Knowledge, attitude, practice regarding to malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar

Mr. Khaing Nyan Linn

A Thesis Submitted in Partial Fulfillment of the Requirements
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ความรู้ ทัศนคติ การปฏิบัติต่อการป้องกันโรคมาลาเรียและการควบคุมสภาพแวดล้อมของบ้าน ของประชาชนในเมืองปะลอ ภูมิภาคทะเนียนทายี ประเทศเมียนมาร์

นายเคียง เหนียน ลิน

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
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เคียง เหนียน ลิน : ความรู้ ทัศนคติ การปฏิบัติต่อการป้องกันโรคมาลาเรียและการควบคุมสภาพแวดล้อมของบ้าน ของประชาชนในเมืองปะลอ ภูมิภาคทะเนียนทายี ประเทศเมียนมาร์ (Knowledge, attitude, practice regarding to malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ดร. ณัฏฐา ฐานีพานิชสกุล, 110 หน้า.

โรคมาลาเรียถือเป็นหนึ่งปัจจัยสำคัญที่ส่งผลต่อการเกิดภาวะเจ็บป่วยและการเสียชีวิตของประชากรในประเทศเมียร์มาร์ การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาระดับความรู้ ทัศนคติ และการปฏิบัติตนต่อการป้องกันการติดเชื้อมาลาเรียและการควบคุมสภาพแวดล้อมของบ้าน รวมทั้งศึกษาความสัมพันธ์ระหว่างปัจจัยต่างๆที่ส่งผลต่อการปฏิบัติต่อการป้องกันการติดเชื้อมาลาเรีย การศึกษาครั้งนี้เป็นการศึกษาภาคตัดขวางระหว่างเดือนมิถุนายนถึงเดือนกรกฎาคม ปี 2559 ในภูมิภาคทะเนียนทายี ประเทศเมียร์มาร์ กลุ่มตัวอย่างเลือกอย่างสุ่มจำนวน 430 คน อายุระหว่าง 18 – 64 ปี โดยเครื่องมือที่ใช้ในการวิจัยประกอบด้วยแบบสัมภาษณ์เพื่อประเมินความรู้ ทัศนคติ และการปฏิบัติตนต่อการป้องกันการติดเชื้อมาลาเรีย การวิเคราะห์ข้อมูลโดยการทดสอบไคสแควร์ และฟิชเชอร์เอกแซค เพื่อประเมินความสัมพันธ์ระหว่าปัจจัยต่างๆและการปฏิบัติตนต่อการป้องกันการติดเชื้อมาลาเรีย ผลการศึกษาพบว่า ร้อยละ 50.7 และ 16.3 ของกลุ่มตัวอย่างมีความรู้และทัศนคติในระดับดีตามลำดับ มีเพียงร้อยละ 6.5 ของกลุ่มตัวอย่างที่มีการปฏิบัติตนต่อการป้องกันการติดเชื้อมาลาเรียอยู่ในระดับดี ปัจจัยที่มีความสัมพันธ์ต่อการปฏิบัติเพื่อป้องกันการติดเชื้อมาลาเรียอย่างมีนัยสำคัญทางสถิติที่ระดับ ได้แก่ กลุ่มอายุ ($p<0.001$) ระดับการศึกษา ($p<0.001$) อาชีพ ($p<0.001$) และรายได้ของครอบครัว ($p=0.003$) นอกจากนี้ระดับความรู้ ($p<0.001$) และทัศนคติ($p<0.001$) ของกลุ่มตัวอย่างมีความสัมพันธ์อย่างมีนัยสำคัญต่อระดับการปฏิบัติตนเพื่อการป้องกันการติดเชื้อมาลาเรียและการควบคุมสภาพแวดล้อมของบ้าน ผลการวิจัยครั้งนี้ได้ให้ข้อเสนอแนะในการจัดทำโปรแกรมการให้ความรู้แก่กลุ่มตัวอย่างในระดับชุมชนในลักษณะการสื่อสารแบบมีปฏิสัมพันธ์เกี่ยวกับลักษณะของบ้านเรือนและโครงสร้างของบ้านเพื่อเพิ่มพูนความรู้ ทัศนคติ และเพื่อส่งเสริมการปฏิบัติเพื่อป้องกันการติดเชื้อมาลาเรีย

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

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Abstract

Malaria infection is of national concern in Myanmar because it is a leading cause of morbidity and mortality. Objectives of current study were 1) to identify level of knowledge, attitude and practice regarding to malaria and home environment prevention and 2) to access those associations. A cross-sectional survey method was conducted during June-July,2016 among population in Palaw Township, Tanintharyi Region of Myanmar. Four hundred and thirty subjects aged between 18-64 were participated in this study. A structure questionnaire was used to gather the data through face-to-face interview. Chi-square and Fisher's exact test were used to determine the association between the variables. The results showed that 50.7%of respondents had good knowledge, 16.3% had good attitude while only 6.5% had good practice regarding malaria prevention. Moreover, we found that there was significant association between age group ($p<0.001$), education level ($p<0.001$), occupation ($p<0.001$), monthly family income ($p=0.003$) and duration of stay ($p=0.002$) and practice on malaria and home environmental prevention. Association between knowledge about malaria and practices on malaria ($p<0.001$) was statistically associated. Participants' attitude towards malaria was associated with practices on malaria and home environment prevention ($p<0.001$). As a result of this study, health education program with direct interaction to community should be emphasized to increase participants' knowledge, attitude and practice about housing condition and housing structure for malaria prevention.

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

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Introduction

1.1Background and rationale

Malaria is the infectious and tropical disease which burden is one of the world's most. Malaria remains a major problem of global health with, 3.2 billion people approximately; nearly world's population of fifty percent lives in malaria risk area(World Health Organization 2015). According to the latest World Health Organization estimation, which is published in September 2015, morbidity is 214 million malaria cases in 2015 and mortality is 438 000 people deaths(World Health Organization 2015). According to the WHO, it was calculated that 23 million of malaria cases occurred in the Southeast Asia region. Moreover, malaria is responsible for the cause of 34,000 people deaths per year in this area(Pearson 2004).

Myanmar is one of the developing countries in the Southeast Asia region. Malaria is of national concern in Myanmar and it is a leading cause of morbidity and mortality. In Myanmar, humanitarian dimension of malaria is very large as a large proportion of population is affected. There is malaria endemic in 284 out of 324 townships, mainly malaria endemic area are rural areas and some pen-urban places. Out of estimated 54.28 million of total population, 38.54 million population (71%) live in areas of at risk (29% or 15.74 million live in malaria high-risk areas, 24% or 13.03 million live in malaria moderate risk areas, and 18% or 9.77 million live in malaria low risk areas)(Vector Borne Disease Control 2005). According to the malaria data of Myanmar in 2012, confirmed malaria cases was 375,503 (annual parasite index 7.7 per 1,000 population) and the number of total malaria deaths was 403 (0.8 per 100,000

population)(Nyi Nyi Lwin 2015). According to the World Malaria Report 2014, in Myanmar, there were 37% of high transmission (> 1 case per 1000 population) and 23% of low transmission (0–1 cases per 1000 population) in 2013(World Health Organization 2014).

Palaw Township in the Tanintharyi Region is located at high risk area, the coastal region of Myanmar. Population Living under Various Malaria Risk Areas in Tanintharyi Region - High Risk – 44.5%, Moderate Risk – 28.6%, Low Risk – 20.9% and No Risk – 5.9%(International Organization for Migration 2012)(Detail of risk classification in Appendix B). In 2013, there were 20853 cases of confirmed malaria in Tanintharyi Region and morbidity rate is 15.62 and mortality rate is 1.05. There were 1090 confirmed malaria cases of under 5year children among the total of 52979 population of under 5year old children. In Palaw Township, population living under malarious areas are 92709 population of 89 villages live in High risk areas, 37797 population of 35 villages in Moderate risk and 7235 population of 4 villages in Low risk areas(Vector Borne Disease Control 2013).

Malaria is still a priority public health problem in the country. It occurs mainly in or near forests, but also in some coastal areas and plantations. Because of these environmental determinants, the malaria burden is particularly high among national races in remote areas and migrants, who seek economic opportunities in rural economic frontier areas, and the economic development activities such as forestry, mining, plantations and road-building. The significant reduction of malaria morbidity and mortality so far made in Myanmar is threatened by evolving complexity of the problem, especially multiple resistances of the parasites to antimalarial medications and the

uncertainty about the financial basis for continued malaria control(Department of Health 2012).

Even though malaria is a life-threatening disease, it is largely preventable and curable disease if it is early diagnosed and adequately treated. Concerning prevention, unfortunately, there are currently no licensed vaccines against malaria. In accordance with the World Health Organization (WHO), the most preventive measures of malaria are personal protection, malaria vector control and chemical control. Reducing the levels of transmission for reduction of malaria morbidity and mortality is the principle objective of vector control. Incapable to combat the vector, Anopheles mosquitoes, human beings are progressively more suffering from malaria, resulting in disease burden(World Health Organization 2015).

Environmental conditions play an important role in the transmission of malaria; therefore, regulating these conditions can help to reduce disease burden. Environmental preventive practices for malaria can be implemented at the community level to complement other malaria control methods. House-hold level environmental prevention relies on sufficient community participation to achieve efficacy in reducing mosquito populations. A better understanding of mosquito biology, malaria epidemiology and habitat requirements is likely to play a role in one's participation in controlling these habitats to reduce mosquito populations(Heather Fawn Randell and Kramer4 2010).

In order to achieve the effective prevention and control of malaria, community awareness is essential. The accurate understanding of the epidemiology of malaria, biology of vectors and socio-behavioral characteristics of the communities is needed to control of malaria. Malaria can be widely spread through human behavior: for example,

create the breeding places for mosquitoes. Monitoring transmission especially in high risk malaria areas is also needed. In accordance with experiences in Malaria, prevention is cost effective and better than cure. Regarding this, sociocultural and economic factors, housing conditions, knowledge, attitude, and practices of the community play an essential role in transmission and preventing malaria infection.

There have been a considerable number of studies about the knowledge, attitudes and practices relating to malaria in different parts of the world. Malaria beliefs and practices are often related to culture, and can influence the effectiveness of control strategies; thus, local knowledge and practice related to malaria is important for the implementation of culturally appropriate, sustainable, and effective interventions(Rupashree Singh 2014). Althrough there is some KAP studies regarding malaria was conducted in Myanmar, no other study was conducted in Palaw Township, Tanintharyi Region, Myanmar which was relating to malaria and home environment factors with malaria.

1.2. Research Question

- What are knowledge, attitudes and practices levels regarding malaria and home environment prevention among the population in Palaw Township, Tanintharyi Region of Myanmar?
- Is there any association between socioeconomic and practices level regarding malaria and home environment prevention?
- Is there any association between housing conditions and practices level regarding malaria and home environment prevention?

- Is there any association between knowledge level and practices level regarding malaria and home environment prevention?
- Is there any association between attitudes level and practices level regarding malaria and home environment prevention?

