่พลบ ค่ำถึงช่วงดึก มีพฤ ติกรรม ในการใช้มุ้งชุบสารกำจัดแมลงที่ดี กว่าผู้ที่ ไม่ได้ทำ งานในช่วงเวลา นี้ 2.203 เท่า (p-value=0.032, AOR 2.203, 95%CI=1.070-4.536) และ เมื่อพิจารณาระดับความรู้ของผู้ให้ข้อมูล ผู้ที่มีความรู้ในระดับปานกลางและระ ดับสูงมีพฤติกรรม ในการ ใช้มุ้งชุบสารกำจัดแมลงที่ดี กว่า ผู้ที่มีความรู้ในระดับต่ำ 5.125 เท่า (p-value<0.001, AOR 5.125, 95%CI=1.062-6.429) ควรมีการ ให้ความรู้ด้านสุขภาพ และการส่งเสริมให้ประ ชาชนเพื่อเพิ่มความ รู้และการใช้มุ้งชุบสารกำจัดแมลง

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2560 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

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AUNG PHYO OO: KNOWLEDGE, ATTITUDE AND CULTURAL FACTORS TOWARDS UTILIZATION OF INSECTICIDE TREATED NETS (ITNS) AMONG RAKHINE ETHNIC GROUP IN ANN TOWNSHIP, RAKHINE STATE, MYANMAR. ADVISOR: PROF. SATHIRAKORN PONGPANICH, Ph.D., 94 pp.

This study is to find associations between general characteristic, knowledge, attitudes and cultural factors on malaria prevention toward utilization of insecticidal nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar. An analytic cross sectional study was conducted among 420 Rakhine ethnic groups aged more than 18 years old from 10 villages in Ann Township. Data were collected by using face-to-face interview. The study found only 3.6% of respondents had good knowledge level, 19.0% good attitude level and 38.8% good practice level towards utilization of ITNs. Female participants were 8.015 times had good practice level than male (p-value <0.001, AOR 8.015, 95% CI = 3.395-18.923). High school level participants likely to use ITNs for 14.518 times than lower education level (p-vale <0.001, AOR 14.518, 95% CI = 4.642-45.408). Married participants were 13.753 times done good practice (p-vale <0.001, AOR 13.753, 95% CI = 4.371-43.267) and widowed participants were 5.403 times done good practice than singles (p-vale 0.039, AOR 5.403, 95% CI = 1.085-26.909). Regarding the cultural factors, participants who always worked from dawn to night time were 2.203 times had good practice level than who never work at that time (p-vale 0.032, AOR 2.203, 95% CI = 1.070-4.536). Regarding knowledge level of the participants, moderate and good knowledge level were 5.125 times had good practice level than lower knowledge level participants (p-vale <0.001, AOR 5.125, 95% CI = 1.062-6.429). Health education and encouragement of people should be done to improve knowledge and utilization to use insecticide treated nets.

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Field of Study: Public Health Student's Signature .....

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LIST OF ABBREVIATIONS

ITNs	Insecticide Treated Nets
LLINs	Long Lasting Insecticide Treated Nets
WHO	World Health Organization
SEA	South East Asia
GMS	Greater Mekong Sub region
NGO	Non-Governmental Organization
ARDS	Acute Respiratory Distress Syndrome
RDT	Rapid Diagnostic Test
ACT	Artemisinin-based Combination Therapy

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Chapter 1

Introduction

1.1 Background and Rationale

Malaria is an infectious disease and it is a most concerning public health problem worldwide, especially in Africa and Southeast Asia countries. It is caused by a parasite that infects certain type of infected mosquitos. People who infected by malaria presented with high fever along with chills and rigor. There are many species of parasite but there are five species that caused malaria in human; *Plasmodium falciparum, P. vivax, P. malariae, P. ovale and P. knowlesi*. Despite malaria is a life threatening disease if leave untreated, it can be prevented and cured with proper prevention and treatment methods. In prevention methods, the most effective method is to cut off the contact of human beings and mosquitos through the use of insecticide treated nets (ITNs) or long lasting insecticidal treated nets (LLINs) (1).

According to world malaria report 2016 by WHO, there is a substantial progress in fighting malaria since 2000. According to the latest estimates between year 2000 and 2015, there were 41% reduction of malaria incidence and 62% reduction in mortality rates. By the year 2016, 91 countries and territories were still considered to be endemic, the number reduced from 108 in 2000. The number of malaria cases globally reduced from an estimated 262 million in 2000, to 214 million in 2015. The trend of malaria deaths reduction from 839,000 in 2000 to 438,000 in 2015 could be seen globally (1).

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In Southeast Asia (SEA), 32 million new cases, and 43,000 deaths are estimated for 2010 (2). The Greater Mekong Sub region (GMS) is a very high-risk region for malaria. Among all the population, around 70 % of the population is on risk of malaria infection and 26 % are still living in a high-risk area (3, 4).

Myanmar, one of the countries in GMS regions, is the one with greatest morbidity and mortality from malaria. According to the risk area stratification, total 180 townships in the year 2012, 61.7 % of population was living in malaria endemic areas. There were many interventions for malaria control such as training and deployment of community health workers, vector control, and accessibility of diagnosis and treatment

of malaria. Vector control in Myanmar is focus on distribution of insecticide treated nets (ITNs) and mainly to communities in remote areas, pregnant women and children in moderate to high risk areas (5). Also, national policy in Myanmar make the use of ITNs for preventing and controlling malaria. One of the main implementation strategies include free delivery of LLINs and free retreatment of mosquito nets before the rainy season and winter at which the malaria transmission is high. These implementations are for ensuring people who living in high-risk malaria areas can protect themselves. By the year 2015, the goal is to cover the population in moderate and high risk more than 80% with ITNs or LLINs. Also due to occurrence of the artemisinin resistance of *P. falciparum* malaria in the southern part of Myanmar, it was recommended to interrupt transmission of *P. falciparum* by universal coverage and usage of insecticide treated bed nets in all targeted areas, mostly in Tier 1 areas. The efficacy of LLIN or ITN will depend on many factors such as intensity of transmission (higher transmission the more effective), vector behavior (indoor or outdoor biting), human behavior (outdoor social and occupational activities) and other factors (6).

In Myanmar, national races (ethnic groups) living in villages near or in the forest are the most vulnerable from malaria cases and deaths. Most of them living from subsistence agriculture supplemented by forest activates, such as bamboo or rattan cutting or rubber plantation. If the village resided within 1 kilometer from the forest, all the age groups being at risk from malaria. If the village is far from the forest, the risk of malaria is high among the adult men as they go into the forest for hunting, agriculture, gathering forest products etc. They stay in the forest for many days in groups and make temporary tents with no or very low protection against mosquito bites (6).

There are also high morbidity and mortality of malaria in area of ethnic minorities also in the border areas because of the topography and climate conditions that facilitate malaria transmission. In addition, also because of few transportations in these remote areas, low literacy rates, few health services, high population mobility and the prevalence of multidrug-resistant *P. falciparum* (7). The cultural beliefs of specific ethnic groups are also the main issue in malaria as they can lead to wrong behaviors. Thus, the understanding of ethnic groups and their behavior can lead to more successful in controlling malaria. By acquiring these information, the reduction of malaria burden in local population as well as transmission to other vulnerable areas can be achieved.

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Rakhine State is surrounded by Rakhine Mountain Range and the Bay of Bengal and is situated in western part of Myanmar. In 2014, the state consisted of 17 townships, 3 sub-townships, 123 wards, 1,044 village tracts and 3,805 villages. The total population in 2014 was about three million, with 83% lived in rural areas. The main economy of the state is forest-related works. It was found that predominance of males among malaria cases might be due to their occupational exposure. In Rakhine state, the ethnic group Rakhine is the primary ethnic group with many different dialects, cultures and traditions. Many mountainous areas make the transportation difficulties and lead to poverty. Literacy rate is also low comparing with other states in Myanmar. Therefore, Rakhine is one of the undeveloped state in Myanmar (8).

Ann is one of the township in Rakhine State with mountainous area, a lot of streams and rivers. There are different ethnic groups and cultural diversity in that area with the majority of Rakhine ethnic groups. Rakhine State is one of the malaria highest-risk areas in Myanmar. Each year, Rakhine State contributes about 20-25% of total malaria cases in Myanmar (9). The malaria morbidity rate in Rakhine State reduced from 40.0 per 1,000 populations in 2000 to 13.5 per 1,000 in 2014. The mortality rate also reduced from nine per 100,000 populations in 2000 to 0.3 per 100,000 in 2014. The highest morbidity rate was observed in 2003 and the highest mortality rate occurred in 2001. However, in Ann Township, annual blood examination rate (40.6%) was high and the positivity rate (15.6%) was also high, indicating the high burden of malaria in the township (9).

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During 2000 – 2014, the malaria morbidity and mortality rates in Rakhine State reduced because of National Malaria Control Programme, International Non-Governmental Organizations (INGOs) and local NGOs were conducted malaria case management through mobile and fixed clinics. Also malaria prevention and control programs through distribution of INTs. However Ann Township is still high in malaria positivity rates (9). In the study of malaria control in the ethnic minority regions in Northern Myanmar along China border, the use of ITNs in ethnic minority groups was still low and need more health education about ITN utilization (10). In the study of malaria control in Tribal community in India, believing evil spirits as the cause of malaria and rely on traditional healers is a major difficulty to timely diagnosis and treatment of malaria. Providing bed nets alone may not be sufficient. The health

education for sociocultural perceptions and preventive behaviors in the community in still needed (11).

1.2 Problem Statement

Since prevention and control of malaria is important to malaria elimination, we need to concentrate in community knowledge and attitudes on insecticide treated nets which is one of the most important preventive measure for malaria. Also the cultural beliefs of specific ethnic groups were the main issue in malaria as they can lead to wrong behaviors. So, it is crucial to know the knowledge, attitudes and utilization of insecticidal nets in population as well as the exploration of their cultural beliefs can provide us with many information for further prevention and control of malaria in the specific regions.

1.3 Research Question

- What are the knowledge, attitude and cultural factors toward utilization of mosquito nets among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar?
- Are there associations between demographic characteristic, knowledge, attitudes and cultural factors on malaria prevention toward utilization of insecticidal nets among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar?

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1.4 Research Objectives

General Objective

- To determine knowledge, attitude and cultural factors toward utilization of Insecticide Treated Nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar

Specific Objectives

- To describe the general characteristics of Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar

- To assess and determine knowledge level, various attitude and extent of practice regarding malaria toward utilization of Insecticide Treated Nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- To describe the cultural factors on malaria of ethnic groups, in Ann Township, Rakhine State, Myanmar
- To determine association between utilization of Insecticide Treated Nets (ITNs) with demographic characteristics, level of knowledge, attitude and cultural factors of Rakhine ethnic group in Ann Township, Rakhine State, Myanmar

1.5 Research Hypotheses

- There is association between the general characteristics and knowledge level of malaria among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- There is association between the general characteristics and attitude level on malaria among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- There is association between the general characteristics and practice level on utilization of Insecticide Treated Nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- There is association between knowledge level of malaria and attitude level on malaria among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- There is association between knowledge level of malaria and practice level on utilization of Insecticide Treated Nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- There is association between attitude on malaria and practice level on utilization of Insecticide Treated Nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- There is association between cultural factors on malaria and utilization of Insecticide Treated Nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar

1.6 Operational Definitions

General characteristic: is characteristics of age, gender, education level, occupation, monthly income, marital status and duration of stay.

Knowledge on malaria: the ability of a person to differentiate correct and wrong answers about malaria in terms of causative agent, mode of transmissions, signs and symptoms and prevention.

Attitude toward malaria: a way of thinking or feeling on susceptibility and severity of malaria, on prevention of malaria and on transmission of malaria.

Traditional beliefs of malaria: refer to the beliefs of ethnic groups in mystical beliefs about malaria according to culture of the community.

Traditional lifestyle: include daily activities of the Rakhine ethnic group that can predispose to malaria infection.

Utilization of insecticides treated nets: routine activities and action of individual or group for utilization of ITNs for prevention of malaria.

Insecticide Treated Nets (ITNs): including insecticide treated nets (ITNs) and Long Lasting Insecticidal treated nets (LLINs)

1.7 Variable of the Study

Independent variables

1. General Characteristics
    - Age
    - Gender
    - Education level
    - Occupation
    - Monthly income
    - Marital status
    - Family member
2. Knowledge of Malaria
    - Knowledge on malaria vector, causation and transmission
    - Knowledge on signs and symptoms
    - Knowledge on prevention & control and treatment of malaria
3. Attitude toward malaria

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- Transmission of malaria
- Susceptibility and severity of malaria
- Prevention of malaria

4. Cultural factors

- Traditional belief of malaria
- Traditional lifestyle

Dependent variable

- Utilization of insecticide treated nets (ITNs)

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Conceptual Framework

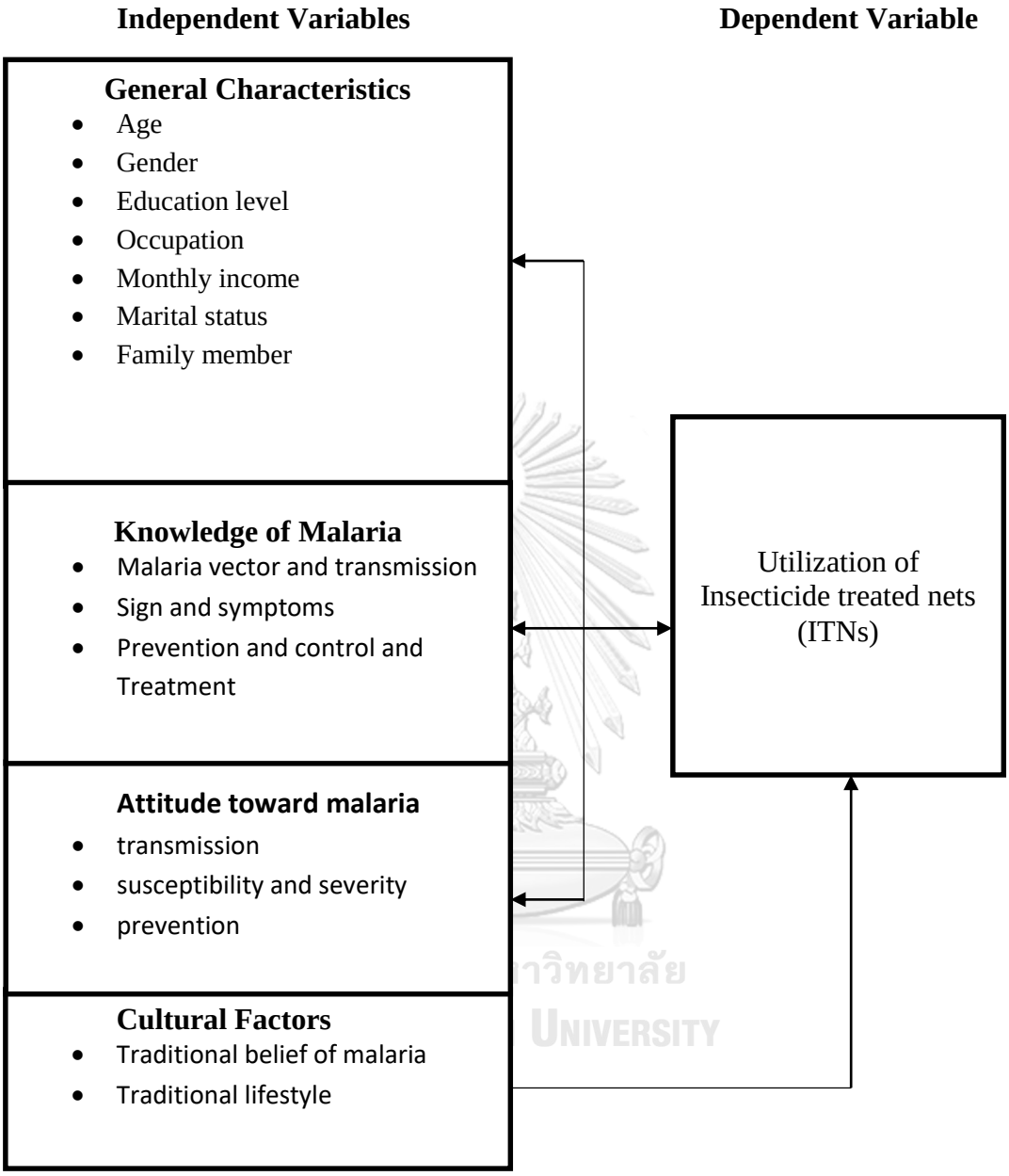

Figure 1 Conceptual Framework

CHAPTER II

LITERATURE REVIEW

2.1 Malaria and Epidemiology of Malaria

2.1.1 Malaria

Malaria is a severe and fatal disease and caused by infection with protozoan parasites belonging to the genus *Plasmodium* transmitted by female *Anopheles* species mosquitoes. The parasites that can cause malaria transmitted into human by the bite of infected female *Anopheles* mosquitos along with its saliva that injected into the bloodstream of humans. If the disease is not treated properly with effective medicine, it can cause severe complications and can lead to dead. There are many species of parasites but there are five species that caused malaria in human being, namely;

- *Plasmodium falciparum*
- *Plasmodium vivax*
- *Plasmodium malariae*
- *Plasmodium ovale*
- *Plasmodium knowlesi*

Plasmodium knowlesi, a parasite that naturally infected macaques monkey and caused malaria in Southeast Asia. From the research of Center for Disease Prevention and Control, *P. knowlesi* can also infects humans and causing malaria that is transmitted from animal to human called "Zoonotic" malaria. In the case of *P. falciparum,* the infection can be more severe and can change into life-threatening cerebral malaria. The other species are generally less serious and usually not severe and life-threatening. In the case of *P. ovale,* the parasite has dormant liver stages, hypnozoites, which can cause relapse after several months or years after infection (12).