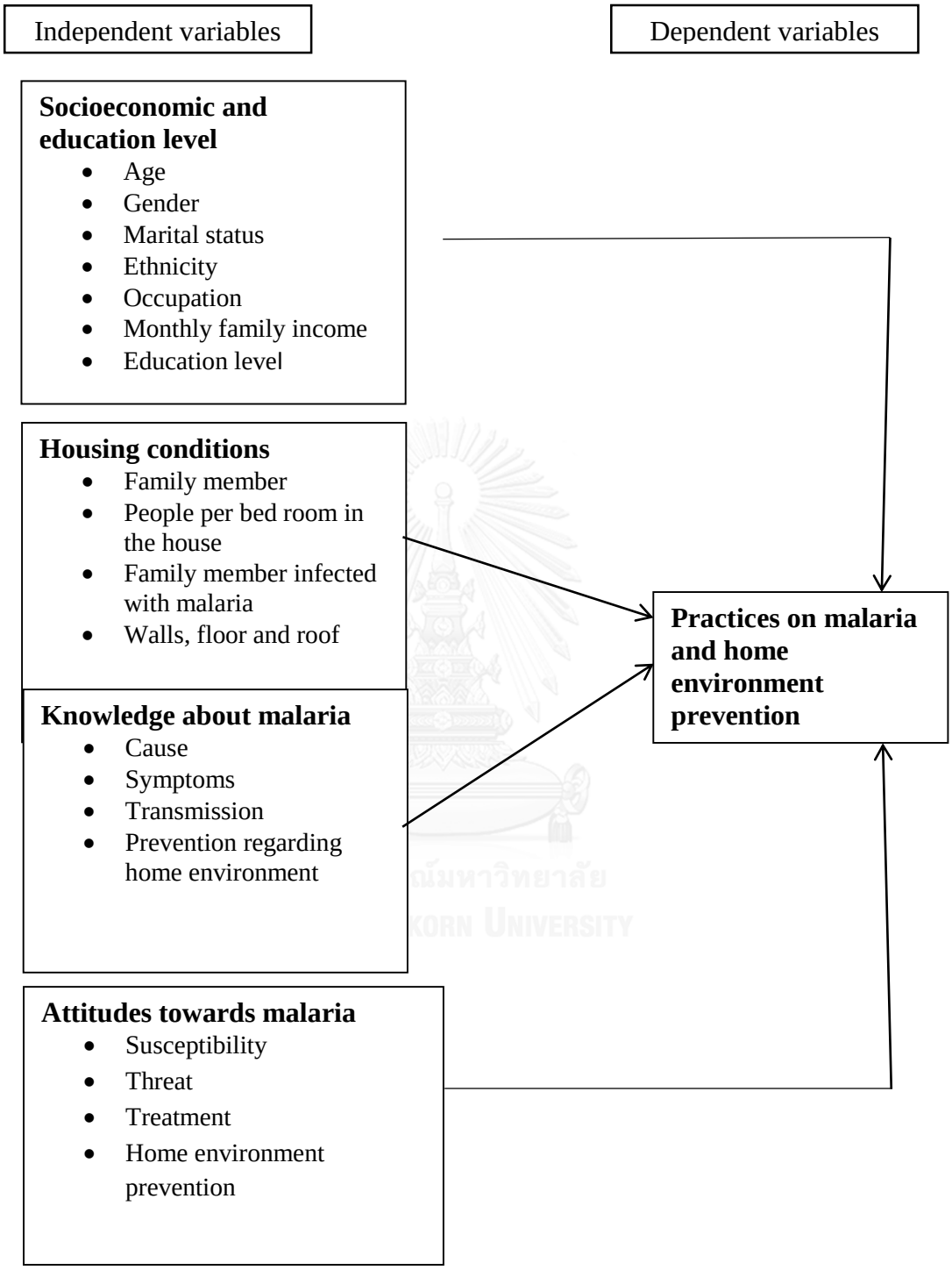
1.3. Objectives

1. To assess the levels of knowledge, attitudes, and practices regarding to malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar
2. To describe the socioeconomic and education level, housing conditions, knowledge level, attitudes level and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar
3. To assess an association between socioeconomic factors and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar
4. To assess an association between housing conditions and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar
5. To assess an association between knowledge level and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar
6. To assess an association between attitudes level and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar

1.4. Research Hypothesis

1. There is an association between socioeconomic factors and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar
2. There is an association between between housing conditions and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar
3. There is an association between knowledge level and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar
4. There is an association between attitudes level and practices level regarding malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar

1.5. Conceptual framework



1.6. Operational Definitions

1.6.a. Socioeconomic and education level refers to information about participant such as age, gender, marital status, ethnicity, occupation of participant, monthly family income, duration of residents and level of schooling.

1.6.b. Housing conditions refers to a characteristic of a participant's house(Merit Mora-Ruiz and Rodríguez 2014).

- **Family members** refer to the total number of people living in participant's house.
- **People per bed room in the house** refer to the number of people living in each room of participant's house.
- **Family member infected with malaria** refer to present of infected family member in the past 6 months, number and age of family members suffered from malaria.
- **Walls, floor and roof** refers to the kind of material used for the walls, floor and roof of the participant's house(more than 50% of component material which made walls, floor and roof)(Merit Mora-Ruiz and Rodríguez 2014).

1.6.c. Knowledge of malaria and home environment refers to the ability of the person to have the correct understanding about malaria(Thanabouasy 2008) and the ability of the have the correct understanding of home environment to prevent malaria.

- **Cause** refers to the correct understanding of causative agent.
- **Symptoms** refer to the correct understanding of signs and symptoms of malaria**.**

- **Transmission** refers to the correct understanding of mode of transmission of malaria.
- **Prevention regarding home environment** refers to the correct understanding of preventive methods and control strategies for malaria prevention at home environment(for example: sleep in bed net, trimming bushes around the house)

1.6.d. Attitude towards malaria refers to beliefs on susceptibility, threat and treatment of malaria(Thanabouasy 2008)

- **Susceptibility** refers to the one's belief of the chances of getting a condition(ReCAPP 2015).
- **Threat** refers to the one's belief of how serious a condition and its consequences are(ReCAPP 2015).
- **Treatment** refers to the belief of treatment about malaria.
- **Home environment prevention** refers to the belief of house condition and malaria prevention or transmission.

1.6.e. Practices on malaria and home environment prevention refers to routine activities and the action of individual or group for malaria and home environment prevention include using impregnate bed net with insecticide, using insecticide spraying, sleep in bed net, and control of mosquito breeding at home environment(Thanabouasy 2008).

Chapter 2

Literature Review

2.1 Malaria

Malaria is one of the infectious diseases which can lead to death. It is caused by Plasmodium parasites that can be transmitted by the bite of the mosquito or blood transfusion or by using a contaminated needle. Malaria which is caused by *Plasmodium falciparum* parasite is the most deadly type(MedicineNet.com 2015). Most vulnerable persons to the disease are young children, pregnant women and non-immune travelers from malaria-free areas than those from malaria endemic area when they become infected. Five species of Plasmodium parasite cause malaria in humans. Among them, the greatest threat caused by malaria come from *P. falciparum* and *P. vivax* species(World Health Organization 2015). *Plasmodium falciparum* specie is not only typically as life threatening but also the major cause of malaria deaths worldwide. It is the most prevalent species in sub-Saharan Africa and *Plasmodium vivax* is the second most significant species and is prevalent in Southeast Asia and Latin America. *Plasmodium vivax* and *Plasmodium ovale* have the additional complication of a dormant liver stage, which can be activated again without the bite of a female mosquito, causing clinical malaria symptoms. Only a small percentage of infections are represented by *Plasmodium malariae* and *Plasmodium ovale*. A fifth and latest species is the *Plasmodium knowlesi* that causes malaria only in primates and then has led to malaria in human, but the exact mode of transmission remains still unclear(Medicines for malaria Venture 2015).

Major plasmodium species in Myanmar are *P. falciparum* (74%) and *P. vivax* (26%) whereas major anopheles species are *An. Minimus* and *An. Dirus*(World Health Organization 2014). Malaria has always been a serious public health problem, and the *An. minimus complex* and *An. dirus s*. have been reported as the malaria vectors in other regions of Myanmar(Guo Yu 2013). Anopheles dirus is one of the primary vectors of highly drug-resistant Plasmodium falciparum, which causes cerebral malaria resulting in high mortality(Oo TT 2003).

2.2 Anopheles mosquitoes

Distinguished features of Anopheles mosquitoes from other mosquitoes are by the palp, which has the same length with the proboscis, and by the wings, having presence of black and white scales discrete blocks. Adult Anopheles can also be recognized by their typical positions of resting: both males and females mosquitoes rest with their abdomens sticking up in the air rather than parallel to the surface on which they are resting. A better understanding of the behavior and biology of Anopheles mosquitoes can help not only transmission malaria and aiding in designing of proper control strategies(Centers of Disease Control and Prevention 2015).

2.3 Life span

Like all mosquitoes, there are four stages of life cycle in the Anopheles mosquito. The first three stages (egg stage, larva stage and pupa stage) are aquatic and last 5-14 days, depending on the species and the ambient temperature. The last stage is adult stage when the female Anopheles mosquito acts as malaria vector. The adult females can live up to a month (or more in captivity). However, most probably do not live more than 1-2 weeks in nature(Centers of Disease Control and Prevention 2015).

Anopheles Egg Anopheles Larva Anopheles Pupa

Figure 1 : Anopheles mosquito life stages

2.4 Patterns of Feeding and Resting

Most Anopheles mosquitoes have crepuscular nature (active at dusk or dawn) or nocturnal nature (active at night). Some Anopheles mosquitoes are endophagic (feed indoor) while others are exophagic (feed outside). Some Anopheles mosquitoes rest indoors (endophilic) while others rest outdoors (exophilic) after their blood feeding. Nocturnal, endophagic Anopheles mosquitoes' bite can be significantly reduced by using of insecticide-treated bed nets (ITNs) or improving housing construction to prevent mosquito entry (e.g., window screens). Endophilic mosquitoes can be readily controlled by indoor spraying of residual insecticides. In contrast, both exophagic and exophilic vectors can be successfully controlled by the destruction of the breeding sites (source reduction)(Centers of Disease Control and Prevention 2015).

2.5 Mosquito biting time

Anopheles mosquitoes enter the house between 5 p.m. and 9.30 p.m. and enter again in the early hours in the morning. They start biting by late evening and the peak of biting activity is at midnight and early hours in the morning. By keeping the windows and doors closed between 5 p.m. and 10 p.m. and again in the early morning, one can prevent the entry of these mosquitoes into the house. Also protect themselves against

bites in the evenings and early mornings by wearing garments that cover the body as much as possible and using mosquito nets at night.(MalariaSite 2015).

2.6 Preferred Sources for Blood Meals

One important behavioral factor of the Anopheles mosquito is the degree to which an Anopheles species prefers to feed on humans (anthropophily) or animals such as cattle (zoophily). Anthrophilic Anopheles are more likely to transmit the malaria parasites from one person to another. Most Anopheles mosquitoes are not exclusively anthropophilic or zoophilic(Centers of Disease Control and Prevention 2015).

2.7 Breeding sites

Adult females lay 50-200 eggs per oviposition. Eggs are laid singly directly on water and are unique in having floats on either side. Although hatching may take up to 2-3 weeks in colder climates, eggs are not resistant to drying and hatch within 2-3 days. Most species prefer to lay in clean, unpolluted water even through the larvae occur in a wide range of habitats. However, larvae of Anopheles mosquitoes have been found in fresh- or salt-water, rice fields, grassy ditches, marshes, mangrove swamps, small, temporary rain pools, the edges of streams and rivers. Although many species prefer habitats with vegetation, others prefer habitats that have none. Some breed in open, sun-lit pools while others are found only in shaded breeding sites in forests. Only a few species like to breed in tree holes or the leaf axils of some plants(Centers of Disease Control and Prevention 2015).

2.8 Mode of Transmission

Malaria transmission is mainly by the bites of female Anopheles mosquitoes. The intensity of transmission depends on some factors related to the parasite, the vector, the human host, and the environment. The female mosquitoes seek a blood meal to

foster their eggs. Each species of Anopheles mosquito has its own preferred aquatic habitat; for instance, some prefer small, shallow collections of fresh water, such as puddles and hoof prints, which are plentiful during the rainy season in tropical countries. Transmission is more extreme in places where the mosquito lifespan is longer and where it prefers to bite humans rather than other animals. Climate also has an influence on the transmission and survival of mosquitoes(Centers of Disease Control and Prevention 2015).

2.9 Life Cycle

There are two types of hosts: female *Anopheles* mosquitos and humans in the natural ecology of malaria parasites infection. First of all, the parasites grow and multiply in the human liver cells and then in the red blood cells. The parasites still grow inside the red blood cells and then destroy the red blood cells. By destroying the red cells, they release merozoites (daughter parasites) which can carry on the cycle by invading other red blood cells. The malaria symptoms are caused by the parasites of the blood stage which are also called gametocytes. During a blood meal, a female *Anopheles* mosquito pick up some gametocytes to start a further, diverse cycle of growth and multiplication in it. After 10-18 days, the parasites in the salivary glands of mosquitos are called “sporozoites”.They are injected into the another human together with saliva of mosquito during a blood meal of the female *Anopheles* mosquito. Then it continue another infection in human when the liver cells are parasitized. Therefore, the mosquito acts as the vector to carry the disease between humans. However, the mosquito vector never suffer the disease from the presence of parasites. This is the difference between two hosts of malaria infection(Centers of Disease Control and Prevention 2015).

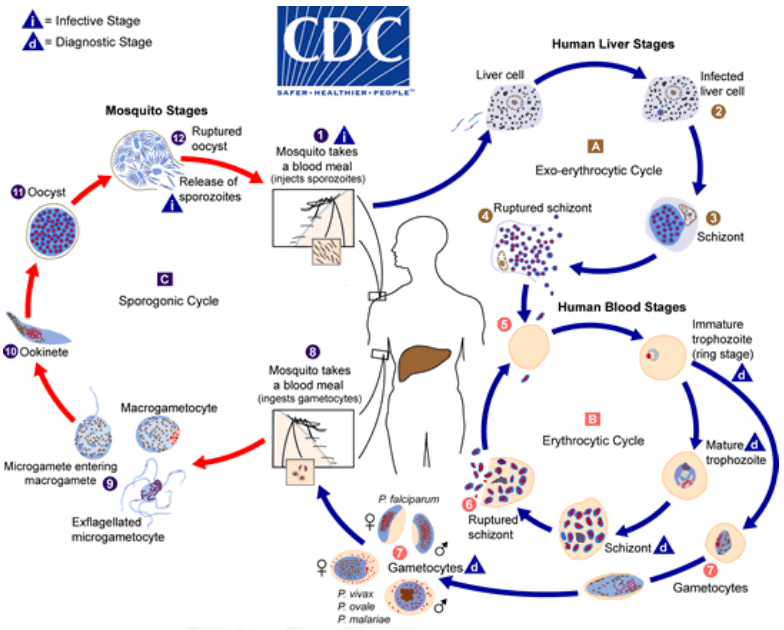


Figure 2. Life cycle of malaria infection

2.10 Symptoms

According to WHO, an acute febrile illness is one of the malarial symptoms. Symptoms occur 1week or more (commonly 10–15 days) in a non-immune individual after the bite of infective mosquitoes. The symptoms that appear first are fever with chills and rigor, headache, vomiting and sometimes abdominal pain may occur which may be minor and difficult to diagnose as malaria. If it not treated within 24 hours, *P. falciparum* malaria can advancement to severe illness often can cause to death. Children with severe malaria frequently show one or more of the following symptoms: respiratory distress which is related to metabolic acidosis, severe malaria or cerebral malaria. Adults can suffer from multi-organ involvement frequently. People may acquire partial immunity, allowing occurrence of asymptomatic infections to occur in malaria endemic areas(World Health Organization 2015).

2.11 Diagnosis and treatment

Early diagnosis and treatment of malaria can prevent not only disease and also reduces deaths. It also contributes to reducing malaria transmission. Artemisinin-based combination therapy (ACT) is the best available treatment, especially for *P. falciparum* malaria. According to WHO recommending, all cases of suspected malaria can be confirmed by using parasite-based diagnostic testing (either microscopy or rapid diagnostic test) before administering treatment. Parasitological confirmation results can be available in 30 minutes or less. When a parasitological diagnosis is not possible, treatment that based only on symptoms should be considered(World Health Organization 2015).

2.12 Prevention and control

The best method for prevention and reduction transmission of malaria is vector control. If coverage of vector control interventions within a specific area is high enough, then a measure of protection will be conferred across the community. There are two forms which are effective in an extensive range of circumstances of vector control are insecticide-treated mosquito nets and indoor residual spraying(World Health Organization 2015).

2.12.1 Insecticide-treated mosquito nets (ITNs)

Long-lasting insecticidal nets (LLINs) are the first choice of ITNs for personal protection and malaria control. WHO recommendation is LLIN coverage is needed for all people at risk of malaria. The effective behavior change communication strategies are necessary to ensure that all people at risk of malaria sleep under a LLIN every night, and that the net is properly maintained(World Health Organization 2015).

2.12.2 Indoor spraying with residual insecticides

Indoor residual spraying (IRS) with insecticides is an authoritative way to reduce malaria transmission rapidly. If at least 80% of houses in the targeted areas are sprayed, its full potential is realized. Indoor residual spraying is effective for 3–6 months, but it is depending on the formulation for the insecticide used and the type of the surface on which it is sprayed. In some surroundings, multiple spray rounds are needed to protect the people for the entire malaria season. Antimalarial drugs can also be used for malaria prevention. For travelers, chemoprophylaxis can prevent malaria, which suppresses the blood stage of malaria infections, by this means preventing malaria disease(World Health Organization 2015).

2.12.3 Man's Role in control of malaria

Man is the most important role in the malaria control. People can be made to understand the problem and can be prevented from malaria. Therefore great emphasis should be laid on educating the people about malaria and its control, so that the community can effectively contribute in controlling malaria(Thanabouasy 2008).

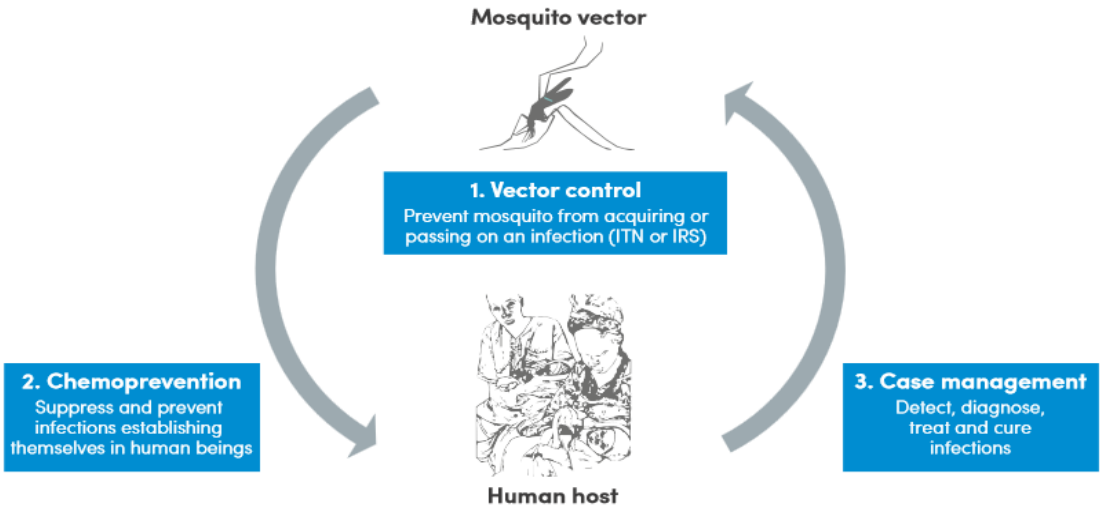


Figure 3: prevention and control circle

2.12.4 Importance of housing in malaria prevention and control

The house is the most commonly contact point, where humans and vectors come in contact, whether it is fleas, sandflies, or mosquitoes. The home is normally viewed as a place of relative safety, yet in many settings it is the place where the risk of malaria and other vector-borne diseases is highest. The structure of the home plays a key role in the ecology of malaria transmission. Inadequately constructed housing allows mosquitoes easy entry into the indoor living environment. Characteristics like open eaves, unscreened windows and doors, mud or thatch walls and roofs, and lack of ceilings are all risk factors for mosquito entry(AIA/ACSA 2015).

2.13 Reviews of relevant finding

There have been a considerable number of studies about the knowledge, attitudes and practices regarding malaria prevention in Myanmar and many other countries. However, according to background and rationale, it quite different and difficult to find this research is done at the Palaw Township, Tanintharyi Region. This survey will help to know about the socioeconomic factors, housing condition, knowledge, attitude and practice toward malaria prevention among villagers of Palaw Township.

In the study among householders from 20 villages across the coastal plain of Chiapas, Mexico in 2012, the percentages of householders used the methods to prevent mosquito bites, householders used bed-nets and householders bought some products for mosquito protection were 98.1%, 94.3% and 72% respectively. Almost all of the householders were preferred with IRS spraying insecticide and a frequency in every two months (Merit Mora-Ruiz and Rodríguez 2014).

In the KAP study conducted in 2009 in Paksong district, Champasack province, Lao PDR, knowledge on malaria prevention was significantly associated with occupation, education, marital status, length of stay, monthly family income, and ever hearing of malaria, which were $p < 0.001$, $p < 0.001$, $p = 0.007$, $p < 0.001$, $p < 0.001$, $p < 0.001$ respectively. Gender, occupation and monthly family income were strongly associated with practice which were $p = 0.017$, $p < 0.001$, and $p < 0.001$ respectively. Attitude was strongly associated with monthly family income, occupation, education and length of stay which were $p < 0.001$, $p < 0.001$, $p = 0.020$ and $p = 0.002$ respectively(Thanabouasy 2008).

A community based KAP study was done in Antimaria Association intervention zones of Amahara National Regional State, Ethiopia by Zewdie Anderaw and Molla Gedefaw in March, 2011. 864 participants were involved in this study and proportional portion was done among urban and rural residents by using trained data collectors and supervisors through questionnaires and interviewing guidelines. This study showed that 37.6% of the study participants mentioned fever as symptom of malaria. The acceptance rate of Indoor Residual Spraying as malaria control and prevention method is 5.37%. From the general population, 26.4% of the participants used Insecticide Treated Nets as malaria prevention and control method. From the total study participants, 66.6%, 50.8%, 64.8% have a good knowledge on clinical manifestations, signs and symptoms, and prevention methods of malaria, respectively. 69% of the participants have positive attitude towards malaria treatment and 47% of them have good practice towards malaria prevention and control activities(Gedefaw 2013).

A descriptive cross-sectional study was carried out with a semi-structured questionnaire among 100 and 123 households from forest-aboriginal and rural areas, of

Peninsular Malaysia respectively. This study showed that rural participants have a higher knowledge on malaria and its transmission than the aborigines significantly (86.2% vs 76%, $p < 0.01$). However, the aboriginal population was significantly higher about the use of medicinal plants and beliefs in witchcraft and sorcery in treating febrile diseases ($p < 0.01$). There were no significant differences between the two communities in terms of the knowledge about malaria symptoms, attitudes towards its severity and practices in preventive measures against malaria by using mosquito bed nets. However, the knowledge and practice of different preventive measures to combat malaria, such as insecticide and the elimination of breeding areas, was significantly higher among the rural population than the aborigines ($p < 0.001$)(Abdulelah H Al-Adhroey 2010).

In the David A Forero and Herrera (2014) study which was conducted in municipalities of Tierralta, Buenaventura and Tumaco, it was found that knowledge and attitudes about transmission of malaria, anti-malarial drug use and diagnosis were significantly different. About "93.5% in MR, and 94.3% in HR areas indicated use of insecticide-treated nets (ITNs) and 75.5% in HR indicated they did nothing to prevent malaria transmission outdoors". Significant gaps still remained relating to practices although there were high level of knowledge. Higher malaria risk was strongly associated with poor adherence to treatment and self-medication, as well as lack of both indoor and outdoor vector control measures (David A Forero and Herrera 2014).