2.1.2 Malaria Vector and Transmission

People can get infected with malaria by the bite of infected female *Anopheles* mosquitoes. For general, approximately 3,500 species of mosquitos but only female *Anopheles* mosquitoes can transmit malaria to humans. Nearly 40 *Anopheles* species are able to transmit malaria and severe enough to cause illness and death to human and

they usually bite their targets between dusk and dawn. In Myanmar, among many species of Anopheles, only 6 have been found to be the main vectors for malaria. Primary vectors are *An. minimus* and *An. dirus,* local vectors are *An. annularis* and *An. sundaicus* and secondary vectors are *An. culicifacies* and *An. philippinensis (6).*

An. minimus is present nearly all over the country and responsible for stable malaria in foothill and forest fringe. The main breeding site of this species are slow running grass edged streams, seepages and rice field in hill tracts. According to the entomological survey, *An. minimus* species feeds preferable on man on and feeding is more intense first quarter of the night depending on season and locality. It is now exophagic and exophilic (6).

An. dirus can be found almost all over the country but mainly prevalent in thick forest and forest fringe. The main breeding site of this species are pools, swamps, hoofmarks and domestic well under shade. This species is mainly anthropophilic, exophagic and exophilic. Biting activity varies from place to place and peak biting time was found to be first and second quarter of the night. This species is the most active during the raining season (6).

The local vectors, *An. annularis* and *An. sundaicus,* were mainly found in coastal area, plain area, forest fringe and forest area of Ayeyarwaddy Region, Mon State and Thintharyi Region of Myanmar but *An. sundaicus* is the main local vector of coastal area of Rakhine State, Myanmar. The biting of both local and secondary vectors are generally from dusk to dawn. The proportion of vectors will change from township to township according to the climatic condition such as temperature, rainfall and humidity level.

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The following characteristics is needed for mosquito species to cause malaria among human:

- Abundance – the existence of the species in adequate amount to carry malaria parasites and cause infection
- Longevity – the life span of the mosquitoes must be long enough for the parasite to evolve to infectious stage in their body and move to salivary glands and then cause infection

- Capacity – the amount of parasites in the mosquito's salivary gland must be high enough to inject into human
- Contact with humans – the habit of the species to bite on human rather than animals for their blood meal and the ability to survive and reproduce in the area that near to human (12)

2.1.3 Characteristic and Life Cycle of Vector

The main characteristic that *Anopheles* mosquitoes noticeably different from other species are their palps which are long and nearly the same size as their proboscis, and their distinct blocks of white scales and black scales on their wings. The resting position of adult *Anopheles* will be also different. They rest 45 degrees upside down of the surface with their abdomens pointing up in the air rather than parallel. There are four stages in their life cycle. Depending on the species and temperature the first three aquatic stages such as egg, larva and pupa will last for 5 – 14 days. After a few days, the adult stage will be reached at the time that the female *Anopheles* mosquito start to bite for blood as a malaria vector.

In the adult stages, males can live for about 7 days which feed only on nectar and other sources of sugar. Females also depend on nectar and different sources of sugar for their survival and energy but they need to depend on blood for their eggs. Unlike males, female mosquitoes have longer life span that can live up to 30 days but probable do not live longer than 7-14 days in nature. The feeding interval for female *Anopheles* mosquitoes will take 2-3 days depend on the process of digestion and egg development (12).

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2.1.4 Mode of Transmission of Malaria and Life Cycle

The malaria parasite is transmitted from person to person by the bite of infected female *Anopheles* mosquitoes. By biting a patient who is already infected by malaria parasite, the mosquito becomes infected then it sucks up the gametocytes, the sexual forms of the parasite in the blood stream. These gametocytes continue to further sexual phases of the cycle and the sporozoites that enter the mosquito fill the salivary glands. That cycle is called extrinsic cycle which has a duration of 10 to 18 days.

When this infected female mosquito bites the man for the blood, it injects the sporozoites into human blood stream, from there, the sporozoites travel to the liver, reproduce, then finally re-enter the blood stream (exo-erythrocytic cycle). The released merozoites then infect red blood cells, formed schizont and ruptured and release more merozoites into the blood stream again (erythrocytic cycle). At this point, the patient will begin to experience symptoms. Some parasites differentiate into sexual gametocytes and taken by female mosquitoes. This process usually takes 7-30 days depending on the *Plasmodium* species (12).

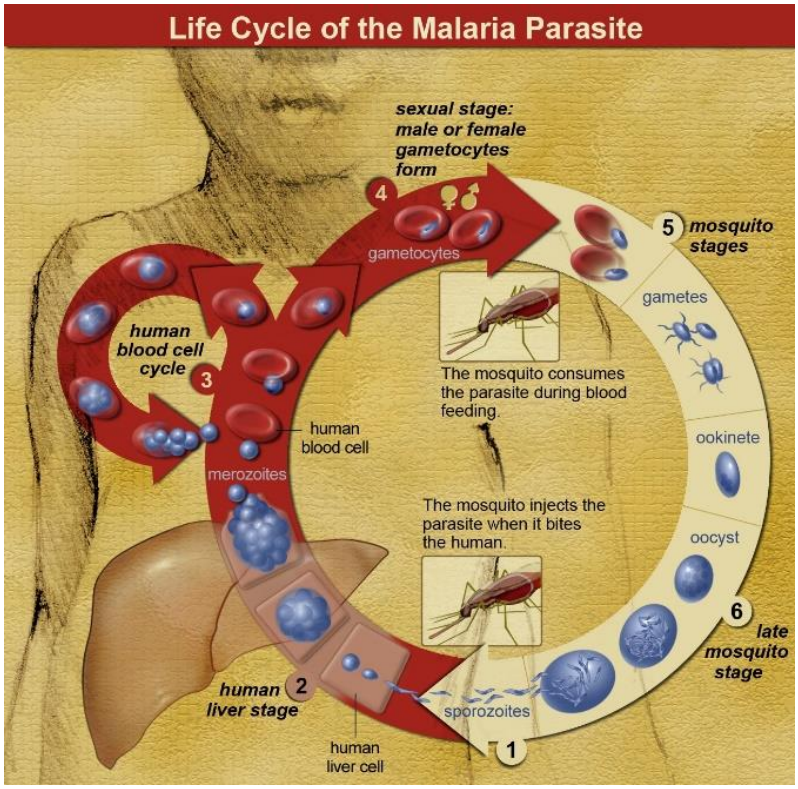

Figure 2 Life Cycle of Malaria Parasite

There are other ways to transmit malaria parasites from infected individual to a normal person besides the bite of infected mosquitoes. In this type of malaria, incubation period of the infection will be shorter and no relapses cases due to the direct entry of asexual forms into the blood stream and pre-erythrocytic stage inside the live do not form. Other types of transmission are; 1) transmission of malaria due to transfusion of infected blood (Transfusion malaria), 2) transmission of malaria from

infected mother to child (congenital malaria), 3) transmission of malaria due to injury or sharing to needles infected with malaria parasite.

2.1.5 Signs and Symptoms

Malaria is an acute and usually presented as high fever, chill and rigor. The severity of the infection may depend on the species and strains of parasite. There are three common stages in the clinical features of uncomplicated malaria namely; Stage (1) a cold stage (sensation of cold, shivering), Stage (2) a hot stage (fever, vomiting, headaches), Stage (3) a sweating stage. In "tertian" malaria (*P. falciparum, P. vivax*, and *P. ovale)*, the symptoms will present every second day of infection. In "Quartan" malaria (*P. malariae*), the clinical features can be seen in every third day. Some clinical features such as fever, chill, sweating, headaches, nausea and vomiting and body aches are similar with the symptoms of common cold. Thus, malaria can be sometime misdiagnosed, more importantly if malaria is not suspected.

In severe cases or complicated malaria cases, malaria can be serious and can causes death due to multi-organ failures (acute renal failure, cardiovascular collapse) or abnormal of the patient's blood metabolism. The most severe case in complicated malaria is cerebral malaria which usually presented with behavior changes, loss of consciousness, convulsion, coma, or other abnormal neurological symptoms, and sometime severe anemia, result of mass red blood cell destruction and haemoglobinuria. There may be also respiratory symptoms such as acute respiratory distress syndrome (ADRS). In this case, the patient must be treated carefully as an emergency case. In *P. vivax* and *P. ovale* infections, relapses can occur after months or year after a recovery from the first infection (12-14).

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2.1.6 Prevention of Malaria

In prevention and control of Malaria in developing countries, the important measures are to break the chain of the man to vector contact and treating the infection as early as possible. As many developing countries are still high in vector amount comparing to the developed countries, breaking the man-vector contact cycle of

transmission is the most effective control measure in prevention of malaria. In prevention of malaria, there are three components;

1. Vector control
2. Avoid contact of vector to host
3. Early diagnosis and prompt treatment with appropriate use of anti-malaria drugs according to national malaria treatment guideline

Those preventive measures are to reduce the breeding place of mosquito, to reduce the adult mosquito, to reduce the man-vector contact and to receive qualified antimalarial treatment to infected population thereby avoiding man to man transmission via vectors. In Myanmar, integrated vector control measures are necessary and wide scale use of insecticide treated nets (ITNs) or Long Lasting Insecticide treated nets (LLINs) is a key in malaria prevention strategy. (6)

In early days, ITNs were introduced to the population for prevention of malaria. Although ITNs proved highly effective in reduction of morbidity and mortality of malaria, ITNs did not prove to be very effective in field because they must be retreated every 6-12 months. Another fact were the cost and availability of the insecticides became an issue. So LLINs were developed to solve these issues. LLINs have been successful in reducing malaria incidences by either reducing or not allowing human exposure to the vector mosquitoes. In recent research, because of LLINs are nets treated with an insecticide into the net fabric which makes the life span of the net last at least 20 times wash and three years of recommended use under field condition. So LLINs become widely used by many organizations in prevention of vector to man contact (15).

For a long term and sustainable vector control, environmental managements such as environmental modification and manipulation are the most crucial parts that can decrease the contacts between men and vectors. The combination of standard methods with environmental management will be necessary to achieve the complete disruption of vectors to human contacts (16).

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2.1.7 Treatment of Malaria

In the treatment of malaria, early diagnosis and prompt treatment is the main combination. Since specific antimalarial treatment is available for specific infection with parasites, it must always be started as soon as malaria is diagnosed by rapid diagnosis test (RDT) or microscopy. Patients with suspected malaria should be confirmed with parasitological tests before any anti-malarial drugs is given. Immediate treatment within 24 hours of fever onset with an effective and safe anti-malarial is necessary to reduce life-threatening complications. The goal of the early treatment is to cut the transmission of malaria to another person, by reducing the infected gametocytes, and to reduce the occurrence of drug resistance malaria (17).

WHO recommends artemisinin-based combination therapies (ACTs), Artermether (20 mg) plus Lumefantrine (120 mg), for the treatment of uncomplicated malaria caused by the *P. falciparum* parasite with a single dose of Primaquine. Other group of drugs are also used in case of treatment failure. Other group of drugs such as Artesunate plus Mefloquine & Dihydroartemisinin plus Piperaquine are usable according to WHO. ACTs are the mainstay of recommended treatment for *P. falciparum* malaria and, as no alternative to artemisinin derivatives. According to WHO, the National Malaria Control Programs should monitor and evaluate the efficacy of anti-malarial drugs to confirm that the chosen treatments remain effective for treatment of malaria.

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P. vivax infections should be treated with chloroquine in areas where this medicine remains effective. Primaquine should also be used to the treatment for radical cure for hypnozoites while dosages and frequencies of the administration should be adjusted depends on body weight or age. Primaquine should be taken for 2 weeks. The treatment of *P. ovale* and *P. malariae* is the same with *P. ovale* because these parasites are also sensitive to chloroquine (17).

In the treatment of severe malaria cases, artesunate injection (intramuscular or intravenous) for at least 24 hours until the patient can take the medicine by oral and followed by a complete 3-day course of an ACT. In view of the latest development of resistance, the initial treatment of severe malaria with these medicines needs to be completed with a 3-day course of an ACT (17).

2.2 Situation of Malaria in Myanmar

By the year 2016, the population of Myanmar is approximately 52 million with 15 States and Regions. The main economy of the country is agriculture, mining, plantations, forestry, fishing, etc. There are total 330 townships in Myanmar, among them 291 of the townships are in malaria endemic townships according to Ministry of Health and Sports, Myanmar (18).

In the Greater Mekong Sub-region, Myanmar is contributed more than a half of the malaria cases and nearly 75% of the death cases in the GMS occurred in 2007 and continuous reduction of yearly incidence from 1998 to 2007. Although malaria burden was high, some interventions and spending in malaria control were still lower than other countries in the Greater Mekong Sub-region. In 2009, 74% of the cases were from the infection of *P. falciparum* and they were mainly from the forest areas of Kachin, Rakhine states and Sagaing Division. In the areas where ethnic minorities were habitat, disease burden of malaria is very high and malaria outbreaks happen more regularly because of lack of Public health infrastructure in out-reach area create those outbreaks and reported cases might be underestimate (19).

Between the year 2005 to 2014, the annual report for malaria show that 81.1 % reduction in malaria incidence in Myanmar (1341.8 cases per 100,000 population to 253.3 cases per 100,000 population) and also the annual mortality from malaria showed a 93.5 % declination (3.79 deaths per 100,000 population to 0.25 deaths per 100,000 population) and a 87.2 % declination in the hospitalization cases due to malaria (7.8 to 1.0 %)(20) (21). The demographic change of the population from the rural area to urban (urbanization) where the malaria incidence is lower may have an effect on declination of the malaria cases (22). Myanmar is also among the one of the country with high deforestation rate. This may have had an impact to reduce vector concentration in many rural and mountainous regions (23).

Reported cases from malaria death were highest in 1991 (>5,000) and then decline slowly. Also, 3,744 mortalities were collected for 1995, 1,261 for 2007 and 788 for 2010. In 2013, only 236 cases of death were reported. Estimated 25-40% of malaria deaths cases had a good treatment seeking behavior but there were still many cases of self-treatments or got the treatment from the formal private and non-formal health

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practitioners. Most of the deaths case were due to late admission. They usually presented to the hospital at the fourth day and more after onset of symptoms (6).

According to data from Ministry of Health and Sports, Myanmar, the prevalence of malaria in species-wise showed that the prevalence of *P. falciparum* (67%) is higher than that of *P. vivax* (33%). The data also showed despite the increased in annual blood examination rate of malaria (2.3%), the annual parasite index decreased to 0.95% and test positivity rate also going down to 4.1% in 2016. For the anti-malaria resistance, therapeutic efficacy studies stated that all ACTs are effective more than 95% except Artesunate-Sulfadoxine-Pyrimethamine, chloroquine and sulphadoxin-pyrimethamine recorded over 25% and Mefloquine is effective less than 10% for *P. falciparum* malaria. For *P. vivax* malaria, chloroquine is still effective and usable (18).

To reduce the malaria burden in high malaria risk rural areas, training and deployment of community health workers is the main activity. The key responsibility of the community health workers that recruited are caring the malaria patients and other activities such as distribution of insecticide-treated nets (ITNs) and helping of indoor residual spraying (IRS) teams (24).

According to WHO malaria profile for Myanmar 2015, insecticide treated nets distribution was adopted from 2000 with free of charge and to all age groups. In 2014, more than 60% of high risk group and have a plan to over 80% coverage of the population at risk. An advantage of the free of charge ITN distribution program is that it can increase the coverage of nets in less developed and remote locations more effectively than other interventions (25).

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2.3 Related Research

Preventive behavior study on malaria on rural villagers living in Takeo province, Vietnam was found that there is a significant association between knowledge, attitude and prevention behavior of malaria and 9.4% were good practices on malaria prevention. Preventive behavior of malaria observed by Doan Duc Hung (2007) in Van Canh, Binh dDinh province, Vietnam, was found that 62% had good malaria preventive behavior and 38% had moderate level of preventive behavior (26).

In the study of knowledge, perception and practices about malaria, nearly all (95.5%) respondents managed to use of insecticide treated mosquito nets (ITN) as the

main method of malaria prevention. Only a small groups of the study population mentioned other vector control methods such as mosquito coils (4.8%), indoor residual spraying (6.8%), and using larvicide (0.8%). About 82.0% of the study population stated that in case of did not had ITN, they brought mosquito nets for the prevention of mosquitoes bite while sleeping in the farms or fields (27).