In the study of Geita district, northwest Tanzania in 2009, there was a significant difference between education level and knowledge on transmission ($p < 0.001$) and about 56% of respondents was associated with occurring disease by mosquito bites. Education status was associated with knowledge of mosquito breeding areas ($P < .001$) and it was also associated with usage of bed nets by the respondents ($p < 0.1$).About

86.3% of respondents agreed with indoor residual spraying of insecticides(Humphrey D. Mazigo 2010).

In 2007 study among 504 community members in epidemic and non-epidemic villages of Muleba district, Tanzania, almost all of the respondents (90.1%) described malaria as the most important disease in their area, and about 92.1% knew that malaria is transmitted through mosquito bite. A total of 436 (86.7%), 306 (60.8%) and 162 (32.1%) mentioned fever, vomiting and loss of appetite as major symptoms/signs of malaria, respectively. About 58.7% of the respondents reported that they have at least one mosquito net and about 78.8% knew insecticides used to impregnate bed nets. About two thirds (63.3%) of the respondents had at least a household member who suffered from malaria during the recent epidemic. During the 2006 outbreak, 278 people (87.2%) sought treatment from health facilities while 27 (8.5%) obtained drugs from drug shops and 10 (3.1%) used local herbs. Household location and level of knowledge of cause of malaria were significant associated and being predictors of a household being affected by epidemic(Safari M Kinung'hiEmail author 2010).

In the systematic review and meta-analysis study by Lucy S Tusting and Steve W Lindsay (2015), 39 (74 %) showed trends towards a lower risk of epidemiological outcomes associated with improved house features. Residents of traditional houses had 53% higher odds of malaria infection than modern houses (adjusted odds ratio (OR) 0°53, 95 % confidence intervals (CI) 0°42–0°67, p < 0°001, five studies) (Lucy S Tusting and Steve W Lindsay 2015).

The cohort study of house poor construction related with increased malaria incidence in young Ugandan children showed that living in non-earth floors modern house which using non-thatched roofs, and non-mud walls, have association with just

about half malaria incidence compared with a traditional house living children(Katherine Snyman and Hugh Sturrock 2015).

A study in two areas in Bangladesh regarding their behavior shows that near 50% of residence experienced malaria episodes in the previous year during face to face interview with the locals. More than three quarter of the locals did not know the mode of transmission of malaria is vector-borne transmission. Awareness of the respondents on the transmission of malaria and symptoms of the malaria in the different areas are not the same from the study. Most of the people residing in the areas responded that sleeping under the bed net is extremely important for prevention of malaria, but association between sleeping with a bed net and prevalence cannot be established in the study. The things that have association with malaria prevalence are education, family members, working outside the house at night, having pets near the resident and Housing Status of the residents. Among the associated factors, Housing conditions are shown to be most prominent factor and almost half of the people living in both areas suffered from malaria infection(Kabirul BasharEmail author 2012).

A study about application of preventive practices against malaria among adolescents in India showed that they know the causal organism, a vector-borne infection, mode of transmission. The significant findings in the study were male know more about protective behavior, some responded that flies were the vector for malaria, only half of them know the symptoms of malaria, no one knows about LLINs. More than half of the respondents reported self-administration of anti-malaria drugs when they suffered from symptoms of malaria(Dharampal G. Dambhare1 2012).

Chapter 3

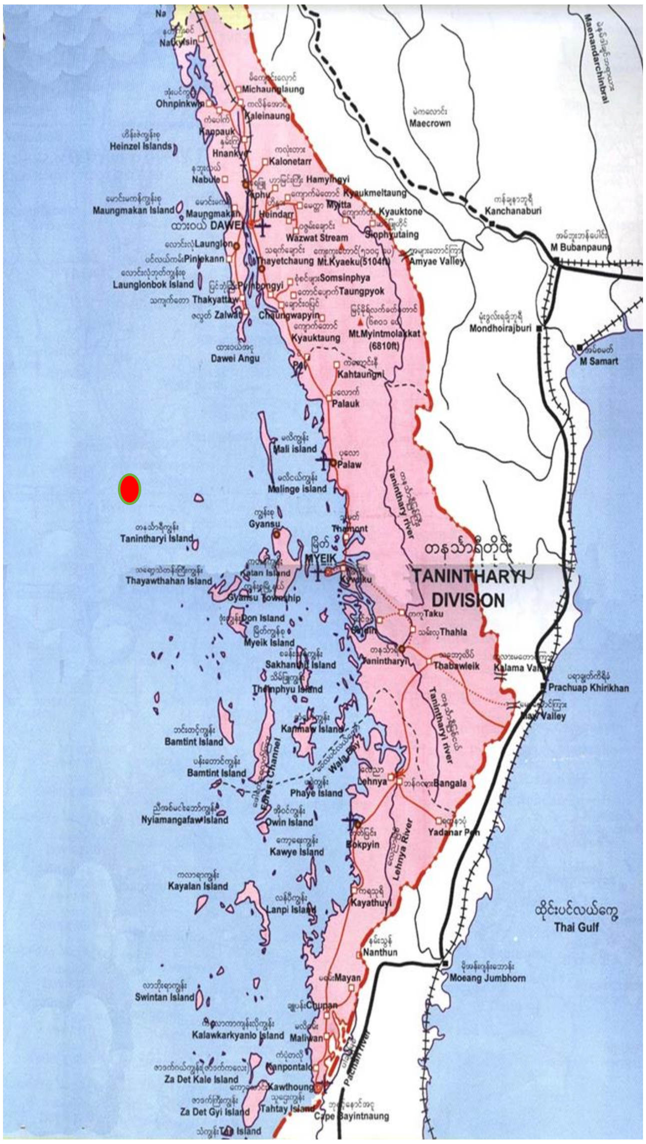
Research Methodology

3.1. Research Design

A cross-sectional survey method was used to identify knowledge, attitude and practice regarding malaria prevention among population in Palaw Township, Tanintharyi Region of Myanmar. The socioeconomic factors and home environment of respondents were also examined in this study. This was conducted during June-July,2016.

3.2. Study Area

This study was conducted among population in Palaw Township of Tanintaryi Region, southernmost part of Myanmar. Palaw Township is included in the highest endemic four Township of Tanintaryi Region(Department of Health 2012). All of the total 128 villages in Palaw Township are in malaria endemic area(Vector Borne Disease Control 2013). Total population of Palaw Township is 92709. Total confirm malaria case was 1573 and morbidity rate is 11.42 in 2013(Vector Borne Disease Control 2013). The occupation of population relate to agricultural and fishing. There are also rubber and oil plantation in this township. There are many ethnic groups with different culture, language, culture, beliefs and lifestyles. Moreover, economy and literacy rate is low in this area.


TANINTHARYI
DIVISION
တနင်္သာရီတိုင်း
DAWEI
MYEIK
Michaunglaung
Ohnpinkwin
Kaleinaung
Kappauk
Heinzel Islands
Hnankye
Kalonetarr
Nabule
Hamyingyi
Kyaukmeltaung
Maungmakan Island
Maungmakan
Myitta
Heindarr
Kyauktone
Sinphyutaing
Wazwat Stream
Launglon
Pinlekann
Thayetchaung
Mt.Kyaeku(5104ft)
Amyae Valley
Launglonbok Island
Somsinphya
Taungpyok
Thakyattaw
Zalwat
Chaungwapyin
Kyauktaung
Mt.Myintmolakkat (6810ft)
Dawei Angu
Kahtaungni
Palauk
Mali island
Palaw
Malinge island
Gyansu
Tanintharyi Island
Thamont
Tanintharyi river
Thayawthahan Island
Katan Island
Kyweku
Gyansu Township
Don Island
Taku
Myeik Island
Thahla
Sakhanthit Island
Tanintharyi
Thabawleik
Kalama Valley
Thenphyu Island
Kanmaw Island
Bamtint Island
Forest Channel
Wala Bay
Lehnya
Bangala
Phaye Island
Nyiamangafaw Island
Owin Island
Bokpyin
Yadanar Pon
Kawye Island
Lehnya River
Kayalan Island
Lanpi Island
Kayathuyi
Nanthun
Mayan
Swintan Island
Chupan
Kalawkarkyanlo Island
Maliwan
Kanpontalo
Za Det Kale Island
Kawthoung
Za Det Gyi Island
Tahtay Island
Cape Bayintnaung
Pachan River
Maecrown
Kanchanaburi
M Bubanpaung
Mondhoirajburi
M Samart
Prachuap Khirikhan
Moeang Jumbhorn
Thai Gulf
ထိုင်းပင်လယ်ကွေ့
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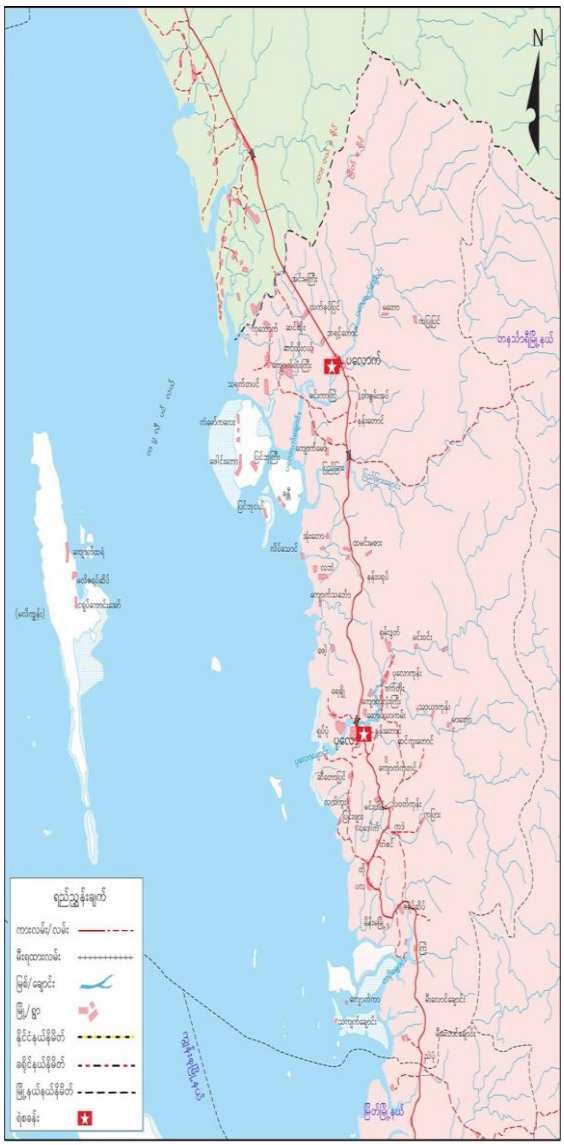

Figure 4: Maps of Palaw Township

3.3. Study Population

Target population of this study consists of population aged 18-64 (according to Malaria in Myanmar), which is about 62579 population of this area, both male and female whose are currently livings in Palaw Township of Tanintharyi Region, Myanmar(Ministry of Health 2009).

3.4. Sample size

Sample estimation was calculated by the Formula of Taro Yamane(G Gomoro 2014).The formula to calculate the sample size was: $n = \frac{N}{1+Ne^2}$

Which is valid were: n = sample size

N = population size of age 15 to 64 (67.5% of total population, from malaria situation in Myanmar): 62579

e = significant level (0.05)

$$n = \frac{N}{1+Ne^2}$$

$$= \frac{62579}{1+62579(0.05)^2}$$

$$= 397$$

In this study, the estimated calculation was at least 397 and 10% was added to prevent data losing. The total sample size is 430 household.

Inclusion criteria

- Age between 18 years and 64 years of both male and female at the time of survey
- Being a family member at the time of survey
- Living continually in the selected villages over a year
- Voluntarily agree to participate in the study

Exclusion criteria

- Member of selected household who have mental health problem

- Member of selected household who have deaf and dumb

3.5. Sampling method

1. First choose 89high risk villages from 128 villages of Palaw Township and select 9 villages of malaria startum 1a from the north part of the township by purposive sampling method. (Criteria for malaria stratification shown at the appendix B)
2. Households were selected by proportion to size from 9 villages as following;

Village No.	Name	Total Household	Sample Household
1	Warzoonoak	114	50
2	Margonemar	85	37
3	Chaungphyar	134	58
4	Pyingyi	78	34
5	Yaypu	114	50
6	Ngatat	112	49
7	Meetkyaungphyu	75	33
8	Zardiwin	83	36
9	Htaminmasar	190	83
		985	430

3. Sample household in each village was selected by systemic random sampling method. Total household in each village was divided by total sample household in each village. So we got sample interval. Select random number from 1 to sample interval and then select next subject by random number with sample interval and so on.
4. If there would be more than one participant who meet inclusion and exclusion criteria, the subject form each sample household was selected by simple random sampling method. (Step of sampling method was presented in figure 5)

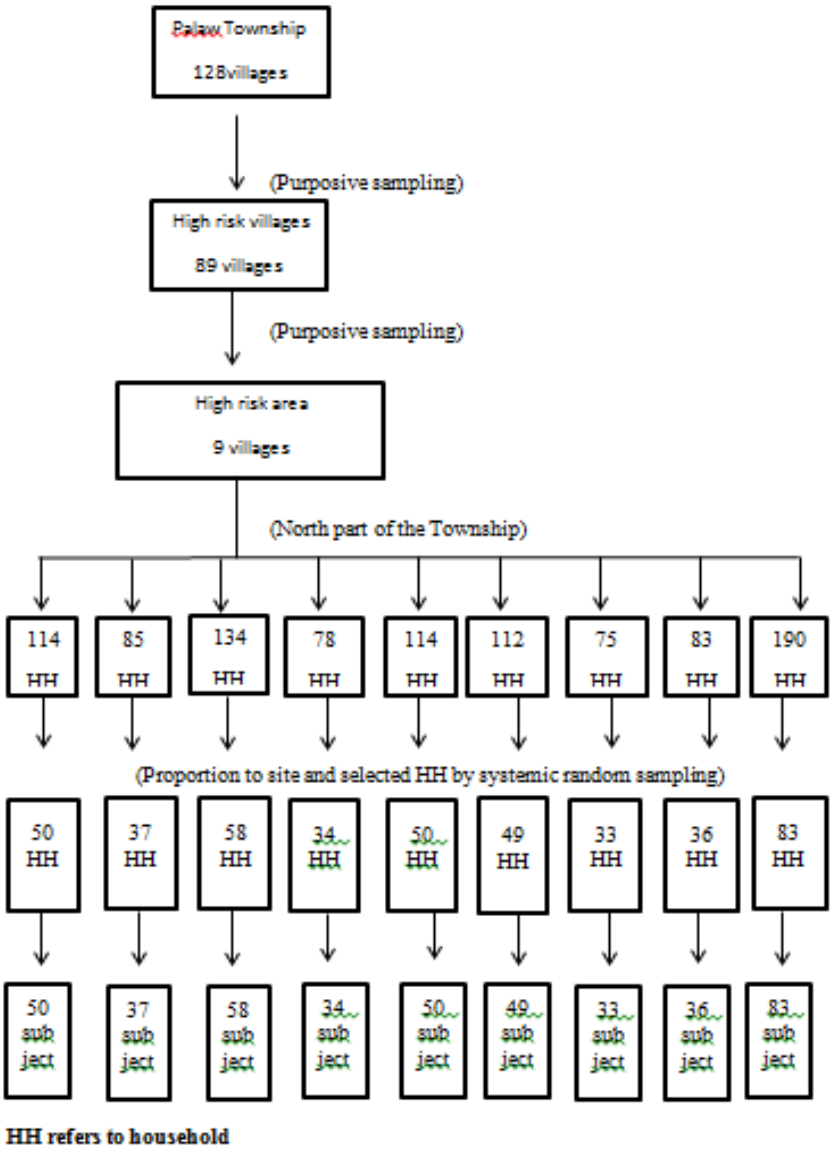

Figure 5: Multistage Random Sampling

3.6. Measurement Tools

Questionnaire was used for this research and it was comprised of the following 5 parts:

Part 1: Socioeconomic and education

This part of questionnaire consists of questions on the socioeconomic factors (8 items) of the sample population of the sample population with including age, gender, marital status, ethnicity, current occupation, monthly income and education level and also duration of stay in Palaw Township(Thanabouasy 2008).

Part 2: Housing condition

This part of questionnaire consists of questions on house condition such as (8 items) family member, people per room in the house, number of family member infected with malaria, what kind of walls, floor and roof of the house(Merit Mora-Ruiz and Rodríguez 2014).

Part3: Knowledge about malaria

This part of questionnaires (41 items) comprises of vector of malaria, malaria species, breeding site, resting place, feeding time, symptoms, treatment, prevention and control of malaria disease.

-The correct answer get: 1 score

-The wrong answer get: 0 score

The possible score ranged from 0 to 41 for knowledge on malaria, and respondent's knowledge was classified into three levels. The cut-off point for 'Goood knowledge': greater than 80% of 37 scores, 'Moderate knowledge': from 60% to 80% of 37 scores, 'Poor knowledge': less than 60% of 37 scores (Mulet Yimer 2013).

Table 1: Classification of knowledge about malaria

Knowledge about malaria	Items	Good knowledge	Moderate knowledge	Poor knowledge
Cause	17 items	>13 scores	11 – 13 scores	<11 scores
Symptoms	7 items	>5 scores	5 scores	<5 scores
Transmission	4 items	>3 scores	3 scores	<3 scores
Prevention regarding home environment	13 items	>10 scores	8 – 10 scores	<8 scores
Total knowledge level	41 items	>32 scores	25 – 32 scores	<25 scores

Part 4: Attitudes towards malaria

This part of questionnaires (20 items) aims to determine the attitudes of the participant toward malaria such as perceived susceptibility, severity and threat. The answer were categorized into five levels strong agree to strong disagree.

-For positive items (10 items), the answer: “Strong agree” get 4 scores, ”agree “get 3 scores, ”Moderately” get 2 scores, “Disagrees” get 1 score and “Strong disagree” get 0 score.

-For Negative score was given for negative items (10 items): “Strong agree” get 0 scores, ”agree “get 1 scores, ”Neutral” get 2 scores, “Disagrees” get 3 score and “Strong disagree” get 4 score(Thanabouasy 2008).

The respondents’ attitude was classified into three levels: “Good/high attitude”, “Moderate attitude” and “Poor attitude”. The cut-off point for ‘High attitude’ was

mentioned: greater one third of the total scores, ‘Moderate attitude’: middle one third to the total scores, ‘Poor attitude’: lower one third of the total scores.

Table 2: Classification of knowledge about malaria

Attitude towards malaria	Items	Good attitude	Moderate attitude	Poor attitude
Susceptibility	4 items	>10 scores	6 – 10 scores	<6 scores
Threat	4 items	>10 scores	6 – 10 scores	<6 scores
Treatment	6 items	>16 scores	9 – 16 scores	<9 scores
Home environment prevention	6 items	>16 scores	9 – 16 scores	<9 scores
Total attitude level	20 items	>53 scores	27 – 53 scores	<27 scores

Part 5: Practices on malaria prevention

This part of questionnaires comprises of 19 items. Practice of malaria prevention focus on the sample population activities to prevent malaria infection. The answers were categorized into three levels: Every times, Sometimes, and Never. For those who answered “Every times” get 2scores, “Sometimes” get 1score, and “Never” get 0 score(A J Abedi 2011). The possible scores ranged from 0 to 38 scores, and the respondents’ practice was classified into three levels: “High practices”, “Moderate practices” and “Poor practices”. The cut-off point for ‘High attitude’ was

mentioned: greater one third of the total scores, ‘Moderate attitude’: middle one third to the total scores, ‘Poor attitude’: lower one third of the total scores.

Table 3: Classification of knowledge about malaria

Practices on malaria and home environment prevention	Items	Good practices	Moderate practices	Poor practices
Personal protection	11 items	>14 scores	8 – 14 scores	<8 scores
Home environment prevention	8 items	>10 scores	6 – 10 scores	<6 scores
Total practices level	19 items	>25 scores	13 – 25 scores	<13 scores

3.7 Validity and Reliability

To establish the reliability, we were conducted the pilot study. The questionnaire was tested with 25 respondents among population in Bago Region, Myanmar. The reliability coefficient (alpha) was acceptable on knowledge questionnaire were 0.75, attitude questionnaire were 0.81 and practices questionnaire were 0.79.

To achieve the validity of the questionnaires, the reviewing literature and 3 consulting content experts were performed. The 3 consulting consent experts were

obtained from 1 academic and 2 local experts. Two academic experts opinions were obtained from Assoc. Prof. Ratana Somrothong, PhD and Dr. Tepanat Pumpaiboon, PhD. One local expert opinion will be obtained from Dr. Myo Min, Project Manager of Malaria, Myanmar Medical Association. Validity was considered acceptable by Item-Objective Congruence (0.82) of the total score.

3.8 Data Collection

Face to Face interview method was utilized. Nine research assistants were contributed from the staff member of the community health workers and malaria volunteers from each village in this study and they were well-trained for one day about the objectives of this study, content of questionnaire and data collection process. For recruit participants, the study was done through the village health volunteers of each village. Then, before starting the interview with the participants, the interviewer explained the instructions of the questionnaire, purpose and benefit of the study, confidentiality and some consideration. Then, the consent form was provided to the subjects and they were free to withdraw if they unwilling to participate. Finally, We gave the correct answers of knowledge about malaria to the participants later the interviewing.

3.9 Data analysis

After collection data, the questionnaire was coded before entering into the computer (SPSS).

a. Descriptive Statistics

Descriptive statistics such as frequency, percentage, median, standard deviation, mean, range and normality test were used for analyzing the general characteristics of

the respondents as well as knowledge on malaria, attitude towards malaria and practice regarding malaria prevention.

b. Inferential Statistics

Chi-Square and Fisher's exact test was used to determine the association between the independent and dependent variables. (Significant $P<0.05$)

3.10 Ethnical Consideration

The research proposal was submitted to the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University with the approval number of COA No. 116/2016. After receiving the permission from Ethical Committee, investigator contributed to collect data.

Chapter 4

Result

The study was an analytical cross-sectional research to study about socioeconomic and education level and housing conditions of respondents, knowledge, attitude and practices regarding malaria and home environment prevention among the population in Palaw Township, Tanintharyi Region of Myanmar. This chapter presents the finding from data analysis of this study on Myanmar. The data analysis reports on the survey, outcomes, and results, in the following orders:

1. Socioeconomic and education level of the respondents
2. Housing condition regarding malaria prevention
3. level of respondent's knowledge towards malaria infection
4. level of respondent's attitude towards malaria prevention
5. level of respondent's practices towards malaria and home environment prevention
6. Association between socioeconomic and education level and practices on malaria and home environment prevention
7. Association between housing condition and practices on malaria and home environment prevention
8. Association between knowledge and attitude about malaria and practices on malaria and home environment prevention

The total number of subjects in this study was 430. The participants in this study were the age between 18-64 years who are residing in the villages of Palaw Township, Tanintharyi Region, Myanmar.