In the study of 443 respondents for knowledge and perception of malaria prevention in Cameron, the knowledge level was significantly associated with education level of respondents. In this study, most respondents (57%) used ITNs mainly for protection against mosquito bites while 48% used them for protection against malaria (28).

The result of the study of 700 people for knowledge, attitude and practice on malaria in Taikkyi Township, Myanmar, there were still misconceptions for the causes of malaria. About 18.9% of respondents answered malaria was caused by drinking water from the forest, 8.3% answered eating banana and 9.4% did not know the causes of malaria. For the knowledge about malaria, 48.9% of the respondents were in low level of knowledge, 51% were in average level and there were none in the high knowledge level (29).

In the study of knowledge, attitude and practice on insecticide treated nets in Myanmar, results showed that more than 62.1% of 256 of the respondents had low knowledge level on malaria and ITNs uses and some understanding toward the transmission of malaria and 75% had low attitude level on prevention of malaria and ITN usage. There is significant association between knowledge and attitude level of respondents and their educational status. In that study, the researcher concluded that the source of knowledge on ITN and insecticides tablets to prevent malaria transmission needed to increase (30).

In a study of migrants' population in Bago Township, Myanmar, had an average household size of 5 and had children under five years. 95% of them had access to at least one bed net but not enough for the number of one net per two persons. Although 70% of them aware the importance of insecticide treated net or Long lasting insecticidal net, the knowledge on insecticide nets was poor (<10%) and contact with source of information and health workers was also low with 30% and 40% respectively (31).

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In the study of the rural communities of Ise-Orun, Nigeria, on the understanding of malaria and practices on 422 mothers of children less than 5 years showed 51% of the mothers had low attitude toward malaria and 14.2% ascribed malaria illness to mosquito bite only. 45% of mothers answered that malaria is a communicable disease while only 8.3% answered that mosquito bite is the only way to get malaria infection. 82.7% of the mothers answered that malaria is severe on children. Of the 200 mothers whose children had malaria infection before the study, 87.5% were relied on home remedies rather than went to health care. (32).

In March 2014, the study on malaria preventive behaviors among residents of Theinni Township, Northern Shan state, Myanmar was done. The results of the study showed that most of the respondents (91.4%) agreed that people who stayed in the forest overnight were more susceptible to malaria. Nearly all of the respondents (92%) agreed if delayed in proper treatment, malaria could cause death. 69.4% of the respondents agree that lighting up the mosquito coil or spraying insecticides caused smoky, smell and harmful to health. 22% of respondents perceived impregnated bed nets have bad smell and disturbed sleep (33).

From the study of Knowledge, Attitude and Practice of the Community towards Malaria Prevention and Control in Ethiopia, 5.37% of 864 respondents accepted Indoor residual spray (IRS) as malaria prevention method and 26.4% of the participants used ITN as malaria prevention and control method. For the good knowledge on clinical manifestations, sign and symptoms and prevention of malaria, 66.6%, 50.8%, 64.8% have a good knowledge level respectively. 69% of the respondents had positive attitude toward malaria treatment and 47% had a good practice toward malaria prevention and control activities (34).

In the study of social and cultural aspects of malaria in central Cote d'lvoire, the local folk name the malaria as "*djèkouadjo".* The locals used their traditional remedies in combination with modern treatments. Even individuals with a good knowledge of the causes and symptoms of malaria still used traditional treatments and only some people sleep under the mosquito nets. Some participants misunderstanding malaria as convulsion due to childhood health problem and mainly described as a deep yellow coloring of the palm, eyes and urine. Interviewees feel that only traditional healers can successfully treat convulsions. On the aspects of prevention of malaria,

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those who believe that malaria is caused by God also believed that it is impossible to avoid the illness as it is only god who can prevent people from getting it. Also on the aspect of treatment, traditional healers stated that it was required to avoid some food such as red tomatoes, red peppers, red soup and red cooking oil (35).

Assessing marginalized tribal communities in India stated that villagers stated malaria as “filth” or “germs that enter the body at night”. From this study, most of them relied on traditional healer for the treatment of malaria and it became the barrier for early diagnosis of malaria. They also believed that the physical illness and symptoms of malaria was the causes from evil spirits and spiritual illness that can only cured by traditional healers (36).

By studying the related research on knowledge, attitude and practice on malaria prevention, using insecticide treated nets is the main intervention for malaria prevention and control. Knowledge and attitude level toward malaria prevention in Myanmar is lower comparing to many other countries. There are also some studies indicated that traditional and cultural beliefs have some impact on prevention and treatment of malaria. In Ann Township, Rakhine State, the majority of the populations are Rakhine ethnic groups with different dialects and traditional cultures. Ann Township is also composed of many mountainous areas and less developed villages with difficult transportation links. So the study on knowledge, attitude, practice and cultural beliefs on malaria will be benefit for further policy making and interventions of malaria prevention and control in Rakhine State.

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CHAPTER III

Research Methodology

3.1 Research Design

A cross-sectional study was conducted to determine the knowledge, attitudes and cultural factors regarding utilization of insecticide treated nets (ITNs) among ethnic groups in Ann Township, Rakhine State, Myanmar. The demographic characteristics of study population were examined in this study. The structured questionnaires were used to collect the data by face-to-face interview.

3.2 Study Area

Ann Township in Rakhine state of Myanmar is the Target area. Ann Township is 205 miles east of Sittwe Township, capital city of Rakhine State. Ann Township is composed of many mountainous areas, a lot of streams and rivers with 290 villages and has the population of 119,714 and 27,359 households. There are different ethnic groups with different languages, beliefs, cultural and life style diversity. It also a malaria endemic area and contribute a high malaria cases each year comparing with other States or Regions in Myanmar. This study will be performed in (10) villages with a high malaria prevalence.

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Figure 3 Map of Myanmar showing Ann Township, Rakhine State

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3.3 Study population

The target population were population aged more than 18 years old, including both male and female.

Inclusion criteria

1) Individuals (both male and female) whose age more than 18 years old
2) Individuals who agree and willing to participate in this study
3) Being a leader of selected household and living in Ann Township more than one year
4) Rakhine ethnicity

Exclusion criteria

1) Individuals who have mental health problems
2) Individuals who have severe illness

3.4 Sample Size Estimation

The number of sample size was calculated by using the Cochran formula with significant level of 5% and 95% confidence level.

$$n = \frac{Z^2\, P(1-P)}{d^2}$$

n= Estimated sample size

Z^2= Standard normal deviate at 95 % confidence level (1.96)

P = Estimated proportion of population with utilization of nets (50%), to get the maximum sample size

d= Error allowance 5% (0.05)

$$n = \frac{1.96^2 \text{x } 0.50 \text{ x } (1- 0.50)}{(0.0025)^2}$$

n = 384.16

With estimate 10% of participant will not participate. Therefore, the sample for the study will be **420**.

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3.5 Sampling Technique

There are total 290 villages and population of 119,714 and 27,359 households in Ann Township. Among those villages, 117 villages with majority of Rakhine ethnic group and high malaria incidence were selected with purposive sampling method. After that, 10 villages from 117 villages were select by simple random sampling method. The samples were selected from each village with proportion of the number of household by systematic random sampling method. From a random starting point, the samples were taken according to calculated interval. One household leader was interviewed from each household according to inclusion and exclusion criteria. If there was no

household leader in the house, the eldest one was chosen and if no one at home during the time of visiting, the nearest household was selected.

Table 1 Systematic Random Sampling

Villages	Household	Population	Needed sample size	Interval (N/n)
Sa Khan Maw	282	1049	93	3
Ah Htet Zin Kaung	106	453	35	3
Sin Khon Taing	81	355	27	3
Pein Yae San	104	452	34	3
Sat Si	80	400	26	3
Law Haing	90	406	30	3
Koe Kan Tan (Ya Khin Pone Na Wa)	140	691	46	3
Ywar Thar Yar	135	590	44	3
Sin Toe	130	363	43	3
Taik Maw	126	580	42	3
Total	1274	5339	420	

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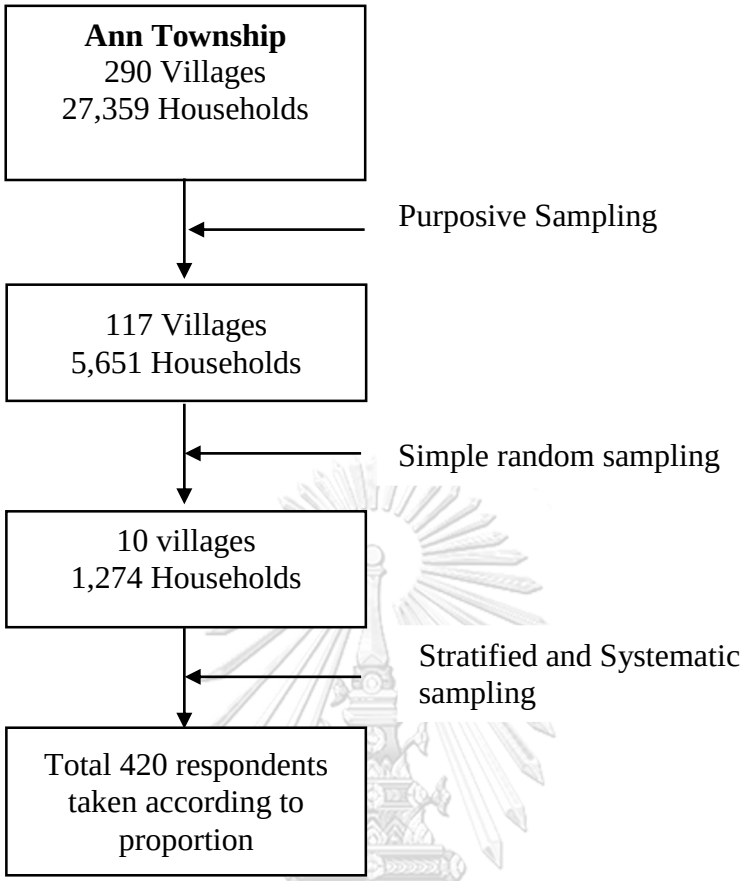

Figure 4 Multistage Random Sampling

3.6 Validity Test

To achieve the validity of the questionnaires, reviewing literature, previous study and guidelines were done. Also, consulting content with 3 experts was performed. Item-Objective Congruence Index: IOC was used as instrument to test validity. The validity of the questionnaires was done by two academic experts; Assist. Professor Naowarat Kanchanakhan, Ph. D. and Tepanata Pumpaibool, Ph.D. and one local expert; Dr. Hein Pyae Aung, the project manager of Myanmar Medical Association (Malaria Project). The obtained value of IOC test was 0.96.

3.7 Reliability

The Questionnaires were constructed in English and translated into Myanmar language and were pre-tested among 30 people to assess the participants understanding

and time spent on the research questions. The internal consistency of the rating scales was performed by Cronbach's alpha coefficient for analysis and the score was 0.882.

3.8 Measurement Tools

A structural questionnaire was developed and were used to get the information needed in this study. It contained 5 Sections:

Section 1: General characteristic

General characteristics of respondents: It contained 7 questions about age, gender, education, occupation, family members, average family income per month and marital status.

Section 2: Knowledge on malaria

Knowledge on malaria include 3 main parts; knowledge on vector and transmission of malaria, knowledge on signs and symptoms of malaria and knowledge on prevention, control and treatment of malaria by 2 scales (Yes, No) with 6 questions.

Section 3: Attitude toward malaria

Attitude on malaria include attitude on transmission of malaria, attitudes on susceptibility and severity of malaria, attitude on benefit of prevention of malaria by 5 rating scales (strongly agree, agree, neutral, disagree, strongly disagree) with 12 questions.

Section 4: Cultural *factors* toward malaria

Traditional beliefs and daily activity practices of the respondents contained 8 questions about their traditional beliefs about malaria and practices of daily activities such as life style with 3 rating scales. "Agree", "Neutral" and "Disagree" for traditional beliefs and "Always", "Sometime" and "Never" for practices of daily activities.

Section 5: Practices on utilization of insecticide treated nets

Utilization of nets including 2 main parts such as practice on utilization of nets and reasons for not using of nets, total 8 question with 3 rating scales (always, sometimes, never).

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3.9 Data Collection

Data collection was conducted in June, 2018. The questionnaires were prepared in both English and Myanmar languages. Four research assistants were selected from local community and they were trained for one day about the objective of this study, the content of questionnaires, data collection process and practicing the real condition. All the research assistants recruited were from non-governmental organization that implemented research activities on malaria and they were able to speak and write Rakhine language, knew the transportation routes to the study areas and their current position in the organization were research assistant. The Data collection method were face-to-face interview. During the data collection, the main interviewer was also being together with the two assistant interviewers to monitor the data collection procedure. After all the questionnaires were answered, the main interviewer gave the brief health education to participant's household members.

The interviewer explained the instructions of the questionnaires, purpose and benefit of the study, confidentiality and some ethical consideration. The inform consent was also obtained from each of the respondent by explaining the consent form verbally or written form. After that, the interviewer got the signature or finger print from each respondent. The respondents were interviewed along with snacks and drinking water throughout the interview and were provided with incentives in kind. All the respondents are free to reject if they are not willing to participate in this research or stop the participation during the interview.

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3.10 Data Analysis (Statistic)

All the completed questionnaires were checked for any error and completeness daily. All the collected data were entered and coded in SPSS (version 22).

Descriptive Statistic

Descriptive statistic such as percentage, mean, standard deviation, median and range were used for analyzing the general characteristic of the respondents as well as knowledge on malaria, attitude toward malaria, cultural beliefs and utilization of mosquito nets.

Analytic statistic

Analytic statistic such as Chi-square test and Fisher's Exact Test was used to determine the relationship between general characteristic, knowledge, attitude and utilization of mosquito nets. The variables which had association with practice level on utilization of insecticide treated nets and variables which had p-value less than 0.2 were then analyzed further by logistic regression at the level of statistical significant of 5% and confident interval of 95%.

3.11 Scoring and its classification

The independent variables and dependent variable were scored as follow in the questionnaires.

3.11.1 Knowledge of Malaria

It includes 6 items; 3 items on knowledge of vectors and transmission, 1 item on knowledge of signs and symptoms, 2 items on knowledge of prevention, control and treatment to measure the knowledge of malaria. If the respondents give a correct answer, "1" score will be given. If the answer is incorrect, "0" score will be given. The possible score for the knowledge of malaria can be "0" to "31". According to Bloom's cut off point, if the respondent can answer 80% of correct answers, it will be regarded as Good knowledge. If the respondent can answer 60% to 79% of correct answers, it will be regarded as Moderate knowledge and if the score of the respondent is less than 60%, it will be regarded as Poor knowledge.

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Table 2 Possible scores of knowledge on malaria

Variables	Possible scores	Low (<60%)	Moderate (60-79%)	Good (>80 %)
Knowledge of malaria vector and transmission	0-13	0-7	8-9	10-13
Knowledge of malaria signs and symptoms	0-6	0-2	3-4	5-6
Knowledge of malaria prevention, control and treatment	0-12	0-7	8-9	10-12

3.11.2 Attitude toward malaria

It contained 12 items to measure attitude on malaria. There were 3 domains – attitude on transmission of malaria, attitudes on susceptibility and severity of malaria, attitude on of prevention of malaria with 4 questions in each domain. The response for each question is assigned as “Strongly agree”, “Agree”, “Neutral”, “Disagree” and “Strongly disagree” as per Likert scale. The answer was classified into 5 levels, according to positive question, “Strongly agree = 4”, “Agree = 3”, “Neutral = 2”, “Disagree = 1” and “Strongly disagree = 0”. There are total of 12 questions. Therefore, scores can be 0 to 48. The attitude scores were categorized by using mean score and standard deviation of the respondents. High or Good attitude was categorized if the score more than or equal to mean plus standard deviation (SD). Moderate attitude was categorized if the score is between mean plus or minus SD. Poor or Bad attitude was categorized if the score is less than or equal mean minus SD.

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Table 3 Possible scores of attitude toward malaria

Variables	Possible scores	Low	Moderate	High
Attitude on transmission	0-16	Score less than or equal minus SD	score is between mean plus or minus SD	score more than or equal to mean plus SD
Attitude on susceptibility and severity	0-16			
Attitude on prevention of malaria	0-16			

3.11.3 Cultural Factors of Participants

It includes 2 main parts; Traditional beliefs about malaria and practices of daily activities (traditional lifestyle). Total of 8 questions with 3 rating scales. “Agree”, “Neutral” and “Disagree” for traditional beliefs and “Always”, “Sometime” and “Never” for practices of daily activities.

3.11.4 Utilization of Mosquito nets

The answers were categorized into three levels; Always, Sometimes and Never. For those who answered “Always” get 2 scores, “Sometimes” get 1 scores and “Never” get 0 scores. If the respondent did not own any mosquito nets, the score was 0 and if the question is negative, the score was reversed. Therefore, the possible scores for utilization of insecticide treated nets is *0 to 12*. The practice scores were categorized by using mean score and standard deviation of the respondents. Respondents who scored above the mean were considered as having good practice and less than the mean score as poor practice.

Table 4 Possible scores of utilization of insecticide treated nets (ITNs)

Variables	**Possible scores**	**poor**	**Good**
Utilization of Mosquito nets	*0-12*	*Score below mean score*	*score above mean score*

3.12 Limitation of the Study

This study design is a cross-sectional study, so there were some limitations and restrictions in this study as the study cannot find out respondents' knowledge level, attitude level and utilization of mosquito nets over time. This study was performed on 10 villages and there are many high risk areas and villages left on very hard to reach areas. So this study was not completely representing the whole area of Ann Township.

3.13 Application Benefit

By conducting this study, it can assist in improving the knowledge and attitude level in the population toward utilization of mosquito nets. Moreover, the study on knowledge, attitude, practice and cultural beliefs on malaria were benefit and aid for further policy making and interventions of malaria prevention and control in Rakhine State.

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3.14 Ethical consideration

The proposal was submitted to ethical committee of Chulalongkorn University. All the procedures of the research were explained and got the permission of the respondents. Also, the instructions of the questionnaires, purpose and benefit of the study were explained and the consent form was provided to the respondents. The respondents can stop the participation before and during answering the questionnaire for any reasons. All the information will be kept confidentially and the name will not be included.

CHAPTER IV

RESULTS

This study was an analytic cross-sectional study which was interviewed and collected data from 420 respondents of Rakhine ethnic groups from 10 villages of Ann Township and focused on general characteristic, knowledge level, attitude level, cultural factors and practice level regarding utilization of insecticide treated nets in Ann Township, Rakhine State, Myanmar. The results were presented in 10 parts as follows:

1. Socio-demographic characteristic of the respondents
2. Knowledge of malaria
3. Attitude toward malaria
4. Cultural factors of respondents
5. Practice toward utilization of insecticide treated nets
6. Association between general characteristic and knowledge level of malaria
7. Association between general characteristic and attitude level toward utilization of insecticide treated nets
8. Association between general characteristic and practice level toward utilization of insecticide treated nets
9. Association between cultural factors of respondents and practice level toward utilization of insecticide treated nets
10. Association between knowledge level, attitude level and practice level toward utilization of insecticide treated nets
11. Association (using multivariate model) between general characteristic, knowledge level, attitude level, cultural factors of respondents and practice level toward utilization of insecticide treated nets

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4.1 General Characteristic of the Respondents

The general characteristics of the respondents included their age groups, gender, education, occupation, types of occupation, family members, average monthly income and marital status as shown in Table 5.

Their age ranged between 18 and 80 years with average of 43.1 with standard deviation (SD) of 14.0 years. The age of the respondents was categorized into 4 groups: 18-24 years, 25-44 years, 45-65 years and more than 65 years respectively. Half of the respondents (50.2%) were 25-44 years age group and the others were 18-24 years (6.4%), 45- 65 years (34.3%) and >65 years (9.0%) respectively. For gender in this study, 73.6% were female and the rest were male (26.4%). Among all the respondents, 27.6% of the respondents were no illiterate or no formal education, 36.9% were primary school level, 16.9% were middle school level, 14.3% were high school level and only 4.3% were college or university level.

By observing the occupation status of the respondents, more than half of them were dependent (51.2%). Others worked in agriculture (27.1%), Forest workers (11.2%), bamboo/rattan cutting (2.4%), government employee (5.5%) and 2.6 % worked in other occupation. The occupation could be categorized into occupation related with forest, occupation not related with forest, dependent and others according to main occupation of region and analytic purposes. By the types of occupation, majority of them are dependent with 51.2% and 40.7% of the respondents worked in forest related work. Only 5.5% had occupations which were not related with forest and 2.6% had other occupations.

For family members, majority of the households had 4 to 5 family members (52.1%), 27.9% had less than 3 and 20.0% of them had more than 6 family members. The average family member per household were 4.4, SD 1.42 and range of 1-9. Most of the respondents earned between 100,001-200,000 kyats (41.2%) and more than 200,001 kyats (40.2%). Only small portions (18.6%) earned between 0-100,000 kyats. For marital status, majority of the respondents are married (78.8%). 13.3% were single and 7.9% were widowed.

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Table 5 Frequency and percentage of general characteristic (n=420)

Variables	Frequency	Percentage
Age groups (years)		
18-24	27	6.4
25-44	211	50.2
45-64	144	34.3
>65	38	9.1
Mean = 43.1 SD = 14.0 Range = 18 - 80		
Gender		
Male	111	26.4
Female	309	73.6
Education		
Illiterate or no formal education	116	27.6
Primary school level	155	36.9
Middle school level	71	16.9
High school level	60	14.3
Collage/University level	18	4.3
Occupation		
Agriculture	114	27.1
Forest worker	47	11.2
Bamboo/ rattan cutting	10	2.4
Government employee	23	5.5
Dependent	215	51.2
Others	11	2.6
Types of occupation		
Related with forest	171	40.7
Not related with forest	23	5.5
Dependent	215	51.2
Others	11	2.6

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Table 5 (Continue) Frequency and percentage of general characteristic (n=420)

Variables	Frequency	Percentage
Family members		
1 - 3	117	27.9
4 - 5	219	52.1
≥ 6	84	20.0
Mean = 4.4 SD = 1.42 Range = 1 - 9		
Average income per month		
0 - 100,000	78	18.6
100,001 - 200,000	173	41.2
200,001 or more	169	40.2
Marital Status		
Single	56	13.3
Married	331	78.8
Widowed	33	7.9

1,424 MMK = 1 USD, 43 MMK = 1 THB

4.2 Knowledge of Malaria

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In this study, knowledge of malaria was divided into 3 portions which were knowledge on vector and transmission, knowledge on signs and symptoms of malaria and knowledge on prevention, control and treatment of malaria. The detailed of the responses to each question for knowledge of malaria were showed in Table 6.

Almost all of the respondents (97.6%) knew well that mosquito bite is the cause of malaria. However, majority of the respondents 93.3% and 85.2% of the respondents still responded that messy environment and unhygienic were also the cause of malaria. In addition, they answered that drinking of stream water or dirty water, bath in stream and eating banana or other fruits or meat were also the cause of malaria with 77.6%, 76.6% and 68.8% respectively. Some of the respondents (22.6%) answered that malaria is caused by spirit. In the case of knowledge on biting time of malaria mosquito, 95.7% gave the correct answer of night time and 61.9% of them could answer that the biting

time was during dawn to dusk. But more than half (55.5%) responded the biting time was during day time. For resting place of malaria mosquito, 96.0% of the respondents correctly answered that it was forested area but majority of them 90.5% and 90.7% gave the wrong answers of bushes around the house and dark places in the house respectively.

Almost all of the respondents (98.6%) could verify that fever with chills and rigor was the main symptoms. Also most of them could answer nausea and vomiting and severe headache are the signs and symptoms of malaria with 87.1% and 91.4% respectively. More than half of the respondents answered that joint pain and loss of appetite with 92.4% and 86.2% respectively. Only 32.9% gave the wrong answer of diarrhea was the malaria symptoms.

All respondents (100%) knew that always sleeping under bed net, sleep under insecticide treated bed net and sleep under long lasting insecticidal net can prevent malaria. But most of the respondents wrongly answered that insecticide spray, avoid drinking or bathing stream water and taking anti-malaria prophylaxis can prevent malaria with 95.7%, 77.9%, 77.9% and 69.3% respectively.

Regarding the treatment of malaria, almost all of the respondents (98.3%) correctly answered that taking full course of anti-malarial drugs from health staff can cured malaria. More than half of the respondents gave correct answers that self-treatment with anti-malarial drug or herbal medicine and traditional healer cannot cure malaria with 58.1%, 60.5% and 54.8% respectively. In addition, 91.0% of the respondents correctly answered that pray for spirit is not the treatment of malaria.

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Table 6 Frequency and percentage of 420 respondents who give correct answers to Knowledge of malaria

Variables	Correct	
	Frequency	**Percentage**
Knowledge on vector and transmission		
Cause of malaria		
Due to drink stream water or dirty water	94	22.4
Due to bath in stream	111	26.4
Due to eating banana or other fruits or meat	131	31.2
Due to spirit	325	77.4
Due to mosquito bite	410	97.6
Due to messy environment	28	6.7
Due to unhygienic	62	14.8
Biting time of malaria mosquito		
Day time	233	55.5
Night time	402	95.7
Dawn and dusk	260	61.9
Resting place of malaria mosquito		
Forested area	403	96.0
Bushes around the house	40	9.5
Dark places in the house	39	9.3

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Table 6 (Continue) Frequency and percentage of 420 respondents who give correct answers to Knowledge of malaria

Variables	Correct	
	Frequency	**Percentage**
Knowledge on signs and symptoms of malaria		
Signs and symptoms of malaria		
fever with chills and rigor	414	98.6
Nausea and vomiting	366	87.1
Severe headache	384	91.4
Joint pain	388	92.4
Diarrhea	282	67.1
Loss of appetite	362	86.2
Knowledge on prevention, control and treatment of malaria		
Protection from malaria		
Always sleeping in the bed	420	100.0
Sleep under Insecticide treated bed net	420	100.0
Sleep under Long lasting insecticidal net	420	100.0
Insecticide spray	18	4.3
Avoid drinking stream water	93	22.1
Avoid bathing in the stream	93	22.1
Taking anti-malaria prophylaxis	129	30.7

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Table 6 (Continue) Frequency and percentage of 420 respondents who give correct answers to Knowledge of malaria

Variables	Correct	
	Frequency	Percentage
Treatment of malaria		
Taking full course of anti-malarial drug	413	98.3
Self-treatment with anti-malarial drug	244	58.1
Self-treatment with herbal medicine	254	60.5
Traditional healer	230	54.8
Pray for spirit	382	91.0

Knowledge level was classified into 3 levels as good knowledge level, moderate level and poor knowledge level in Table 7. The knowledge level of the respondents was poor with 72.6% and 23.8% were in moderate knowledge level. Only 3.6% of them had a good knowledge level. The mean score of knowledge level was 16.7 with standard deviation of 3.6. The range of knowledge scores obtained from all the respondents were 11-29.

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Table 7 Frequency and percentage of knowledge level of malaria (n=420)

Knowledge level	Frequency	Percentage
Poor Knowledge	305	72.6
Moderate Knowledge	100	23.8
Good Knowledge	15	3.6
Mean = 16.7 SD = 3.6 Range = 11-29		

4.3 Attitude toward Malaria

Attitude toward malaria is divided into 3 groups as attitude on transmission of malaria, attitude on susceptibility and severity of malaria and attitude on prevention of malaria in Table 8 which shows frequency and percentage of each variables of respondents' attitude toward malaria.

For attitude on transmission malaria, majority of the respondents (75.3%) agree that if someone got malaria, they should avoid close contact with that person while 24.6% were not agree. Three quarter of the respondents (75.7%) agreed that malaria can transmit form one person to another like a common cold but the rest (23.3%) were disagree. Most of the respondents (96.2%) agree the fact that sleeping inside the mosquito nets at night can prevent malaria and only 2.7% were disagree with the fact. More than half of the respondents (56.2%) disagree that malaria can be re-infected while 42.2% of them thought that malaria cannot be re-infected.

For attitude on susceptibility and severity of malaria, 99.3% of the respondents agree that people who stay in the forest overnight are more susceptible to malaria. A large proportion of the respondents (91.7%) agree that malaria can be prevented even if one is living in malaria endemic area while 7.9% were disagree with them. Majority of the respondents (89.7%) agree the statement that children and pregnant women can get malaria infection more easily and 8.7% were not agree. Almost all of the respondents (97.1%) agree that malaria is serious and life threating disease while 2.1% of them disagree.

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For attitude on prevention of malaria, 81.0% of the respondents agree on wearing long sleeves and pants can protect them from biting of mosquito while 18.3% disagree. Most of the respondents (93.8%) agree on the fact that spraying insecticide take mosquito away even their home is dirty. On the fact of burning mosquito coil will drive away mosquito, 92.1% of the respondents agree and 7.1% were disagree. Almost all of the respondents (95.0%) agree that the best way to prevent malaria is to avoid mosquito bite and only 1.7% were not agree on that fact.

Table 8 Frequency and percentage of attitude on transmission of malaria (n=420)

Variables	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
Attitude on transmission of malaria					
If someone got malaria, people should avoid close contact with that person*	159(37.9)	157(37.4)	1(0.2)	49(11.7)	54(12.9)
Malaria can transmit from one person to another like a common cold*	179(42.6)	139(33.1)	4(1.0)	59(14.0)	39(9.3)
Sleeping inside the mosquito nets at night can prevent malaria	283(67.4)	121(28.8)	5(1.2)	4(1.0)	7(1.7)
In my opinion, once people get malaria, it cannot be re-infected*	94(22.4)	83(19.8)	7(1.7)	94(22.4)	142(33.8)
Attitude on susceptibility and severity of malaria					
People who stay in the forest overnight are more susceptible to malaria	194(70.0)	123(29.3)	0(0.0)	2(0.5)	1(0.2)
Malaria can be prevented even if one is living in malaria endemic area	180(42.9)	205(48.8)	2(0.5)	21(5.0)	18(2.9)
Children and pregnant women can get malaria infection more easily	254(60.5)	122(29.2)	9(2.1)	31(7.4)	4(1.0)
Malaria is serious and life threating disease	352(83.8)	56(13.3)	3(0.70)	9(2.1)	0(0.0)

*****Negative statements

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Table 8 (Continue) Frequency and percentage of attitude on transmission of malaria (n=420)

Variables	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
Attitude on prevention of malaria					
Wearing long sleeve and pants can protect from biting of mosquito*	194(46.2)	146(34.8)	3(0.7)	64(15.2)	13(3.1)
Spraying insecticide take mosquito away even my home is dirty	178(42.4)	216(51.4)	9(2.1)	14(3.3)	3(0.7)
Burning mosquito coil will drive away mosquito	181(43.1)	206(49.0)	3(0.7)	27(6.4)	3(0.7)
The best way to prevent malaria is to avoid mosquito bite	284(67.6)	115(27.4)	14(3.3)	2(0.5)	5(1.2)

*Negative statements

Table 9 shows the summary of the attitude level on malaria with frequency and percentage with 3 levels using mean score for cutoff point and standard deviation. Among 3 levels of attitude on malaria, most of the respondents (61.0%) had moderate attitude level, 20.0% had poor attitude level and 19.0% had good attitude level. The mean score of the attitude was 33.4 with SD of 4.7 and range of 22-47 scores.

Table 9 Frequency and percentage attitude level on malaria (n=420)

Attitude level on malaria	Frequency	Percentage
Poor Attitude	84	20.0
Moderate Attitude	256	61.0
Good Attitude	80	19.0
Mean = 33.4 SD = 4.7 Range = 22-47		

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4.4 Cultural Factors of Respondents

Cultural factors were divided into traditional beliefs about malaria and traditional lifestyle which were showing in Table 10. As shown in table 10, most of the respondents (>85.0%) did not agree that malaria is caused by punishment of supernatural existence from ancestry, bad karma in previous lives or prevented by worshiping to the previous ancestry or supernatural god but less than 10.0% of the respondents still agree on that statements. Also most of the respondents (>85.0%) were disagree that malaria can be easily cured by taking herbs and traditional plants or only can be cured by spiritual healer while about 11.0% still agree on the facts. For traditional life style, 91.9% of the respondents got up early in the morning and 78.8% of the respondents never worked from dawn to the night times. Among the 89 respondents (78.7%) who worked from dawn to night times, most of them wear long sleeve shirts and pants during work but 21.3% of them did not.

Table 10 Frequency and percentage of cultural factors (n=420)

Variables	Agree/ Always	Neutral/ Sometime	Disagree/ Never
	n (%)	n (%)	n (%)
Traditional Belief about malaria			
Malaria is caused by the punishment of supernatural existence from ancestry.	45(10.7)	12(2.9)	363(86.4)
Children are most affected by cerebral malaria and die because they have bad Karma in previous lives.	35(8.3)	15(3.6)	370(88.1)
Malaria can be prevented by worshiping to the previous ancestry or supernatural god.	42(10.0)	16(3.8)	362(86.2)
Malaria can be easily cured by taking herbs and traditional plants	46(11.0)	6(1.4)	368(87.6)
Malaria can be cured only by spiritual healer.	48(11.4)	9(2.1)	363(86.4)

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Table 10 (Continue) Frequency and percentage of cultural factors (n=420)

Variables	Always	Sometime	Never
	n (%)	n (%)	n (%)
Traditional lifestyle			
Do you usually get up early in the morning (dawn)?	386(91.9)	0(0.0)	34(8.1)
Do you usually work from dawn to the night times?	89(21.2)	0(0.0)	331 (78.8)
How often do you wear long sleeves shirts and pants when you work from dawn to the night times? (n=89)	62(69.7)	8(9.0)	19(21.3)

4.5 Practice toward Utilization of Insecticide Treated Nets

The ownership of insecticide treated nets and the detail number and percentage of insecticide treated nets in households were described in Table 11. Almost all of the households (96.7%) owned insecticide treated nets and only 3.3% of them did not had one. By looking at the number of nets in household, 79.0% owned 3-5 nets, 17.6% owned more than 4 nets and only 3.3% of them did not had one. The average number of insecticide treated nets in each household was 2.6 with the standard deviation of 1.3 and the range of 0-7 nets.