4.1 Socioeconomic and education level of respondents

Majority of the respondents were aged between 41-53 years. Average age of the respondents was 28-54 years. Majority of respondents were female (75.8%). Most of the respondents were married (67.7%), 21.9% were single and only few of them were divorced and widowed with 1.9% and 8.6% respectively. Majority of the respondents were are Burma (77.4%), some of them were Kayen (15.6%) and only few of them (3.5%) were Mon and other ethnic respectively. Majority of the respondents (41.9%) had completed primary school education while 10.7% of them have never attend school. There was about 27.2% and 10.5% attend secondary school and high school education respectively. Only 9.8% have college or university school education. Most of the respondents were housewife and agriculture with 34.4% and 36.7% respectively. Some of them were small shop owner and vendor (10.7%), Teacher (5.3%), Livestock (3.5%) and daily wages (5.6%). Only few of them were health personnel (1.4%). (Table 4) The level of economic status of the respondents had been assessed on the basic of monthly total family income. Total monthly family income ranged from 400,00 – 900,000 kyats. The average income was 205744.19 (±96273.09) kyats*1 USD = 1200 kyats (approximately). Majority of respondents (67.5%) had monthly family income less than 200,000 kyats; (36.3%) most of them had income less than 150,000 kyats and 31.2% of respondents had income 150,000-200,000 kyats. About 32.5% of respondents had total monthly family income more than 200,000 kyats; 12.3% and

20.2% of them had income 200,001-250,000 and more than 250,000 kyats respectively. Average duration of stay among participants was 19-52years in Palaw Township, Tanintharyi Region.(Table 4)

Table 4: Frequency and percentage distribution of respondents by socioeconomic and education level (n=430)

Socioeconomic and education level	Frequency	Percentage
Age		
18-30	110	25.6
31-40	105	24.4
41-53	112	26.0
54-64	103	24.0
Mean=41.36,SD=13.036, Median=40.50, Range=18-64		
Gender		
Male	104	24.2
Female	326	75.8
Marital status		
Single	94	21.9
Married	291	67.7
Divorced	8	1.9
Widowed	37	8.6
Ethnicity		
Burma	333	77.4
Mon	15	3.5
Kayen	67	15.6
Others	15	3.5
Education		
Never attend school	46	10.7
Primary school	180	41.9
Secondary school	117	27.2
High school	45	10.5
College/University	42	9.8
Occupation		
Housewife	148	34.4
Teacher	23	5.3

Health personnel	6	1.4
Small shop owner	35	8.1
Vendor	11	2.6
Livestock	15	3.5
agriculture	158	36.7
Daily wages	24	5.6
Others	10	2.3
Monthly family income(Kyats)		
≤150,000	156	36.3
150,001-200,000	134	31.2
200,001-250,000	53	12.3
>250,000	87	20.2
Mean=205744.1860,SD=96273.08603 Median=200,000, Range= 400,00-900,000		
Duration of stay		
1-24 years	110	25.6
25-35 years	115	26.7
36-49 years	98	22.8
≥ 50 years	107	24.9
Mean=35.6279 , SD= 16.21307 Median= 35 years, Range= 2-69 years		

***1 USD = 1200 kyats (approximately)**

4.2 Housing condition regarding malaria prevention

Table 5 shows the details of frequency and percentage of respondents' housing conditions including information regarding family members whom infected malaria during last 6 months ago.

The characteristic of house components among respondents shows that more than half of the residents' wall surface was made by wood (53.7%) and most of the rest (26.0%) was made by block or brick, some of them was made with bamboo (16.5%) and others kind of wall was 2.6 %. Only 1.2% of residents stayed at their home without

wall. Majority of the residents' house floor was made from wood (73.5%). Some of them was made by cement and others such as bamboo with 20.5% and 4.2% respectively. Nearly three quarters (72.6%) of the residents' roof was made with straw or palm, few of the residents' roof was made by zinc sheet (19.8%). (Table 5)

Majority of the respondents (66.5) had total family member of 4-6 persons, 13.3% of respondents had total family member 1-3 persons and 20.2% of respondents had total family member 7-11 persons. Most of the respondents (74.0%) was sleeping 1-3 persons per bedroom. Average sleeping per bedroom was 2-4 persons (Table 4.2). Only 4.2% of the respondents have malaria infected family member in the past 6 months ago. Some of them (24.9%) had one infected family member and few of them (9.1%) had more than one infected family member in the past. Average age of infected family member was 11-38years old. (Table 6)

Table 5: Frequency and percentage distribution of respondents by housing condition and malaria prevention (n=430)

Housing condition	Frequency	Percentage
Wall's surface		
Block or brick	112	26.0
Wood	231	53.7
Bamboo	71	16.5
No walls	5	1.2
Others	11	2.6
Floor		
Ground	8	1.9
Cement	88	20.5
Wood	316	73.5
Others (bamboo, etc..)	18	4.2
Roof		
Straw or palm	312	72.6
Cement	3	0.7
Wood	11	2.6
Zinc sheet	85	19.8
Tile and others (vinyl sheet, etc..)	19	4.5
Total family member		

1-3	57	13.3
4-6	286	66.5
7-11	87	20.2
Range=1-11 persons		
Number of people sleeping per bedroom		
1-3 persons	318	74.0
4-6 persons	104	24.2
7-10 persons	8	1.9
Range=1-10 persons		

Table 6: Frequency and percentage distribution of respondents by related infected malaria (n=430)

Malaria infection situation of participants	Frequency	Percentage
Malaria infected person 6months ago		
No	412	95.8
Yes	18	4.2
Number of family member infected malaria		
No infected	284	66.0
1 person	107	24.9
More than 1 person	39	9.1
Ages of malarious persons		
<13 years	51	11.7
13-21 years	52	12.1
22-34 years	46	10.7
>34 years	43	10.0
Range=2-58 years		

4.3 level of respondent's knowledge towards malaria infection

Table 7 shows the frequency and percentage of respondents who had level of knowledge about Causes, Transmission, Symptoms of malaria and Prevention regarding home environment. In the part of causes about malaria, more than half of the respondents (62.8%) had high knowledge level about malaria and 19.1% and 18.1% of respondents had poor and moderate knowledge level towards malaria. Most of the respondents (55.6%) had poor level of malaria transmission knowledge. Some of them

(21.6%) and (22.8%) had moderate and high level of malaria transmission knowledge respectively. Majority of respondents (60.0%) had high knowledge about malaria symptoms; some of them 18.1% and 21.9% had poor and moderate knowledge about malaria symptoms respectively. There was about 25.1%, 38.6% and 36.3% of respondents had poor, moderate and high knowledge level towards malaria and home environment prevention respectively. For overall knowledge towards malaria and home environment prevention, half of the respondent had high knowledge level (50.7%) and some of them had poor and moderate knowledge level towards malaria about 21.2% and 28.1% respectively. (Table 17 of frequency and percentage distributions of respondents who answered correctly to each question of knowledge on malaria was showed at the appendix)

Table 7 : Frequency and percentage distributions of level of respondent's knowledge towards each question about malaria (n=430)

Knowledge	**Frequency**	**Percent**
Cause		
Poor	82	19.1
Moderate	78	18.1
High	270	62.8
Transmission	239	55.6
Poor	93	21.6
Moderate	98	22.8
high		
Symptoms		
Poor	78	18.1
Moderate	94	21.9
High	258	60.0
Prevention regarding home environment		
Poor	108	25.1
Moderate	166	38.6

High	156	36.3
Overall Knowledge		
Poor	91	21.2
Moderate	121	28.1
High	218	50.7

4.4 level of respondent's attitude towards each part of question about malaria prevention

Table 8 shows the frequency and percentage of respondents who had level of attitude about Susceptibility, Threat, Treatment of malaria and home environment prevention. Majority of the respondents (65.1%) had moderate level of attitude about malaria susceptibility and 21.9% and 13.0% of respondents had poor and high attitude level towards malaria susceptibility. Most of the respondents (61.4%) had moderate level of threat about malaria attitude; some of them 6.7% and 31.9% had poor and high level of attitude towards malaria threat respectively. More than half of the respondents (54.4%) had moderate attitude about malaria treatment, some of them 12.1% and 33.5% had poor and high attitude towards malaria treatment respectively. Majority of respondents (71.4%) had moderate attitude towards malaria and home environment and some of them (21.9%) had poor attitude towards malaria and home environment. Few of them (6.7%) had high attitude towards malaria and home environment. For overall attitude towards malaria and home environment prevention, majority of respondents (70.0%) had moderate attitude level. Only 13.7% and 16.3% of the respondents had poor and high attitude level. (Table 18 of frequency and percentage distributions of respondents who answered correctly to each question of attitude towards malaria was showed at the appendix)

Table 8: Frequency and percentage distributions of level of respondent's attitude towards each question about malaria prevention(n=430)

Attitude	Frequency	Percent
Susceptibility		
Poor	94	21.9
Moderate	280	65.1
High	56	13.0
Threat		
Poor	29	6.7
Moderate	264	61.4
high	137	31.9
Treatment		
Poor	52	12.1
Moderate	234	54.4
High	144	33.5
Home environment prevention		
Poor	94	21.9
Moderate	307	71.4
High	29	6.7
Overall Attitude		
Poor	59	13.7
Moderate	301	70.0
high	70	16.3

4.5 level of respondent's practices towards each part of question about malaria and home environment prevention

Table 9 shows the frequency and percentage of respondents who had level of prevention practices about personal protection to prevent malaria and home environment protection to prevent malaria. Majority of the respondents (69.3%) had moderate level of prevention practices towards personal protection and some of them 15.8% and 14.9% of respondents had poor and high prevention practice towards personal protection to prevent malaria. Not same as above, most of the respondents 47.4% and 42.6% of the respondents had moderate level and poor level of home environment prevention practices respevtively; few of them 10.0% had high level of home environment prevention practices. For overall pracices towards malaria and home

environment prevention, there was about 23.5%, 70.0% and 6.5% of respondents had poor, moderate and high level of practices respectively. (Table 19 of frequency and percentage distributions of respondent's practices on malaria prevention towards each question about malaria was showed at the appendix)

Table 9: Frequency and percentage distributions of level of respondent's practices towards each question about malaria(n=430)

Practices	Frequency	Percent
Personal protection to prevent malaria		
Poor	68	15.8
Moderate	298	69.3
High	64	14.9
Home environment protection to prevent malaria		
Poor	183	42.6
Moderate	204	47.4
High	43	10.0
Overall Practice		
Poor	101	23.5
Moderate	301	70.0
High	28	6.5

4.6 Association between socioeconomic and education level and practices on malaria and home environment prevention

The association with between socioeconomic and education level and practices on malaria and home environment prevention was shown in table 10. It showed that there were 5 variables statistically associated with chi-square test (P-value <0.05). We found that there was significant association between age group and practices on malaria and home environment prevention ($p<0.001$), education level and practices ($p<0.001$), occupation and practices ($p<0.001$), monthly family income and practices ($p=0.003$), duration of stay and practices ($p=0.002$).

Regarding age groups, the proportion of good practices was highest in 18-30 aged groups (10.9%), 31-40 aged groups was 4.8%, 41-53 aged groups was 6.3% and good practices was lowest in 54-64 aged group (3.9%). There was about proportion of 74.5% and 14.5% with moderate and poor practices respectively in 18-30 aged groups, 81.9% and 13.3% with moderate and poor practices respectively in 31-40 aged groups, 71.4% and 22.3% in 41-53 aged groups and 51.5% and 44.7% in 54-64 aged groups with moderate and poor practices respectively.

Regarding education level, good practices was high at college/university level (16.7%), 11.1% of respondents with high school level, 10.3% of respondents with secondary school level and 1.8% of respondents with never attend school and primary school level.