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Table 11 Frequency and percentage of 420 respondents who have insecticide treated nets in their household

Statement	Yes	No
	n (%)	**n (%)**
Ownership of insecticide treated nets in household	406(96.7)	14(3.3)
	Frequency	**Percentage**
Number of insecticide treated nets in household		
Do not have	14	3.3
1-3	332	79.0
> 4	74	17.6
Mean = 2.6 SD = 1.3 Range = 0-7		

Table 12 described detailed frequency and percentage of practice regarding utilization of insecticide treated nets of 406 participants who owned insecticide treated nets. Only more than half (57.1%) of the respondents always sleep under mosquito net at night, 38.4% of them slept under nets sometime at night and 4.4% never slept under mosquito net at all. Nearly half (50.5%) of the respondents answered that they never use mosquito net when they sleep in the forest or field. Nearly half of the respondents never checked for the holes or immediately repaired mosquito net once they found the holes (43.3% and 50.5% respectively). Thirty-seven percent of the respondents gave the answers that all the family members were always sleep under mosquito net. Majority of the respondents (70.0%) said that they never used mosquito repellent coil or spray instead of mosquito net.

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Table 12 Frequency and percentage of practice regarding utilization of insecticide treated nets of 406 respondents who owned insecticide treated nets in household

Variables	Always	Sometime	Never
	n (%)	n (%)	n (%)
How often do you sleep under mosquito net at night?	232(57.1)	156(38.4)	18(4.4)
How often do you sleep under mosquito net when you sleep in the forest or field?	41(10.0)	160(39.4)	205(50.5)
How often do you check for the holes in your mosquito net?	57(14.0)	173(42.6)	176(43.3)
How often do you immediately repair mosquito net once you find out of hole?	50(12.3)	151(37.2)	205(50.5)
How often do all the members in your household sleep under mosquito net?	152(37.4)	200(49.3)	54(13.3)
How often do you use mosquito repellent coil or spray instead of mosquito net? *	7(1.7)	115(28.3)	282(70.0)

*Negative statement

Table 13 showed the reasons of 14 participants who were not using insecticide treated nets along with the frequency and percentage. Only 0.5% of the respondents stated that they did not know about the insecticide treated nets and majority of them did not use the nets because of other reasons. Regarding other reasons for not using ITNs, most of the participants gave the reason of they were not in their village at the time of distribution of ITNs and they lost or broke the nets.

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Table 13 Frequency and percentage of reasons for not using insecticide treated nets of 14 respondents who did not had insecticide treated nets in household

Variables	Frequency	Percentage
reasons for not using insecticide treated nets		
Do not know about insecticide treated net	2	14.3
Cannot afford to buy	0	0.0
Do not like to use because of any reason	0	0.0
Believe it has no effect on health	0	0.0
Other	12	85.7

The practice level of utilization of insecticide treated nets were classified into 2 levels of good practice and poor practice which were shown in Table 14. By observing the Table 14, the mean score of the practice was 6.2 with SD of 2.5 and the range of 0-12 scores. Majority of the participants (61.2%) had a poor practice and 38.8% of them had a good practice level of utilization of insecticide treated nets.

Table 14 Frequency and percentage of practice level of utilization of insecticide treated nets (n=420)

Practice level of utilization of insecticide treated nets	Frequency	Percentage
Poor practice	257	61.2
Good practice	163	38.8
Mean = 6.2 SD = 2.5 Range = 0-12		

4.6 Association between General Characteristic and Knowledge Level of Malaria

The analysis on the association between general characteristics and knowledge level of malaria was performed by using chi-square test as shown in Table 15. The general characteristics significantly associated with knowledge level of malaria were age, education, occupation, average income per month and marital status of the respondents with p-value <0.001. In oppose to that, there were no associations between gender, family members and knowledge level of malaria with p-value 0.994 and 0.277 respectively.

For the age group, the group of aged more than 65 years (92.1%) had poor knowledge level compared to other groups. The second age group that had poor knowledge level was 25-44 years with 80.1%. The portion of poor and moderate knowledge level between age groups of 18-24 and 45-64 years were not very different.

For the education, good and moderate knowledge level only present in education level of high school (15.0%) and collage/university (33.3%). The majority of the participants with the illiterate or no formal education and primary school level had

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poor knowledge level with percentage of 89.7% and 89.0% respectively. For the middle school level, more than half (54.9%) had a poor knowledge level.

For the occupation, the majority participants (87.1%) who had a job related with forest were seen in poor knowledge level. The big proportion (68.8%) of dependent participants were in poor knowledge level. Among all the respondents, those who earned 0-100,000 kyats (85.9%) had poor knowledge level compared to two other groups of 100,001-200,000 kyats and 200,001/more with percentage of 76.3% and 62.7% respectively.

Regarding the marital status, poor knowledge level participants were more likely to present in widowed participants with 84.8%. In addition, majority of married participants (78.2%) were also in poor practice level.

Table 15 Association between general characteristics and knowledge level of malaria (n=420)

Variables	Total (n=420)	Knowledge level (n%)			P-value
		Poor	Moderate	Good	
Age group (years)					
18-24	27	15(55.6)	12(44.4)	0(0.0)	<0.001*
25-44	211	169(80.1)	32(15.2)	10(4.7)	
45-64	144	86(59.7)	53(36.8)	5(3.5)	
>65	38	35(92.1)	3(7.9)	0(0.0)	
Gender					
Male	111	81(73.0)	26(23.4)	4(3.6)	0.994
Female	309	224(72.5)	74(23.9)	11(3.6)	

*Significant by chi-square Test

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Table 15 (Continue) Association between general characteristics and knowledge level of malaria (n=420)

Variables	Total (n=420)	Knowledge level (n%)			P-value
		Poor	Moderate	Good	
Education					
Illiterate or no formal education	116	104(89.7)	12(10.3)	0(0.0)	<0.001*
Primary school level	155	138(89.0)	17(11.0)	0(0.0)	
Middle school level	71	39(54.9)	32(45.1)	0(0.0)	
High school level	60	21(35.0)	30(50.0)	9(15.0)	
Collage/University level	18	3(16.7)	9(50.0)	6(33.3)	
Occupation					
Agriculture	114	102(89.5)	12(10.5)	0(0.0)	<0.001*
Forest worker	47	38(80.9)	9(19.1)	0(0.0)	
Bamboo/ rattan cutting	10	9(90.0)	1(10.0)	0(0.0)	
Government employee	23	2(8.7)	9(39.1)	12(52.2)	
Dependent	215	148(68.8)	64(29.8)	3(1.4)	
Others	11	6(54.5)	5(45.5)	0(0.0)	
Types of occupation					
Related with forest	171	149(87.1)	22(12.9)	0(0.0)	<0.001*
Not related with forest	23	2(8.7)	9(39.1)	12(52.2)	
Dependent	215	148(68.8)	64(29.8)	3(1.4)	
Others	11	6(54.5)	5(45.5)	0(0.0)	
Family members					
1 - 3	117	86(73.5)	27(23.1)	4(3.4)	0.277
4 - 5	219	151(68.9)	58(26.5)	10(4.6)	
≥ 6	84	68(81.0)	15(17.9)	1(1.2)	

*Significant by chi-square Test

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Table 15 (Continue) Association between general characteristics and knowledge level of malaria (n=420)

Variables	Total (n=420)	Knowledge level (n%)			P-value
		Poor	Moderate	Good	
Average income per month					
0 - 100,000	78	67(85.9)	11(14.1)	0(0.0)	<0.001*
100,001 - 200,000	173	132(76.3)	38(22.0)	3(1.7)	
200,001 or more	169	106(62.7)	51(30.2)	12(7.1)	
Marital Status					
Single	56	18(32.1)	38(67.9)	0(0.0)	<0.001*
Married	331	259(78.2)	57(17.2)	15(4.5)	
Widowed	33	28(84.8)	5(15.2)	0(0.0)	

*Significant by chi-square Test

4.7 Association between General Characteristic and Attitude Level toward Utilization of Insecticide Treated Nets

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Table 16 showed association between general characteristics and attitude level of malaria. There was significant association between occupation, marital status and attitude level of malaria with p-value <0.001 with chi-square test. Also there was statically associated between gender and attitude level of malaria with p-value 0.005. There was no association between age group, family members, average income per month and attitude level of malaria.

For the gender, a proper attitude level was seen in male participants (90.2%) than female participants (76.4%). Regarding education of the participants, good attitude level of attitude on malaria was occupied by high school level and collage/university level with 51.7% and 55.6% respectively. A proper attitude level could also see in primary school level (82.6%) and middle school level (74.6%).

For the occupation of participants, the highest percentage of proper attitude level can observe in others occupation group (99.1%) followed by participants who had a job not related to forest (95.7%) and job related to forest (85.4%). By looking at marital status, the highest attitude level was occupied by single participants (84.0%) and second and third were married participants (81.3%) and widowed participants (60.5%) respectively.

Table 16 Association between general characteristics and Attitude level of malaria (n=420)

Variables	Total (n=420)	Attitude level (n%)			P-value
		Poor	Moderate	Good	
Age group (years)					
18-24	27	6(22.2)	13(48.1)	8(29.6)	0.072
25-44	211	37(17.5)	133(63.0)	41(19.4)	
45-64	144	29(20.1)	85(59.0)	30(20.8)	
>65	38	12(31.6)	25(65.8)	1(2.6)	
Gender					
Male	111	11(9.9)	78(70.3)	22(19.8)	0.005*
Female	309	73(23.6)	178(57.6)	58(18.8)	
Education					
Illiterate or no formal education	116	34(29.3)	65(56.0)	17(14.7)	<0.001*
Primary school level	155	27(17.4)	121(78.1)	7(4.5)	
Middle school level	71	18(25.4)	38(53.5)	15(21.1)	
High school level	60	2(3.3)	27(45.0)	31(51.7)	
Collage/University level	18	3(16.7)	5(27.8)	10(55.6)	

*Significant by chi-square Test

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Table 16 (Continue) Association between general characteristics and Attitude level of malaria (n=420)

Variables	Total (n=420)	Attitude level (n%)			P-value
		Poor	Moderate	Good	
Occupation					
Agriculture	114	20(17.5)	76(66.7)	18(15.8)	<0.001*
Forest worker	47	1(2.1)	37(78.7)	9(19.1)	
Bamboo/ rattan cutting	10	4(40.0)	4(40.0)	2(20.0)	
Government employee	23	1(4.3)	8(34.8)	14(60.9)	
Dependent	215	57(26.5)	122(56.7)	36(16.7)	
Others	11	1(9.1)	9(81.8)	1(9.1)	
Types of occupation					
Related with forest	171	25(14.6)	117(68.4)	29(17.0)	<0.001*
Not related with forest	23	1(4.3)	8(34.8)	14(60.9)	
Dependent	215	57(26.5)	122(56.7)	36(16.7)	
Others	11	1(9.1)	9(81.8)	1(9.1)	
Family members					
1 - 3	117	22(18.8)	77(65.8)	18(15.4)	0.367
4 - 5	219	46(21.0)	124(56.6)	49(22.4)	
≥ 6	84	16(19.0)	55(65.5)	13(15.5)	

*Significant by chi-square Test

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Table 16 (Continue) Association between general characteristics and Attitude level of malaria (n=420)

Variables	Total (n=420)	Attitude level (n%)			P-value
		Poor	Moderate	Good	
Average income per month					
0 - 100,000	78	16(20.5)	54(62.2)	8(10.3)	0.203
100,001 - 200,000	173	38(22.0)	100(57.8)	35(20.2)	
200,001 or more	169	30(17.8)	102(60.4)	37(21.9)	
Marital Status					
Single	56	9(16.1)	24(42.9)	23(41.1)	<0.001*
Married	331	62(18.7)	214(64.7)	55(16.6)	
Widowed	33	13(39.4)	18(54.5)	2(6.1)	

*Significant by chi-square Test

4.8 Association between General Characteristic and Practice Level toward Utilization of Insecticide Treated Nets

The association between general characteristic and practice level toward utilization of insecticide treated nets was shown in Table 17. After analysis, there was a significant association between gender, education, occupation, average income per month and practice toward utilization of insecticide treated nets with p-value <0.001 using chi-square. In addition, there was an association between age group, marital status and practice level toward utilization of insecticide treated nets with p-value of 0.017 and 0.032 respectively.

For gender of participants, most of the male participants (80.2%) had poor practice level and only more than half of female respondents (54.4%) had poor practice level. The proportion of good practice was highest in collage/university and high school level with 83.3% and 76.7% respectively. A poor practice level was found in

participants with illiterate or no formal education (78.4%) and primary school level (70.3%).

Regarding the occupation, most of participants in the group of job not related with forest (87.0%) had good practice level but only 40.5%, 31.6% and 18.2% had good practice in participants inside the group of dependent, job related to forest and others respectively.

For average income per month, practice level was lowest among participants who earned between 100,001 to 200,000 kyats (71.1%). The highest practice level was the group of participants with income of more than 200,001 kyats (50.3%). For marital status, most of widowed participants (81.8%) tend to have poor practice level than other marital status.

Table 17 Association between general characteristics and practice level regarding utilization of insecticide treated nets (n=420)

Variables	Total (n=420)	Practice level n(%)		P-value
		Poor	Good	
Age group (years)				
18-24	27	16(59.3)	11(40.7)	0.017*
25-44	211	120(56.9)	91(43.1)	
45-64	144	89(61.8)	55(38.2)	
>65	38	32(84.2)	6(15.8)	
Gender				
Male	111	89(80.2)	22(19.8)	<0.001*
Female	309	168(54.4)	141(45.6)	

*Significant by chi-square Test

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Table 17 (Continue) Association between general characteristics and practice level regarding utilization of insecticide treated nets (n=420)

Variables	Total (n=420)	Practice level n(%)		P-value
		Poor	Good	
Education				
Illiterate or no formal education	116	91(78.4)	25(21.6)	<0.001*
Primary school level	155	109(70.3)	46(29.7)	
Middle school level	71	40(56.3)	31(43.7)	
High school level	60	14(23.3)	46(76.7)	
Collage/University level	18	3(16.7)	15(83.3)	
Occupation				
Agriculture	114	78(68.4)	36(31.6)	<0.001*
Forest worker	47	31(66.0)	16(34.0)	
Bamboo/ rattan cutting	10	8(80.0)	2(20.0)	
Government employee	23	3(13.0)	20(87.0)	
Dependent	215	128(59.5)	87(40.5)	
Others	11	9(81.8)	2(18.2)	
Types of occupation				
Related with forest	171	117(68.4)	54(31.6)	<0.001*
Not related with forest	23	3(13.0)	20(87.0)	
Dependent	215	128(59.5)	87(40.5)	
Others	11	9(81.8)	2(18.2)	
Family members				
1 - 3	117	68(58.1)	49(41.9)	0.284
4 - 5	219	127(58.0)	92(42.0)	
≥ 6	84	62(73.8)	22(26.2)	

*Significant by chi-square Test

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Table 17 (Continue) Association between general characteristics and practice level regarding utilization of insecticide treated nets (n=420)

Variables	Total (n=420)	Practice level n(%)		P-value
		Poor	Good	
Average income per month				
0 - 100,000	78	50(64.1)	28(35.9)	<0.001*
100,001 - 200,000	173	123(71.1)	50(28.9)	
200,001 or more	169	84(49.7)	85(50.3)	
Marital Status				
Single	56	31(55.4)	25(44.6)	0.032*
Married	331	199(60.1)	132(39.9)	
Widowed	33	27(81.8)	6(18.2)	

*Significant by chi-square Test

4.9 Association between Cultural Factors of Respondents and Practice Level toward Utilization of Insecticide Treated Nets

Table 18 showed association between cultural factor and practice level toward utilization of insecticide treated nets. There was a statically association between working from dawn to night times and practice level toward utilization of insecticide treated nets with p-value of <0.001 using chi-square test. But there was no association between traditional beliefs and practice level toward utilization of insecticide treated nets. Most of the participants who always work from dawn to night times (78.7%) had a lower practice level than who never work during that time (56.5%).

Table 18 Association between cultural factor and practice level toward utilization of insecticide treated nets (n=420)

Traditional Belief about malaria	Total (n=420)	Practice level (n%)		P-value
		Poor	Good	
Malaria is caused by the punishment of supernatural existence from ancestry.				
Disagree	363	221(60.9)	142(39.1)	0.911
Neutral	12	8(66.7)	4(33.3)	
Agree	45	28(62.2)	17(37.8)	
Children are most affected by cerebral malaria and die because they have bad Karma in previous lives.				
Disagree	370	227(61.4)	143(38.6)	0.441
Neutral	15	11(73.3)	4(26.7)	
Agree	35	19(54.3)	16(45.7)	
Malaria can be prevented by worshiping to the previous ancestry or supernatural god.				
Disagree	362	220(60.8)	142(39.2)	0.506
Neutral	16	12(75.0)	4(25.0)	
Agree	42	25(59.5)	17(40.5)	
Malaria can be easily cured by taking herbs and traditional plants				
Disagree	368	218(59.2)	150(40.8)	0.184
Neutral	6	4(66.7)	2(33.3)	
Agree	46	35(76.1)	11(23.9)	

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Table 18 (Continue) Association between cultural factor and practice level toward utilization of insecticide treated nets (n=420)

Traditional Belief about malaria	Total (n=420)	Practice level (n%)		P-value
		Poor	Good	
Malaria can be cured only by spiritual healer.				
Disagree	363	218(60.1)	145(39.9)	0.189
Neutral	9	8(88.9)	1(11.1)	
Agree	48	31(64.6)	17(35.4)	
Practice of daily activity	**Total (n=420)**	**Practice level (n%)**		**P-value**
		Poor	**Good**	
Do you usually get up early in the morning (dawn)?				
Never	34	16(47.1)	18(52.9)	0.278
Sometime	0	0(0.0)	0(0.0)	
Always	386	241(62.4)	145(37.6)	
Do you usually work from dawn to the night times?				
Never	331	187(56.5)	144(43.5)	<0.001*
Sometime	0	0(0.0)	0(0.0)	
Always	89	70(78.7)	19(21.3)	
How often do you wear long sleeves shirts and pants when you work from dawn to the night times? (n=89)				
Never	19	11(57.9)	8(42.1)	0.413
Sometime	8	8(100.0)	0(0.0)	
Always	62	51(82.3)	11(17.7)	

*Significant by Fisher's Exact test

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4.10 Association between Knowledge Level and Attitude Level of Malaria

By observing Table 19, there was a significantly association between knowledge level and attitude level on malaria with p-value of <0.001 using chi-square test. All the participants (100.0%) with good knowledge level were also had good attitude level. Most of the participants with poor knowledge level were seen in poor and moderate attitude level (88.2%) and half of the participants with moderate knowledge level were seen in moderate attitude level (51.0%).

Table 19 Association between Knowledge level and Attitude level of malaria (n=420)

Knowledge level	Total (n=420)	Attitude level (n%)			P-value
		Poor	Moderate	Good	
Poor	305	64(21.0)	205(67.2)	36(11.8)	<0.001*
Moderate	100	20(20.0)	51(51.0)	29(29.0)	
Good	15	0(0.0)	0(0.0)	15(100.0)	

*Significant by chi-square Test

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4.11 Association between Knowledge Level and Practice Level Regarding Utilization of Insecticide Treated Nets

Table 20 showed the association between knowledge level and practice level regarding utilization of insecticide treated nets. There was a significant association between knowledge level and practice level with p-value of <0.001 using chi-square test. All of the respondents with good knowledge level (100.0%) had good practice level. Most of the participants who had moderate knowledge level (61.0%) were in good practice level. Only 28.5% of participants who had poor knowledge level had a good practice level.

Table 20 Association between Knowledge level and practice level regarding utilization of insecticide treated nets (n=420)

Knowledge level	Total (n=420)	Practice level (n%)		P-value
		Poor	Good	
Poor	305	218(71.5)	87(28.5)	<0.001*
Moderate	100	39(39.0)	61(61.0)	
Good	15	0(0.0)	15(100.0)	

*Significant by chi-square Test

4.12 Association between Attitude Level and Practice Level Regarding Utilization of Insecticide Treated Nets

Regarding the association between attitude level and practice level regarding utilization of insecticide treated nets, there was a significant association with p-value of <0.001 by chi-square test (Table 21). Most of the poor practice level were seen in participants with poor attitude level (65.5%) and moderated attitude level (68.4%). Respondents with good attitude level (66.3%) had good practice level compared to other participants.

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Table 21 Association between attitude level and practice level regarding utilization of insecticide treated nets (n=420)

Attitude level	Total (n=420)	Practice level (n%)		P-value
		Poor	Good	
Poor	84	55(65.5)	29(34.5)	<0.001*
Moderate	256	175(68.4)	81(31.6)	
Good	80	27(33.8)	53(66.3)	

*Significant by chi-square Test

4.13 Association (using multivariate model) between General Characteristic, Knowledge Level, Attitude Level, Cultural Factors of Respondents and Practice Level toward Utilization of Insecticide Treated Nets

The association (multivariate model) between general characteristic, knowledge level, attitude level, cultural factors and practice level toward utilization of insecticide treated nets was described in Table 22. For the multivariable model, variables which were associated with practice level as well as variables with p-value less than 0.2 with chi-square test were include in the model using binary logistic regression test. The analysis showed that there were association between genders, education, marital status, work from dawn to night time, knowledge level and practice level toward utilization of insecticide treated nets. There was no statically association between age group, type of occupation, average income per month, malaria can be easily cured by taking traditional plants, malaria can be cured by spiritual healer and attitude level with practice level.

Regarding gender of the participants, male participants were the reference group for the comparison with female group. From comparison, female participants were 8.015 times had good practice level than male participants (p-value <0.001, adjusted OR 8.015, 95% CI). For the education, the reference group was illiterate or no formal education. The participants with middle school level tend to had 2.717 times good practice than reference group (p-value 0.024, adjusted OR 2.717, 95% CI). As the education level increased to high school level, the good practice level was increased to 14.518 times than lower education level (p-vale <0.001, adjusted OR 14.518, 95% CI).

For marital status of the participants, single participants were considered as a reference group. The comparison showed married participants were 13.753 times done good practice (p-vale <0.001, adjusted OR 13.753, 95% CI) and widowed participants were 5.403 times done good practice than reference group (p-vale 0.039, adjusted OR 5.403, 95% CI).

For working from dawn to night time, the reference group was the participants who never worked from dawn to night time. The participants who always worked from

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dawn to night time were 2.203 times tend to have good practice level than who never work at that time (p-vale 0.032, adjusted OR 2.203, 95% CI).

Regarding knowledge level, participants with poor knowledge level were used as a reference group. From the model, participants who had moderate and good knowledge level were 5.125 times had good practice level (p-vale <0.001, adjusted OR 5.125, 95% CI) than lower knowledge level participants.

Table 22 the association (multivariate model) between general characteristic, knowledge level, attitude level, cultural factors and practice level toward utilization of insecticide treated nets

Variables	Poor practice	Good practice	Adjusted OR	95% CI		P-value
				Lower	Upper	
Age group (years)						
18-24 **	16(59.3)	11(40.7)	1			
25-44	120(56.9)	91(43.1)	0.848	0.277	2.599	0.773
45-64	89(61.8)	55(38.2)	0.395	0.128	1.219	0.106
>65	32(84.2)	6(15.8)	0.456	0.097	2.138	0.319
Gender						
Male **	89(80.2)	22(19.8)	1			
Female	168(54.4)	141(45.6)	8.015	3.395	18.923	<0.001*
Education						
Illiterate or no formal education **	91(78.4)	25(21.6)	1			
Primary school level	109(70.3)	46(29.7)	1.211	0.608	2.410	0.586
Middle school level	40(56.3)	31(43.7)	2.717	1.140	6.474	0.024*
High school level	14(23.3)	46(76.7)	14.518	4.642	45.408	<0.001*
Collage/University level	3(16.7)	15(83.3)	3.424	0.571	20.533	0.178

* Statistical significance at P-value <0.05 ** Reference group

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Table 22 (Continue) The association (multivariate model) between general characteristic, knowledge level, attitude level, cultural factors and practice level toward utilization of insecticide treated nets

Variables	Poor practice	Good practice	Adjusted OR	95% CI		P-value
				Lower	Upper	
Types of occupation						
Related with forest **	117(68.4)	54(31.6)	1			
Not related with forest	3(13.0)	20(87.0)	1.921	0.339	10.871	0.461
Dependent	128(59.5)	87(40.5)	0.613	0.331	1.137	0.121
Others	9(81.8)	2(18.2)	0.180	0.030	1.077	0.060
Average income per month						
0 - 100,000 **	50(64.1)	28(35.9)	1			
100,001 - 200,000	123(71.1)	50(28.9)	0.538	0.264	1.097	0.088
200,001 or more	84(49.7)	85(50.3)	1.682	0.833	3.395	0.147
Marital Status						
Single **	31(55.4)	25(44.6)	1			
Married	199(60.1)	132(39.9)	13.753	4.371	43.267	<0.001*
Widowed	27(81.8)	6(18.2)	5.403	1.085	26.909	0.039*
Work from dawn to night time						
Never **	187(56.5)	144(43.5)	1			
Always	70(78.7)	19(21.3)	2.203	1.070	4.536	0.032*

* Statistical significance at P-value ** Reference group

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Table 22 (Continue) The association (multivariate model) between general characteristic, knowledge level, attitude level, cultural factors and practice level toward utilization of insecticide treated nets

Variables	Poor practice	Good practice	Adjusted OR	95% CI		P-value
				Lower	Upper	
Malaria can be easily cured by taking herbs and traditional plants						
Disagree + Neutral **	222(59.3)	152(40.7)	1			
Agree	35(76.1)	11(23.9)	0.822	0.534	1.268	0.376
Malaria can be cured only by spiritual healer						
Disagree + Neutral **	226(60.8)	146(39.2)	1			
Agree	31(64.6)	17(35.4)	1.360	0.871	2.123	0.176
Knowledge level						
Poor **	218(71.5)	87(28.5)	1			
Moderate + Good	39(33.9)	61(66.1)	5.125	2.379	11.041	<0.001*
Attitude level						
Poor **	55(65.5)	29(34.5)	1			
Moderate	175(68.4)	81(31.6)	0.855	0.448	1.630	0.634
Good	27(33.8)	53(66.3)	2.613	1.062	6.429	0.086

* Statistical significance at P-value ** Reference group

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CHAPTER V

DISCUSSION

In this chapter, discussion, limitations, conclusion and recommendations of researched finding will be presented. This cross-sectional study was conducted among the Rakhine ethnic group of Ann Township, Rakhine state, Myanmar. Total of 420 respondents were selected from 10 villages. The purpose of this study was focused on determining utilization of insecticide treated nets and factors related to practice toward utilization of insecticide treated nets as general characteristics of the ethnic groups, knowledge of malaria, attitude on malaria and cultural factors of the participants. According to the result of the analysis and study, the discussion was made according to the hypothesis of the study.

The general objective of this study is to determine knowledge, attitude and cultural factors toward utilization of Insecticide Treated Nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar. The specific objectives of this study include the following:

- To describe the demographic characteristics of Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- To assess and determine knowledge level, various attitude and extent of practice regarding malaria toward utilization of Insecticide Treated Nets (ITNs) among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar
- To describe the cultural beliefs on malaria of ethnic groups, in Ann Township, Rakhine State, Myanmar
- To determine association between utilization of Insecticide Treated Nets (ITNs) with demographic characteristics, level of knowledge, attitude and cultural beliefs of Rakhine ethnic group in Ann Township, Rakhine State, Myanmar

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5.1 Discussion

5.1.1 General Characteristic

The general characteristics of respondents in this study contained age groups, gender, education, occupation, family members, average family income per month and marital status. For the age group of respondents, there was significant association with practice level on utilization of ITNs with p-value of 0.017. The study found that the older the age of the respondents, the lower the practice level on utilization of ITNs. In the research of factors affecting use of ITNs in Kenya pointed out that the age of the household leaders decreased the use of ITNs compared to younger groups (p-value <0.001)(37). The gender of the participants had association with practice level with p-value of <0.001. By adding gender in multivariate model, female participants were 8.015 times had good practice level on utilization of insecticide treated nets than male participants (p-value <0.001, adjusted OR 8.015, 95% CI). In a study of gender differences in the use of insecticide-treated nets n Kano State, Nigeria also showed that females were more likely to use ITNs compared to males (p-value <0.001, crude OR 1.46, 95% CI)(38).

The education level of the participant had a significant association with practice level on utilization of ITNs with p-value of <0.001. In multivariate model, the higher the education level of the household leaders, the higher the practice level on utilization of insecticide treated nets. In the study of utilization of insecticide treated nets in Arbaminch Town and the malarious villages of Arbaminch Zuria District, Southern Ethiopia also found that an increase in the educational level of head of household increased the odds utilization of ITNs (p-value 0.016, OR 1.31, 95% CI)(39).

For the occupation, it was significantly associated with practice level on utilization of ITNs (p-value <0.001). The result of the study in in China showed that the participants who had a job related to forest had lower practice level than others types of occupations. The study showed that occupation as farming contributed to more cases of malaria by 66% (40). The average income of the participants also had significant association with practice level with p-value <0.001. The results was supported by the research done in Bahir Dar city, northwest Ethiopia about factors affecting utilization of insecticide treat net which had results of those who have better income were 1.8

times more likely utilize ITN than have less income (p-value <0.001, OR 1.829, 95% CI)(41).

The marital status of the participants had significant association with practice level (p-value 0.032) on utilization of ITNs. After added to multivariate model, the result showed that married participants were more likely to use ITNs for prevention of malaria than others. This result was opposed to the result of the study done in Huong Hoa District, Quang Tri Province, Vietnam which found that people who were married were having good preventive behavior than those who were single (42).

5.1.2 Cultural Factors of Participants

According to the results of the study, most of the respondents (>85%) did not believe about the traditional taboos of malaria but there were less than 10% who were still believing in such taboos. However, the study of social and cultural aspects of malaria in central Cote d'lvoire state that the traditional healers were still influence on the treatment of malaria and prevention was also influenced by the God (35). This study's results were significant different with our study. This might be due to many factors like cultural factors, socioeconomic status between two different countries.

In traditional lifestyle, 91.9% of the participants getting up early in the morning and among 420 participants, 88 of them (78.8%) always work from dawn to night time. There was a significant association between working from dawn to night time and practice of utilization of ITNs with p-value (<0.001). By adding to multivariate model, the participants who worked from dawn to night time were 2.203 times better practice level toward utilization of ITNs. This finding was similar in the research of universal coverage and utilization of insecticide-treated bed nets in migrant plantation workers in Myanmar which find that the consistent utilization of ITNs was higher in workers who always worked at night for the plantation (p-value < 0.001) (25).

5.1.3 Knowledge on Malaria

Regarding the responses to knowledge questions, almost all of the respondents (96.6%) knew well that mosquito bite is the cause of malaria but misconceptions were still present with that messy environment and unhygienic were also the cause of malaria with percentage of 93.3% and 85.2% respectively. In addition, they answered that

drinking of stream water or dirty water, bath in stream and eating banana or other fruits or meat were also the cause of malaria with proportion of around 70%. For biting time of mosquito, 95.7% gave the correct answer of night time but more than half (55.5%) still answered the biting time was during day time.

For signs and symptoms of malaria, almost all of the respondents (98.6%) could verify that fever with chills and rigor was the main symptoms. For Knowledge on prevention, control and treatment of malaria, all respondents (100%) knew that always sleeping under bed net, sleep under insecticide treated bed net and sleep under long lasting insecticidal net can prevent malaria but three quarter of them still misconception for other preventive measures. Almost all of the respondents (98.3%) gave the correct answer that the main treatment of malaria is taking full course of anti-malarial drugs from health staff.

Among all the participants, there was a huge knowledge gap between good knowledge and poor knowledge level. Most of respondents had a poor knowledge level 72.6%, 23.8% for moderate level and only 3.6% had a good knowledge level. This might because of most of the people in Rakhine State were primary school level and very few high school or graduated people. Knowledge level of participants were significantly associated with attitude level and practice level on utilization of ITNs with p-value <0.001 for both. According to multivariate model, the moderate and good knowledge level had a good practice level for 5.125 times than poor knowledge level (p-vale <0.001, adjusted OR 5.125, 95% CI). This finding was similar with the result of the research done in Maji District, Bench Maji Zone, Southwest Ethiopia which showed that having higher level malaria knowledge increased the like hood of ITNs utilization by 10 times and moderate level malaria knowledge increased by 2 times than low knowledge level of malaria (43).

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5.1.4 Attitude on Malaria

For attitude level of malaria, majority of the participants had moderate attitude level (61.0%). The proportion of poor and good attitude level were similar with percentage around 20%. For attitude on transmission malaria, most of the respondents (75.3%) agree that if someone got malaria. Seventy-five percent of the respondents agree that malaria can transmit from one person to another like a common cold. This

might need more health education to change the attitude of the respondents because it could lead to wrong practices. Majority of the respondents (96.2%) agree that sleeping inside the mosquito nets at night can prevent malaria. More than half of the respondents (56.2%) disagree that malaria can be re-infected which also need more health education.

For attitude on susceptibility and severity of malaria, 99.3% of the respondents agree that people who stay in the forest overnight are more susceptible to malaria and 91.7% agree that malaria can be prevented even if one is living in malaria endemic area. For the statement of children and pregnant women can get malaria infection more easily, 89.7% of them agreed with it. Almost all of the respondents (97.1%) agree that malaria is serious and life threating disease. Regarding attitude on susceptibility and severity of malaria, the participants had good level of attitude.

For attitude on prevention of malaria, 81.0% of the respondents agree on wearing long sleeves and pants can protect them from biting of mosquito. Almost all of the respondents (93.8%) agreed on the fact that spraying insecticide take mosquito away even their home is dirty. On the fact of burning mosquito coil will drive away mosquito, 92.1% of the respondents agreed on that fact. Majority of them (95.0%) accepted that the best way to prevent malaria is to avoid mosquito bite. Regarding attitude on prevention of malaria, the respondents agreed on positive statements which was good for further interventions of prevention of malaria in that areas.