Regarding occupation, good practices was high with health personal and teacher (13.8%) then, agriculture and live-stocker (6.4%) and housewife (6.1%). There was about good practices proportion of 5.9% and 4.3% with daily wags and others group and small shop owner and vendor group respectively.

Regarding monthly family income, good practice was highest among those who total family income more than 250,000 kyats per month (10.3%) while in the group with income less than 150,000 kyats per month, income between 150,000-200,000 kyats per month and income between 210,000-250,000 kyats per month found 7.7%, 2.2% and 7.5% respectively.

Regarding duration of stay, good practice was lowest among those who lived more than 50 years (3.7%) while in the group 1-25 years, 26-35 years and 36-50 years with 6.4%, 9.6% and 6.1% respectively.

Table 10: Association between socioeconomic and education level and practices on malaria and home environment prevention (n=430)

Socioeconomic and Education level	Good practices	Moderate practices	Poor practices	Chi-square	P-value
Age (4 groups,quartile)	12(10.9%)	82(74.5%)	16(14.5%)		
18-30					
31-40	5(4.8%)	86(81.9%)	14(13.3%)	40.484	<0.001
41-53	7(6.3%)	80(71.4%)	25(22.3%)		
54-64	4(3.9%)	53(51.5%)	46(44.7%)		
Range=18-64					
Gender					
Male	9(8.7%)	70(67.3%)	25(24.0%)	1.126	0.569
Female	19(5.8%)	231(70.9%)	76(23.3%)		
Marital status					
Single	8(8.5%)	71(75.5%)	15(16.0%)		
Married	18(6.2%)	200(68.7%)	73(25.1%)	5.989[a]	0.383
Divorced	0(0.0%)	7(87.5%)	1(12.5%)		
Widowed	2(5.4%)	23(62.2%)	12(32.4%)		
Ethnicity					
Burma	25(7.5%)	237(71.2%)	71(21.3%)		
Mon	1(6.7%)	12(80.0%)	2(13.3%)	9.572[a]	0.110
Kayen	1(1.5%)	42(62.7%)	24(35.8%)		
Others	1(6.7%)	10(66.7%)	4(26.7%)		
Education					
Never attend school and primary school	4(1.8%)	143(63.6%)	79(35.0%)		
Secondary school	12(10.3%)	93(79.5%)	12(10.3%)	48.511	<0.001
High school	5(11.1%)	35(77.8%)	5(11.1%)		
College/University	7(16.7%)	30(71.4%)	5(11.9%)		
Occupation					
Housewife	9(6.1%)	87(58.8%)	52(35.1%)		
Teacher and health personnel	4(13.8%)	24(82.8%)	1(3.4%)		
Small shop owner and vendor	2(4.3%)	38(82.6%)	6(13.0%)	32.930	<0.001
Agriculture and livestock	11(6.4%)	132(76.3%)	30(17.3%)		
Daily wages and others	2(5.9%)	19(55.9%)	13(38.2%)		
Monthly family income(Kyats)					
<150,000	12(7.7%)	103(66.0%)	41(26.3%)		
150,000-200,000	3(2.2%)	89(66.4%)	42(31.3%)	19.936	0.003
210,000-250,000	4(7.5%)	40 (75.5%)	9(17.0%)		

>250,000	9(10.3%)	69(79.3%)	9(10.3%)		
Range= 400,00-900,000					
Duration of stay					
1-25 years	7(6.4%)	74(68.2%)	28(25.5%)		
26-35 years	11(9.6%)	88(76.5%)	16(13.9%)	21.214	0.002
36-50 years	6(6.1%)	75(76.5%)	17(17.3%)		
More than 50 years	4(3.7%)	63(58.9%)	40(37.4%)		

(a= Fisher extract test value)

Table 11: Association between housing condition and practices on malaria and home environment prevention (n=430) (a= Fisher extract test value)

Housing condition	Good practices	Moderate practices	Poor practices	Chi-square	P-value
Wall's surface					
Block or brick	13(11.6%)	84(75.0%)	15(13.4%)		
Wood + Bamboo + No walls + Others	15(4.7%)	217(68.2%)	86(27.0%)	13.151	0.001
Floor					
Cement	10(11.4%)	67(76.1%)	11(12.5%)		
Ground + Wood +Others	18(5.3%)	234(68.4%)	90(26.3%)	10.283	0.006
Roof					
Cement + Zinc-sheet + Tile	13(14.4%)	63(70.0%)	14(15.6%)	14.050	0.001
Straw or palm + Wood +Others	15(4.4%)	238(70.0%)	87(25.6%)		
Total family member	6(10.5%)	43(75.4%)	8(14.0%)		
1-3	15(5.2%)	199(69.6%)	72(25.2%)	5.268	0.261
4-6	7(8.0%)	59(67.8%)	21(24.1%)		
7-11					
Range=1-11 persons					
Number of people sleeping per bedroom	23(7.2%)	233(73.3%)	62(19.5%)		
	3(2.9%)	64(61.5%)	37(35.6%)	17.196	0.002
	2(25.0%)	4(50.0%)	2(25.0%)		
1-3 persons					

4-6 persons					
7-10 persons					
Range=1-10 persons	28(6.8%) 0(0.0%)	294(71.4%) 7(38.9%)	90(21.8%) 11(61.1%)	8.459[a]	0.002
Malarious person 6months ago					
No	21(7.4%)	186(65.5%)	77(27.1%)	8.639	0.071
Yes	5(4.7%)	86(80.4%)	16(15.0%)		
Number of infected family member	2(5.1%)	29(74.4%)	8(20.5%)		
No infected					
1 person					
More than 1 person					

(a= Fisher extract test value)

4.7. Association between knowledge and attitude about malaria and practices on malaria and home environment prevention

Table 12 shown that there was significant association between knowledge about malaria and practices on malaria and home environment prevention ($p<0.001$), good practice was high with good knowledge (9.6%), moderate (2.6%) and poor (0.0%).

From association between knowledge levels of cause, transmission, symptoms, prevention regarding home environment towards malaria and practices on malaria prevention of respondents was shown in table 4.8. We found that there was significant association between cause and practices on malaria prevention of respondents ($p<0.001$), transmission and practices on malaria prevention ($p=0.001$), symptoms and practices on malaria prevention ($p<0.001$) and prevention regarding home environment and practices on malaria prevention ($p<0.001$).

Table 12: Association between knowledge levels of cause, transmission, symptoms, prevention regarding home environment towards malaria and practices on malaria and home environment prevention (n=430)

Knowledge	Good practices	Moderate practices	Poor practices	Chi-square	P-value
Cause					
Good	26(9.6%)	216(80.3%)	28(10.4%)	89.763 [a]	<0.001
Moderate	2(2.6%)	53(67.9%)	23(29.5%)		
Poor	0(0.0%)	32(39.0%)	50(61.0%)		
Transmission					
Good	14(14.3%)	69(70.4%)	15(15.3%)	19.309	0.001
Moderate	7(7.5%)	67(72.0%)	19 (20.4%)		
Poor	7(2.9%)	165(69.0%)	67(28.0%)		
Symptoms					
Good	26(10.1%)	203(78.7%)	29(11.2%)	64.292 [a]	<0.001
Moderate	2(2.1%)	58(61.7%)	34(36.2%)		
Poor	0(0.0%)	40(51.3%)	38(48.7%)		
Prevention regarding home environment					
Good	23(14.7%)	124(79.5%)	9(5.8%)	127.550 [a]	<0.001
Moderate	5(3.0%)	135(81.3%)	26(15.7%)		
Poor	0(0.0%)	42(38.9%)	66(61.1%)		
Overall knowledge					
Good	26(11.9%)	178(81.7%)	14(6.4%)		
Moderate	2(1.7%)	87(71.9%)	32(26.4%)	114.716 [a]	<0.001
Poor	0(0.0%)	36(39.6%)	55(60.4%)		

(a= Fisher extract test value)

Table 13 shown that there was significant association between attitude towards malaria and practices on malaria and home environment prevention (p<0.001), good practice was high with good attitude (12.9%), moderate (6.0%) and poor (1.7%).

The association between attitude levels of susceptibility, threat, treatment, home environment prevention towards malaria and practices on malaria prevention of respondents was shown in table 4.9. We found that there was significant association between susceptibility and practices on malaria prevention of respondents (p<0.001), threat and practices on malaria prevention (p<0.001), treatment and practices on malaria

prevention (p<0.001) and home environment prevention and practices on malaria prevention (p<0.001)

Table 13: Association between attitude level of susceptibility, threat, treatment and home environment prevention towards malaria and practices on malaria and home environment prevention (n=430)

Attitude	Good practices	Moderate practices	Poor practices	Chi-square	P-value
Susceptibility					
Poor	5(5.3%)	55(58.5%)	34(36.2%)		
Moderate	13(4.6%)	201(71.8%)	66(23.6%)	33.202	<0.001
Good	10(17.9%)	45(80.4%)	1(1.8%)		
Threat					
Poor	1(3.4%)	10(34.5%)	18(62.1%)		
Moderate	8(3.0%)	185(70.1%)	71(26.9%)	55.344	<0.001
Good	19(13.9%)	106(77.4%)	12(8.8%)		
Treatment					
Poor	2(3.8%)	15(28.8%)	35(67.3%)		
Moderate	10(4.3%)	163(69.7%)	61(26.1%)	92.255	<0.001
Good	16(11.1%)	123(85.4%)	5(3.5%)		
Home environment prevention					
	2(2.1%)	43(45.7%)	49(52.1%)		
	21(6.8%)	234(76.2%)	52(16.9%)	59.326 [a]	<0.001
Poor	5(17.2%)	24(82.8%)	0(0.0%)		
Moderate					
Good					
Overall attitude					
Poor	1(1.7%)	16(27.1%)	42(71.2%)		
Moderate	18(6.0%)	227(75.4%)	56(18.6%)	96.168	<0.001
Good	9(12.9%)	58(82.9%)	3(4.3%)		

(a= Fisher extract test value)

From association between housing condition and knowledge of prevention regarding home environment of respondents was shown in table 14. It showed that there were 5 variables statistically associated with chi-square test (P-value <0.05). We found that there was significant association between respondents' wall surface and knowledge of prevention regarding home environment (p=0.003), respondents' floor and knowledge of prevention regarding home environment (p=0.040), respondents' roof and knowledge of prevention regarding home environment (p<0.001), total family

member of the respondents and knowledge of prevention regarding home environment (p=0.012), number of sleeping per bed room and knowledge of prevention regarding home environment (p<0.001).

The respondents' house made by blocks or brick was high in good knowledge of prevention regarding home environment with 58.0% and respondents' house made by wood, bamboo, others and no wall with 44.1%. The respondents' floor made by cement was high in good knowledge with 58.0% and respondents' floor made by ground, wood and others with 48.8%. The respondents' roof made by cement, zinc-sheet and tile was high in good knowledge with 64.4% and respondents' roof made by straw or palm wood and others with 44.1%.

Regarding total family member of the respondents, good knowledge of prevention regarding home environment was highest among those who had total family member 1-3 persons (59.6%) while in the group with 4-6 persons and 7-11persons found 47.9% and 54.0% respectively.

Regarding number of sleeping per bed room, good knowledge of prevention regarding home environment was high with 1-3persons groups (55.0%), 4-6persons groups (38.5%), and 7-10persons groups (37.5%).

Regarding malaria infected family member in the past 6 months ago, it showed that the proportion of no malaria infected family member was high at good knowledge of prevention regarding home environment with 55.1% and respondents' family having infected family member in the past 6 months ago with 33.3%.