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There was a significant association between attitude level and practice level regarding utilization of insecticide treated nets with p-value of <0.001. Most of the good practice level participants were in the group of good attitude level (66.3%). Good practice level for poor and moderate level were nearly the same with around 30.0%. But in the study of knowledge, attitude and practice on insecticide treated nets in Magway division, Myanmar, which is the division adjacent to Rakhine State, showed there was no statistically significant association between respondents' attitude and practice (p-value 0.090). That finding became contradicted to my study (30).

5.1.5 Practice toward Utilization of Insecticide Treated Nets

For the ownership of insecticide treated nets, almost all of the households (96.7%) owned insecticide treated nets. This was because of VBDC of Myanmar,

NGOs and INGOs performed a mass distribution of ITNs for the prevention of malaria in the region for free of charges. Other 3.3% that did not own an ITN was because of they missed or not in the village at the time of distribution. Most of the households (96.7%) owned at least one ITN nets. Surprisingly, only more than half (57.1%) of the respondents always sleep under mosquito net at night and 38.4% of them slept under nets sometime at night. In addition, only 37.4% of the respondents gave the answers that all the family members were always sleep under mosquito net. Majority of the respondents (70.0%) said that they never used mosquito repellent coil or spray instead of mosquito net. Although they all received and owned at least one ITN in household, the utilization of ITNs were only seen in nearly half of the participants. The main reason of not using the nets was because of they could not sleep at night due to hot weather during the summer.

Nearly half (50.5%) of the respondents answered that they never use mosquito net when they sleep in the forest or field. The village health volunteers or health workers should encourage the locals to use ITNs when they go for work in the forest. Only 56.6% of the respondent checked for the holes in the mosquito nets and only 49.5% of them immediately repaired mosquito net once you find out of hole.

For the practice level of utilization of insecticide treated nets, majority of the participants (61.2%) had a poor practice and 38.8% of them had a good practice level of utilization of insecticide treated nets. The utilization of ITNs in this study is lower than other endemic area of Myanmar. In the study of household ownership of bed nets in areas with and without artemisinin resistance containment measures in Myanmar, the utilization of ITNs was 45.0% of household members (44). In another study of ownership and use of ITNs among people living in malaria endemic areas of eastern Myanmar, the utilization rate of ITNs is 62.4% of all the respondents (45).

5.2 Limitation

Because of this study was done on Rakhine ethnic group in rural area, the main challenge was language barriers and because of main interviewer involve in the interview, the answers of the participants might lead to interviewer bias. There will be some limitations and restrictions in this study as this study used a cross-sectional design

and moreover the study cannot find out respondents' knowledge level, attitude level and utilization of mosquito nets over time. In addition, the causes of low knowledge and practice level toward utilization could not determine in this study.

5.3 Conclusion

The main purpose of this study is to find the general characteristic, knowledge, attitude and cultural factors toward utilization of mosquito nets among Rakhine ethnic groups, in Ann Township. Apart from that this study tends to find out associations between demographic characteristic, knowledge, attitudes and cultural factors on malaria prevention toward utilization of insecticidal nets among Rakhine ethnic groups, in Ann Township, Rakhine State, Myanmar.

5.3.1 General Characteristic

For the age of the participants, half of them were 25-44 years with 50.2% and mean age of 43.1 with SD of 14.1 years. Our survey time was in the summer season and most of the man goes to the rice field or stay in the forest for work. So, we interviewed more female respondents (73.6% than male respondents. Most of the respondents were primary school level (36.9%) and the second was Illiterate or no formal education (27.6%). For the occupation, more than half of them were dependent (51.2%) and 40.7% of them work in the forest which was risky for malaria infection. Majority of the participants were married (78.8%) and had 4-5 family members (52.1%). The income of the participants was quite low with 41.2% of them earned 100,001-200,000 kyats and 40.2% of them earned 200,001 or more.

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5.3.2 Knowledge on Malaria

Regarding knowledge on vector and transmission of malaria, almost all of the respondents (97.6%) knew well that mosquito bite is the cause of malaria. However, majority of them were still confused with the cause of malaria. A very large proportion of the respondents still answered messy environment and unhygienic were also the cause of malaria with 93.3% and 85.2% respectively. Other common answers were drinking of stream water or dirty water, bath in stream and eating banana or other fruits or meat were also the cause of malaria with more than 70.0%. In the case of knowledge on biting time of malaria mosquito, 95.7% gave the correct answer of night time.

Almost of them (96.0%) could identify the resting place of malaria mosquito was forested area. However, 90.5% and 90.7% still confused with the wrong answers of bushes around the house and dark places in the house respectively. By looking at this data, the proper health education about malaria is needed from all of the organizations and from government health staffs in the region.

Almost all of the respondents (98.6%) could verify that fever with chills and rigor was the main symptoms. All respondents (100%) knew that always sleeping under bed net, sleep under insecticide treated bed net and sleep under long lasting insecticidal net can prevent malaria. Regarding the treatment of malaria, almost all of the respondents (98.3%) correctly answered that taking full course of anti-malarial drugs from health staff is the correct treatment of malaria. Overall, 72.0% of them had poor knowledge level, 23.8% were in moderate knowledge level and only 3.6% of them had a good knowledge level.

5.3.2 Attitude on Malaria

For the attitude level, most of the respondents (61.0%) had moderate attitude level, 20.0% had poor attitude level and 19.0% had good attitude level. The mean score of the attitude was 33.4 with SD of 4.7 and range of 22-47 scores.

5.3.4 Cultural Factors of Respondents

Most of the respondents (>85.0%) did not believe that malaria is caused by supernatural existence, bad karma or prevented by worshiping to the previous ancestry or supernatural god but few of them (<10.0%) still believed in such statements. For traditional life style, 91.9% of the respondents got up early in the morning and 21.2% always worked from dawn to the night times. Among those who always worked from dawn to the night times, most of them (78.7%) wear long sleeve shirts and pants during work which is good for protection from mosquito bite during night time.

5.3.5 Practice toward Utilization of Insecticide Treated Nets

Almost all of the households (96.7%) owned insecticide treated nets with average number of 2.6 with the standard deviation of 1.3 nets. Only more than half (57.1%) of the respondents always sleep under mosquito net at night which is not in the recommended rate. According to National malaria guild line, 100% of them should

sleep with ITNs especially in malaria endemic area. Overall, majority of the participants (61.2%) had a poor practice and 38.8% of them had a good practice level of utilization of insecticide treated nets.

5.3.6 Association between Knowledge Level, Attitude Level and Practice Level toward Utilization of Insecticide Treated Nets

To find out the association between each, chi-square teat was used. The general characteristics significantly associated with knowledge level of malaria were age (p-value <0.001), education (p-value <0.001), occupation (p-value <0.001), average income per month (p-value <0.001) and marital status of the respondents (p-value <0.001). For association between general characteristics and attitude level of malaria, there was association between gender (p-value 0.005), occupation (p-value <0.001), marital status (p-value <0.001) and attitude level of malaria. Regarding association between general characteristic and practice level toward utilization of insecticide treated nets, there was a significant association between gender (p-value <0.001), education (p-value <0.001), occupation (p-value <0.001), average income per month (p-value <0.001) and practice level toward utilization of ITNs. For the association between cultural factor and practice level toward utilization of insecticide treated nets, there was a statically association between working from dawn to night times and practice level nets with p-value of <0.001.

Knowledge level of the participants was significantly associated with attitude level on malaria and practice level on utilization of ITNs with p-value of <0.001. For the association between attitude level and practice level regarding utilization of insecticide treated nets, there was a significant association with p-value of <0.001.

The variables were further analyzed with multivariable model by adding variables which were associated with practice level as well as variables with p-value less than 0.2 with chi-square test. Regarding gender of the participants, female participants were 8.015 times had good practice level than male participants (p-value <0.001, adjusted OR 8.015, 95% CI). For the education, high school level participants were tending to use ITNs for 14.518 times than lower education level (p-vale <0.001, crude OR 14.518, 95% CI). For marital status of the participants, married participants were 13.753 times done good practice (p-vale <0.001, adjusted OR 13.753, 95% CI)

and widowed participants were 5.403 times done good practice than reference group (p-vale 0.039, adjusted OR 5.403, 95% CI). For working from dawn to night time, the participants who always worked from dawn to night time were 2.203 times tend to have good practice level than who never work at that time (p-vale 0.032, adjusted OR 2.203, 95% CI).

Regarding knowledge level of the participants, moderate and good knowledge level were 5.125 times had good practice level than lower knowledge level participants (p-vale <0.001, adjusted OR 5.125, 95% CI).

5.4 Recommendation

This study provided the information about knowledge, attitude, and cultural factors toward utilization of insecticide treated nets. According to finding of the study, the following recommendation can be given for improving the knowledge and attitude level in the population toward utilization of mosquito nets and aid for further activities and interventions of malaria prevention and control in Rakhine State.

1. Since there were few transportation links in rural area, accessibility of malaria health service to the outreach area should be encouraged through government sectors as well as NGOs by recruiting active village health volunteers in each and every village. They should train and encourage each volunteer to give the health education and encourage the community to use ITNs.
2. Improving the knowledge of people especially in cause of malaria is still needed. To improve the knowledge, government sectors as well as NGOs should train and encourage each volunteer to give the health education in their village apart from giving only diagnosis and treatments as they are the closet to the community.
3. For the attitude on malaria, community empowering activities by giving information, education and communication about personal protective measures with the ethnic language should be encouraged.
4. According to this study, the rate of sleeping under ITNs was still half although almost all of them received ITNs from government sectors and NGOs. Traditional approach of distribution of ITNs should be integrated with health

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education sessions and encourage the people to sleep under ITNs every night and everywhere.

5. Pre-test and post-test on knowledge of malaria should be done after all the health education sessions to make sure that people get all the massages on knowledge on malaria. In addition, monitoring and evaluation of activities of village health volunteers whether they gave education in their villages. From this intervention, we can get the information of low knowledge and practice level on prevention of malaria is whether due to requirement of health education by health personals themselves or due to low interest of community on malaria.
6. According to this study, low knowledge level and poor practice level could only be described. It required additional for understanding the main causes to explain the low knowledge level and poor practice level on utilization of insecticide treated nets. Therefore, additional data collection using qualitative tools could better explain this phenomenon.

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APPENDIX

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APPENDIX

Work Plan

Procedure	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18
Literature Review										
Writing Proposal										
Submit Proposal										
Proposal Exam										
Ethical consideration										
Pretest Questionnaires										
Data Collection										
Data Analysis										
Thesis Writing										
Final Thesis Exam										
Submit Article										
Submit Thesis										

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QUESTIONAIRE

Code No. _____ Interviewer _____ Date of interview ___/___/_____

(Instruction: Please tick in the box ☐ of suitable answer or fill in the blanks)

Section 1: General Characteristics

1. Age: _____ year (completed years)

2. Gender: ☐ 1. Male ☐ 2. Female

3. Education:

☐ 1. Illiterate or no formal education ☐ 2. Primary school level

☐ 3. Middle school level ☐ 4. High school level

☐ 5. Collage/ University level ☐ 6. Others (Please specify) _____

4. Occupation:

☐ 1. Agriculture ☐ 2. Forest worker

☐ 3. Bamboo/ rattan cutting ☐ 4. Government employee

☐ 5. Dependent ☐ 6. Retired

☐ 7. Others (Please specify) _____

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5. Family member _____

6. Average family income per month _____ kyats

7. Marital status:

☐ 1. Single ☐ 2. Married ☐ 3. Divorced

☐ 4. Widowed ☐ 5. Separated

Section 2: Knowledge on Malaria

No	Questions	Yes	No
	Knowledge on vector and transmission		
1.	**What is the cause of malaria?**		
	1.1 Due to drink stream water or dirty water	[ ]	[ ]
	1.2 Due to bath in stream	[ ]	[ ]
	1.3 Due to eating banana or other fruits or meat	[ ]	[ ]
	1.4 Due to spirit	[ ]	[ ]
	1.5 Due to mosquito bite	[ ]	[ ]
	1.6 Due to messy environment	[ ]	[ ]
	1.7 Due to unhygienic	[ ]	[ ]
2.	**What is the biting time of malaria mosquito?**		
	2.1 Day time	[ ]	[ ]
	2.2 Night time	[ ]	[ ]
	2.3 Dawn and dusk	[ ]	[ ]
3.	**Resting place of malaria mosquito**		
	3.1Forested area	[ ]	[ ]
	3.2 Bushes around the house	[ ]	[ ]
	3.3 Dark places in the house	[ ]	[ ]
	Knowledge on signs and symptoms of malaria		
4.	**What are the signs and symptoms of malaria?**		
	4.1 fever with chills and rigor	[ ]	[ ]
	4.2 Nausea and vomiting	[ ]	[ ]
	4.3 Severe headache	[ ]	[ ]
	4.4 Joint pain	[ ]	[ ]
	4.5 Diarrhea	[ ]	[ ]
	4.6 Loss of appetite	[ ]	[ ]

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No	Questions	Yes	No
	Knowledge on prevention, control and treatment of malaria		
5.	**How can you protect yourself from malaria infection?**		
	5.1 Always sleeping in the bed net	[ ]	[ ]
	5.2 Sleep under Insecticide treated bed net	[ ]	[ ]
	5.3 Sleep under Long lasting insecticidal net	[ ]	[ ]
	5.4 Insecticide spray	[ ]	[ ]
	5.7 Avoid drinking stream water	[ ]	[ ]
	5.6 Avoid bathing in the stream	[ ]	[ ]
	5.7 Taking anti-malaria prophylaxis	[ ]	[ ]
6.	**How can you cure malaria?**		
	6.1 Taking full course of anti-malarial drug	[ ]	[ ]
	6.2 Self-treatment with anti-malarial drug	[ ]	[ ]
	6.3 Self-treatment with herbal medicine	[ ]	[ ]
	6.4 Traditional healer	[ ]	[ ]
	6.5 Pray for spirit	[ ]	[ ]

Section 3: Attitude toward malaria

No.	Questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	Attitude on transmission of malaria					
1.	If someone got malaria, people should avoid close contact with that person	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Malaria can transmit from one person to another like a common cold	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Sleeping inside the mosquito nets at night can prevent malaria	[ ]	[ ]	[ ]	[ ]	[ ]
4.	In my opinion, once people get malaria, it cannot be re-infected	[ ]	[ ]	[ ]	[ ]	[ ]

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No.	Questions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	Attitude on susceptibility and severity of malaria					
1.	People who stay in the forest overnight are more susceptible to malaria	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Malaria can be prevented even if one is living in malaria endemic area	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Children and pregnant women can get malaria infection more easily	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Malaria is serious and life threating disease	[ ]	[ ]	[ ]	[ ]	[ ]
	Attitude on prevention of malaria					
1.	Wearing long sleeve and pants can protect from biting of mosquito	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Spraying insecticide take mosquito away even my home is dirty	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Burning mosquito coil will drive away mosquito	[ ]	[ ]	[ ]	[ ]	[ ]
4.	The best way to prevent malaria is to avoid mosquito bite	[ ]	[ ]	[ ]	[ ]	[ ]

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Section 4: Cultural factors toward malaria

No.	Questions	Agree	Neutral	Disagree
Traditional Belief about malaria				
1.	Malaria is caused by the punishment of supernatural existence from ancestry.	[ ]	[ ]	[ ]
2.	Children are most affected by cerebral malaria and die because they have bad Karma in previous lives.	[ ]	[ ]	[ ]
3.	Malaria can be prevented by worshiping to the previous ancestry or supernatural god.	[ ]	[ ]	[ ]
4.	Malaria can be easily cured by taking herbs and traditional plants	[ ]	[ ]	[ ]
5.	Malaria can be cured only by spiritual healer.	[ ]	[ ]	[ ]
No.	**Questions**	**Always**	**Sometime**	**Never**
Traditional Lifestyle				
1.	Do you usually get up early in the morning (dawn)?	[ ]	[ ]	[ ]
2.	Do you usually work from dawn to the night times? (if No, skip to next section)	[ ]	[ ]	[ ]
3.	How often do you wear long sleeves shirts and pants when you work from dawn to the night times?	[ ]	[ ]	[ ]

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Section 5: Utilization of Insecticide treated nets

(Practice questions need to ask about specific action in previous one-month duration.)

1. Do you have insecticide treated mosquito net in your house?

☐ 1. Yes ☐ 2. No (if no skip to No. 10)

2. How many bed nets are there in your household?

_____ net

No.	Questions	Always	Sometimes	Never
3.	How often do you sleep under mosquito net at night?	[ ]	[ ]	[ ]
4.	How often do you sleep under mosquito net when you sleep in the forest or field?	[ ]	[ ]	[ ]
5.	How often do you check for the holes in your mosquito net?	[ ]	[ ]	[ ]
6.	How often do you immediately repair mosquito net once you find out of hole?	[ ]	[ ]	[ ]
7.	How often do all the members in your household sleep under mosquito net?	[ ]	[ ]	[ ]
8.	How often do you use mosquito repellent coil or spray instead of mosquito net?	[ ]	[ ]	[ ]

10. Reasons for not using insecticide treated nets

- ☐ 1. Do not know about insecticide treated net
- ☐ 2. Cannot afford to buy
- ☐ 3. Do not like to use because of any reasons
- ☐ 4. Believe it has no effect on health
- ☐ 5. Other _____

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စစ်တမ်းကောက်မေးခွန်းလွာ

အမှတ်စဉ် ..... သုတေသနစစ်တမ်းကောက်ယူသူ..... ရက်စွဲ .....

အပိုင်း (၁) အခြေခံအချက်အလက်များ

၁။ သင့်အသက် ဘယ်လောက်ပြည့်ပြီးပြီလဲ။ ..... နှစ်

၂။ လိင် ☐ ၁။ ကျား ☐ ၂။ မ

၃။ သင်တက်ခဲ့ဖူးသော အမြင့်ဆုံး ပညာရေး (သို့) အတန်းပညာမှာ အဘယ်နည်း။

☐ ၁။ ကျောင်းမနေဖူးပါ။ ☐ ၂။ မူလတန်းပညာ
☐ ၃။ အလယ်တန်းပညာ ☐ ၄။ အထက်တန်းပညာ
☐ ၅။ ဘွဲ့ရပညာ နှင့် ဘွဲ့လွန်ပညာ ၆။ အခြား (ရှိလျှင် ဖော်ပြရန်) .....

၄။ သင်၏ အဓိကလုပ်ငန်း အလုပ်အကိုင် အဘယ်နည်း။

☐ ၁။ လယ်ယာ ☐ ၂။ သစ်ခုတ်
☐ ၃။ ဝါးခုတ် ☐ ၄။ အစိုးရဝန်ထမ်း
☐ ၅။ မိုရိ ☐ ၆။ အငြိမ်းစား
☐ ၇။ အခြား (ရှိလျှင် ဖော်ပြရန်).....

၅။ သင့်အိမ်တွင် အတူနေထိုင်သူ မိသားစုဝင် ဘယ်နှစ် ယောက်ရှိပါသလဲ။
..... ယောက်

၆။ မိသားစု တစ်လဝင်ငွေ ပျမ်းမျှအားဖြင့် မည်မျှရှိသနည်း။
..... ကျပ်

၇။ အိမ်ထောင်ရေးအခြေအနေ

☐ ၁။ လူလွတ် ☐ ၂။ အိမ်ထောင်သည်
☐ ၃။ ကွာရှင်း ☐ ၄။ မုဆိုးဖို/မ
☐ ၅။ အိမ်ထောင်ကွဲ

အပိုင်း (၂) ၄က်ဖျားရောဂါ အသိပညာ မေးခွန်းများ

စဉ်	မေးခွန်းများ	ဟုတ်	မဟုတ်
	ရောဂါပိုးသယ်ဆောင်သောအကောင်နှင့် ကူးစက်ပုံ		
၁။	**ဘယ်လိုကြောင့် ၄က်ဖျား ဖြစ်ရပါသနည်း။**	[ ]	[ ]
	၁.၁ စမ်းချောင်းရေ/ညစ်ညမ်းရေသောက်ခြင်း	[ ]	[ ]
	၁.၂ စမ်းချောင်းရေချိုးခြင်း	[ ]	[ ]
	၁.၃ ၄က်ပျောသီးစားခြင်း/အခြားအသားနှင့်အရွက်များစားခြင်း	[ ]	[ ]
	၁.၄ စိတ်ဝိညာဉ်ကြောင့်ဖြစ်ခြင်း	[ ]	[ ]
	၁.၅ ခြင်ကိုက်ခြင်း	[ ]	[ ]
	၁.၆ ပတ်ဝန်းကျင်ညစ်ပတ်ခြင်း	[ ]	[ ]
	၁.၇ တစ်ကိုယ်ရည်သန့်ရှင်းမှုမရှိခြင်း	[ ]	[ ]
၂။	**၄က်ဖျားပိုးကို သယ်ဆောင်သော အကောင်သည် မည်သည့်အချိန်တွင် ကိုက်သနည်း။**		
	၂.၁ နေ့ခင်းဘက်	[ ]	[ ]
	၂.၂ ညဘက်	[ ]	[ ]
	၂.၃ မနက်မှောင်ရီပျိုးချိန်	[ ]	[ ]
၃။	**၄က်ဖျားပိုးကို သယ်ဆောင်သော အကောင်သည် မည်သည့် နေရာတွင် အများဆုံးနားနေတတ်သနည်း။**		
	၃.၁ သစ်တောများသောနေရာ	[ ]	[ ]
	၃.၂ အိမ်ပတ်ဝန်းကျင်ရှိ ချုံများ	[ ]	[ ]
	၃.၃ အိမ်တွင်းရှိမှောင်သောနေရာများ	[ ]	[ ]
	၄က်ဖျားရောဂါလက္ခဏာများ		
၄။	**၄က်ဖျားရောဂါလက္ခဏာများမှာအဘယ်နည်း။**		
	၄.၁ ချမ်းတုန်ဖျားခြင်း	[ ]	[ ]
	၄.၂ မူးခြင်း၊အန်ခြင်း	[ ]	[ ]
	၄.၃ ခေါင်းအရမ်းကိုက်ခြင်း	[ ]	[ ]
	၄.၄ ကိုယ်လက်နာကျင်ကိုက်ခဲခြင်း	[ ]	[ ]
	၄.၅ ဝမ်းလျှောခြင်း	[ ]	[ ]
	၄.၆ အစားအသောက်ပျက်ခြင်း	[ ]	[ ]

စဉ်	မေးခွန်းများ	ဟုတ်	မဟုတ်
	ငှက်ဖျားရောဂါကာကွယ်ခြင်း၊ထိန်းချုပ်ခြင်းနှင့်ကုသခြင်းဆိုင်ရာဝဟုသုတများ		
၅။	**ငှက်ဖျားရောဂါ မဖြစ်အောင် ဘယ်လို ကာကွယ်နိုင်သနည်း။**		
	၅.၁ ခြင်ထောင်နှင့်အမြဲအိပ်ခြင်း	[ ]	[ ]
	၅.၂ ဆေးစိမ်ခြင်ထောင်နှင့်အိပ်ခြင်း	[ ]	[ ]
	၅.၃ တာရှည်ခံဆေးစိမ်ခြင်ထောင်နှင့်အိပ်ခြင်း	[ ]	[ ]
	၅.၄ ခြင်နှိုင်ဆေးဖြန်းခြင်း	[ ]	[ ]
	၅.၅ စမ်းရေသောက်ခြင်းမှရှောင်ခြင်း	[ ]	[ ]
	၅.၆ စမ်းရေချိုးခြင်းမှရှောင်ခြင်း	[ ]	[ ]
	၅.၇ ငှက်ဖျားရောဂါကြိုတင်ကာကွယ်ဆေးသောက်ခြင်း	[ ]	[ ]
၆။	**ငှက်ဖျားရောဂါကို မည်ကဲ့သို့ကုသမည်နည်း။**		
	၆.၁ ကျန်းမာရေးဝန်ထမ်းမှပေးသောငှက်ဖျားဆေးသောက်ခြင်း	[ ]	[ ]
	၆.၂ မိမိဘာသာကုသခြင်း	[ ]	[ ]
	၆.၃ မိမိဘာသာ ဆေးမြစ်၊ဆေးပင်များဖြင့်ကုသခြင်း	[ ]	[ ]
	၆.၄ တိုင်းရင်းဆေးဆရာများဖြင့်ကုသခြင်း	[ ]	[ ]
	၆.၅ တမလွန်ဘဝ၊စိတ်ဝိညာဉ်များသို့ဆုတောင်းခြင်း	[ ]	[ ]

အပိုင်း (၃) ငှက်ဖျားရောဂါနှင့်ပက်သက်သော ထင်မြင်ယူဆချက်များ

စဉ်	မေးခွန်းများ	လုံးဝသဘော တူသည်	သဘောတူ သည်	ထင်မြင်ယူဆ ချက် မရှိပါ	သဘောမတူ ပါ	လုံးဝသဘော မတူပါ
	ငှက်ဖျားရောဂါ ကူးစက်မှုနှင့်ပတ်သက်သည့်ထင်မြင်ယူဆချက်များ					
၁။	ငှက်ဖျားရောဂါရှိနေသောလူနှင့် ထိတွေ့မှုများကို ရှောင်ကျဉ်သင့်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၂။	ငှက်ဖျားရောဂါသည် သာမာန်ဖျားနာခြင်းများကဲ့သို့ လူတစ်ယောက်မှတစ်ယောက် ကူးစက်နိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၃။	ခြင်ထောင်ဖြင့် အိပ်ခြင်းသည် ငှက်ဖျားရောဂါကို ကာကွယ်နိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၄။	ငှက်ဖျားရောဂါသည် တစ်ခါဖြစ်ပြီး ပြန်မဖြစ်နိုင်ပါ။	[ ]	[ ]	[ ]	[ ]	[ ]

စဉ်	မေးခွန်းများ	လုံးဝသဘောတူသည်	သဘောတူသည်	ထင်မြင်ယူဆချက် မရှိပါ	သဘောမတူပါ	လုံးဝသဘောမတူပါ
	ငှက်ဖျားရောဂါ၏ပြင်းထန်မှုနှင့် ပတ်သက်သည့်ထင်မြင်ယူဆချက်များ					
၁။	တောထဲတွင် ညအိပ်တတ်သောသူများသည် ငှက်ဖျားရောဂါပိုမိုကူးစက်နိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၂။	ငှက်ဖျားရောဂါဖြစ်ပွားလေ့ရှိသောဒေသတွင်နေထိုင်သောလူများသည် ငှက်ဖျားရောဂါမဖြစ်အောင်ကာကွယ်နိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၃။	ကလေးများနှင့် ကိုယ်ဝန်ဆောင်များသည် ငှက်ဖျားရောဂါ ပိုမို ကူးစက်နိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၄။	ငှက်ဖျားရောဂါကို ဓောဝီးစွာ မကုသနိုင်ပါက အသက်ဆုံးနိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
	ငှက်ဖျားရောဂါကာကွယ်မှုနှင့် ပတ်သက်သည့်ထင်မြင်ယူဆချက်များ					
၁။	အကျီရှည်၊ ဘောင်းဘီရှည်ဝတ်ခြင်းဖြင့် ငှက်ဖျားရောဂါကို ကာကွယ်နိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၂။	ခြင်ဆေးဖြန်းခြင်းကြောင့် အိမ်ညစ်ပတ်သည့်တိုင် ခြင်များကို ပြေးစေနိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၃။	ခြင်ဆေးခွေထွန်းခြင်းသည် ခြင်များကိုပြေးစေနိုင်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]
၄။	ငှက်ဖျားရောဂါကို အကောင်းဆုံးကာကွယ်နည်းမှာ ခြင်မကိုက်မခံရ အောင်နေခြင်းဖြစ်သည်။	[ ]	[ ]	[ ]	[ ]	[ ]

အပိုင်း (၄) ယဉ်ကျေးမှုနှင့်ဓလေ့ထုံးတမ်းဆိုင်ရာ အချက်အလက်များ

စဉ်	မေးခွန်းများ	သဘောတူသည်	ထင်မြင်ယူဆချက် မရှိပါ	သဘောမတူပါ
	ဓလေ့ထုံးတမ်းဆိုင်ရာယုံကြည်မှုများ			
၁။	ငှက်ဖျားရောဂါသည် တမလွန်ဘဝမှ အပြစ်ပေးခြင်းကြောင့်ဖြစ်သည်။	[ ]	[ ]	[ ]
၂။	ကလေးများသည် ဦးနှောက်ငှက်ဖျားကြောင့် သေဆုံးရခြင်းမှာ အတိတ်ဘဝမှ မကောင်းမှုများကြောင့်ဖြစ်သည်။	[ ]	[ ]	[ ]
၃။	ငှက်ဖျားရောဂါကို ဆွေစဉ်မျိုးဆက်များကို ရှိခိုးကန်တော့ခြင်း (သို့မဟုတ်) နတ်ဘုရားများကို ရှိခိုးကန်တော့ခြင်းဖြင့် ကာကွယ်နိုင်သည်။	[ ]	[ ]	[ ]
၄။	ငှက်ဖျားရောဂါကို ဆေးပင်များစားသုံးခြင်း၊ ဆေးမြီးတိုများသောက်ခြင်းဖြင့် အလွယ်တကူ ကုသနိုင်သည်။	[ ]	[ ]	[ ]
၅။	ငှက်ဖျားရောဂါကို နတ်ဆေးဆရာများဖြင့် ကုသနိုင်သည်။	[ ]	[ ]	[ ]
	ဓလေ့ထုံးတမ်းဆိုင်ရာ အလေ့အကျင့်များ			
၁။	မနက်အစော နေမထွက်ခင်ထလေ့ရှိပါသလား။	[ ]	[ ]	[ ]
၂။	မနက်အစော နေမထွက်ခင်မှ ညချိန်ထိအလုပ်လုပ်လေ့ရှိပါသလား။ (မရှိပါက အပိုင်း ၅ သို့ကျော်သွားပါ)	[ ]	[ ]	[ ]
၃။	မနက်အစော နေမထွက်ခင်မှ ညချိန်ထိအလုပ်လုပ်ရာတွင် အကျိုရှည်၊ ဘောင်းဘီရှည်ဝတ်လေ့ရှိပါသလား။	[ ]	[ ]	[ ]

အပိုင်း (၅) ဆေးစိမ်ခြင်ထောင်အသုံးပြုခြင်းဆိုင်ရာလက်တွေ့လုပ်ဆောင်မှုအချက်အလက်များ

၁။ သင်၏အိမ်တွင် ဆေးစိမ်ခြင်ထောင်ရှိပါသလား။ (မရှိလျှင် နံပါတ် ၁၀ သို့ကျော်သွားပါ)

☐ ၁။ ရှိ ☐ ၂။ မရှိ

၂။ သင်၏အိမ်တွင် ခြင်ထောင် မည်မျှရှိသနည်း။

..... လုံး

စဉ်	မေးခွန်းများ	အမြဲတမ်း	တခါတရံ	လုံးဝ
၃။	ဆေးစိမ်ခြင်ထောင်ဖြင့် ညအခါတွင် မကြာခဏ မည်မျှ အိပ်လေ့ရှိသနည်း။	[ ]	[ ]	[ ]
၄။	တောထဲ (သို့မဟုတ်) လယ်ကွင်းထဲတွင် အိပ်ရလျှင် ဆေးစိမ်ခြင်ထောင်ဖြင့်မည်မျှ အိပ်လေ့ ရှိသနည်း။	[ ]	[ ]	[ ]
၅။	သင့် ခြင်ထောင်တွင် အပေါက်အပြြများကို ရှာဖွေခြင်း မကြာခဏ မည်မျှ လုပ်လေ့ ရှိသနည်း။	[ ]	[ ]	[ ]
၆။	သင့် ခြင်ထောင်တွင် အပေါက်အပြြများကိုတွေ့ရှိလျှင် ချက်ချင်း ဖာထေးခြင်းများ မကြာခဏ မည်မျှ လုပ်လေ့ ရှိသနည်း။	[ ]	[ ]	[ ]
၇။	မိသားစုဝင်အားလုံး ခြင်ထောင်ထဲတွင် အိပ်လေ့ရှိပါသလား။	[ ]	[ ]	[ ]
၈။	ခြင်ထောင်အစား ခြင်ဆေးဖြန်းခြင်း၊ ခြင်ဆေးခွေထွန်းခြင်းများ မကြာခဏလုပ်လေ့ရှိပါသလား။	[ ]	[ ]	[ ]

၁၀။ ဆေးစိမ်ခြင်ထောင် အသုံးမပြုရခြင်း အကြောင်းများ

- ☐ ၁။ ဆေးစိမ်ခြင်ထောင် အကြောင်းမသိခြင်း
- ☐ ၂။ ဂယ်ယူရန်မတတ်နိုင်ခြင်း
- ☐ ၃။ အကြောင်းအမျိုးမျိုးကြောင့် မနှစ်သက်၍ မသုံးမပြုခြင်း
- ☐ ၄။ ကျန်းမာရေးအတွက် ကောင်းကျိုးမဖြစ်ဟု ယုံကြည်သောကြောင့်
- ☐ ၅။ အခြားအကြောင်းအရာများ .....

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Brief Profile

I am a medical doctor holding M.B., B.S degree and graduated from University of Medicine (I), Yangon, Myanmar. I am a registered doctor with SAMA 37531 from Myanmar Medical Council. I worked as a medical officer in Green Cross Public Hospital for 1 year and I had 2 years experiences in public health sector related to Malaria Project of Myanmar Medical Association (MMA) as a Quality Assurance Officer.

Educational Qualification

- Certificate of Leadership and Team Building
- Certificate for “Proposal Writing and M&E Training”
- Certificate for “DOT and Case Investigation Training for Malaria”
- Certificate for “Training of Trainers on Malaria Elimination
- Bachelor of Medicine and Bachelor of Surgery (M.B., B.S) (Ygn), University of Medicine (I), Yangon

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