Table 14: Association between housing condition and knowledge of prevention regarding home environment (n=430)

Housing condition	Good knowledge	Moderate knowledge	Poor knowledge	Chi-square	P-value
Wall's surface					
Block or brick	65(58.0%)	36(32.1%)	11(9.8%)		
Wood + Bamboo + No walls + Others	153(48.1%)	85(26.7%)	80 (25.2%)	11.676	0.003
Floor	51(58.0%)	27(30.7%)	10(11.4%)		
Cement	167(48.8%)	94(27.5%)	81(23.7%)	6.424	0.040
Ground + Wood +Others	58(64.4%)		5(5.6%)		
Roof		27(30.0%)			
Cement + Zinc-sheet + Tile	160(47.1%)		86(25.3%)	17.484	<0.001
Straw or palm + Wood +Others		94(27.6%)			
Total family member	34(59.6%)	20(35.1%)	3(5.3%)		
1-3	137(47.9%)	76(26.6%)	73(25.5%)	12.782	0.012
4-6	47(54.0%)	25(28.7%)	15(17.2%)		
7-11					
Range=1-11 persons					
Number of people sleeping per bedroom	175(55.0%)	88(27.7%)	55(17.3%)		
1-3 persons	40(38.5%)	28(26.9%)	36(34.6%)	18.845[a]	<0.001
4-6 persons	3(37.5%)	5(62.5%)	0(0.0%)		
7-10 persons					
Range=1-10 persons	212(51.5%)	116(28.2%)	84(20.4%)	3.907	0.142
Malarious person 6months ago	6(33.3%)	5(27.8%)	78(38.9%)		
No					
Yes					

(a= Fisher extract test value)

From association between housing condition and attitude towards home environment prevention of respondents was shown in table 15. It showed that there were 3 variables statistically associated with chi-square test (P-value <0.05). We found

that there was significant association between respondents' wall surface and attitude towards home environment prevention (p=0.029), respondents' floor and attitude towards home environment prevention (p=0.001), respondents' roof and attitude towards home environment prevention (p=0.016).

The respondents' house made by blocks or brick was high in good attitude towards home environment prevention with 23.2% and respondents' house made by wood, bamboo, others and no wall with 13.8%. The respondents' floor made by cement was high in good attitude with 28.4% and respondents' floor made by ground, wood and others with 13.2%. The respondents' roof made by cement, zinc-sheet and tile was high in good attitude with 25.6% and respondents' roof made by straw or palm wood and others with 13.8%.

Regarding total family member of the respondents, good attitude towards home environment prevention was highest among those who had total family member 7-11 persons (20.7%) while in the group with 1-3 persons and 4-6persons found 17.5% and 14.7% respectively.

Regarding number of sleeping per bed room, good attitude towards home environment prevention was high with 7-10persons groups (25.0%), 1-3persons groups (17.0%), and 4-6persons groups (13.5%).

Regarding malaria infected family member in the past 6 months ago, it showed that the proportion of no malaria infected family member was high at good attitude towards home environment prevention with 16.3% and respondents' family having infected family member in the past 6 months ago with 16.7%.

Table 15: Association between housing condition and attitude towards prevention regarding home environment (n=430)

Housing condition	Good attitude	Moderate attitude	Poor attitude	Chi-square	P-value
Wall's surface					
Block or brick	26(23.2%)	76(67.9%)	10(8.9%)		
Wood + Bamboo + No walls + Others	44(13.8%)	225(70.8%)	49(15.4%)	7.109	0.029
Floor					
Cement	25(28.4%)	56(63.6%)	7(8.0%)		
Ground + Wood +Others	45(13.2%)	245(71.6%)	52(15.2%)	13.322	0.001
Roof					
Cement + Zinc-sheet + Tile	23(25.6%)	59(65.6%)	8(8.9%)	8.275	0.016
Straw or palm + Wood +Others	47(13.8%)	242(71.2%)	51(15.0%)		
Total family member	10(17.5%)	40(70.2%)	7(12.3%)		
1-3	42(14.7%)	204(71.3%)	40(14.0%)	1.965	0.742
4-6	18(20.7%)	57(65.5%)	12(13.8%)		
7-11					
Range=1-11 persons					
Number of people sleeping per bedroom	54(17.0%)	220(69.2%)	44(13.8%)		
1-3 persons	14(13.5%)	75(72.1%)	15(14.4%)	1.925[a]	0.748
4-6 persons	2(25.0%)	6(75.0%)	0(0.0%)		
7-10 persons					
Range=1-10 persons	67(16.3%)	289(70.1%)	56(13.6%)	0.150	0.928
Malarious person 6months ago	3(16.7%)	12(66.7%)	3(16.7%)		
No					
Yes					

(a= Fisher extract test value)

Table 16 shows the association between knowledge and attitude towards malaria and practices on home environment prevention of participants. We found that there was significant association between knowledge and practices on home environment prevention with p value (<0.001) and significant association between

attitude towards malaria and practices on home environment prevention with p value (<0.001)

Table 16: Association between knowledge and attitude about malaria and practices on home environment prevention (n=430)

Knowledge	**Good practices**	**Moderate practices**	**Poor practices**	**Chi-square**	**P-value**
Good	34(15.6%)	144(66.1%)	40(18.3%)		
Moderate	9(7.4%)	49(40.5%)	63(52.1%)	143.836 [a]	<0.001
Poor	0(0.0%)	11(12.1%)	80(87.9%)		
Attitude	**Good practices**	**Moderate practices**	**Poor practices**	**Chi-square**	**P-value**
Good	10(14.3%)	52(74.3%)	8(11.4%)		
Moderate	23(10.6%)	139(46.2%)	130(43.2%)	55.961	<0.001
Poor	1(1.7%)	13(22.0%)	45(76.3%)		

(a= Fisher extract test value)

Chapter 5

Discussion, Conclusions and Recommendations

This chapter first presents about discussion, limitations, conclusion and recommendations of research findings of this study.

A cross-sectional study was carried out among population living in villages of Palaw Township, Tanintharyi Region, Myanmar. Data were collected by using structured questionnaire. The respondents were 435 villagers aged 18-64 years resided in the study area.

The general objective of this study is to assess the levels of knowledge, attitudes, and practices regarding to malaria and home environment prevention among population in Palaw Township, Tanintharyi Region, Myanmar.

More specifically, this study aimed to:

- Describe the socioeconomic and education level such as age, gender, marital status, ethnicity, education level, current occupation, monthly family income, duration of stay, etc..
- Describe housing conditions such as resident's wall surface, floor, roof, number of people living in the house, average number of people sleeping per bedroom, does any infected family member in the past 6 months ago, number of infected family member in the past and ages of them, etc..
- Assess and determine the level of knowledge, various attitudes and extent of practices on malaria and home environment prevention among villagers in Palaw Township.

- Identify relationships between practices on malaria and home environment prevention with socioeconomic and education level, housing conditions, level of knowledge and attitude towards malaria.

5.1 Discussion

From this study, we found that there was significant association between age group and practices on malaria and home environment prevention ($p<0.001$), education level and practices ($p<0.001$), occupation and practices ($p<0.001$), monthly family income and practices ($p=0.003$), duration of stay and practices ($p=0.002$). Moreover, there was significant association between respondents' wall surface and practices on malaria and home environment prevention ($p=0.001$), respondents' floor and practices on malaria and home environment prevention ($p=0.006$), respondents' roof and practices on malaria and home environment prevention ($p=0.001$), number of sleeping per bed room and practices on malaria and home environment prevention ($p=0.002$), malaria infected family member in the past 6 months ago and practices on malaria and home environment prevention ($p=0.002$).

Concerning to overall knowledge on malaria prevention, 50.7% out of 430 subjects had good knowledge. This figure was lower than the finding of the study which conducted in Paksong District, Champasack Province, Lao PDR (59%) (Thanabouasy 2008). The proportion of poor knowledge on causes of malaria and transmission were 19.1% and 55.6% respectively. These were lower than the finding of proportion of people with poor knowledge on causes of malaria and higher than the result of poor knowledge on transmission in Karen Ethnic group in Umpiem Mai refugee camp, Phobphra District, Tak Province. The proportion of people with poor knowledge on malaria vector was 24% and transmission was 38% (Wahwahpaw Phensaengngam,

2008). The proportion of poor knowledge on malaria symptoms and prevention were 18.1% and 25.1% respectively. These were higher than the finding in Karen Ethnic group in Umpiem Mai refugee camp, Phobphra District, Tak Province. The proportion of people with poor knowledge on malaria symptoms and transmission was 1.3% (Wahwahpaw Phensaengngam, 2008). In this study , there were 66.4% of respondents misunderstood feeding time of mosquito as day time, 59.2% misunderstood that drinking contaminated water can transmit malaria, 44.9% misbelieve that eating contaminated food can transmits malaria and 61.9% had a misconception that malaria can be transmitted by closed contact with malaria patient. Almost of respondents (98.2%) had knowledge on malaria prevention by sleep under mosquito net and 95.4% of respondents had knowledge on home environment prevention by insecticide spraying, these figure was lower in sleeping under net knowledge than the finding in Karen Ethnic group in Umpiem Mai refugee camp, Phobphra District, Tak Province (99.2) and quite similar to the finding of above study (95.4%) (Wahwahpaw Phensaengngam, 2008). There was lower than half proportion of respondents knowing about building house with cement, lack of holes in their house and having ceiling can prevent malaria with 24.1%, 46.7% and 31.3% respectively. It shows that knowledge about housing structure and home environment prevention about malaria should be enhanced through NGOs program. Improved housing to protect malaria is characterized by features that can reduce the entry of mosquitoes indoors, such as closed eaves, screened doors and windows, ceilings, metal roofs and finished or improved wall surfaces. There is strong evidence that modern housing is protective in many tropical countries (Vector Control Working Group, 2015).

Regarding socioeconomic and education, statistically, were 5 variables significant association with age group and practices on malaria and home environment prevention ($p<0.001$), education level and practices ($p<0.001$), occupation and practices ($p<0.001$), monthly family income and practices ($p=0.003$), duration of stay and practices ($p=0.002$). As the result, the program of health education needs to enhance the knowledge on malaria causes, transmission, symptoms as well as prevention regarding home environment. Moreover, there are still needs to distribution of insecticide bed nets, insecticide spraying and malaria drugs.

Regarding housing condition and practices regarding home environment prevention of respondents, there were 5 variables statistically significant association between respondents' wall surface and practices regarding home environment prevention ($p=0.001$), respondents' floor and practices regarding home environment prevention ($p=0.006$), respondents' roof and practices regarding home environment prevention ($p=0.001$), number of sleeping per bed room and practices regarding home environment prevention ($p=0.002$), malaria infected family member in the past 6 months ago and practices on malaria and home environment prevention ($p=0.002$). As the result, the program of health education needs to enhance the correct understanding on housing structure as well as housing condition regarding home environment prevention.

Concerning to respondent's attitudes towards malaria prevention, there was about 13.7%, 70.0% and 16.3% of respondents had poor, moderate and high level respectively. This was lower than towards high attitude (40.1%), higher than towards moderate attitude (58.3%) respectively with the study conducted in Karen Ethnic group in Umpiem Mai refugee camp, Phobphra District, Tak Province and higher than towards poor attitude (1.6%) of above study (Wahwahpaw Phensaengngam, 2008).

This may be because negative perception of the residents who was misunderstood by local believes. In this study, four kind of different ethnicity was mainly participated and might have been some misbelieve of each ethnicity.

Regarding attitude towards malaria prevention, we found that there was significant association between susceptibility and practices on malaria prevention of respondents ($p<0.001$), threat and practices on malaria prevention ($p<0.001$), treatment and practices on malaria prevention ($p<0.001$) and home environment prevention and practices on malaria prevention ($p<0.001$). This study revealed out some incorrect attitudes towards malaria prevention, 41.4% of the respondents agree that malaria can be transmitted from person to person like common cold, 51.5% of the respondents thought that malaria could be transmitted through having close contact with malaria patient while 34.7% of respondents thought that it was fine to stop the medicine immediately as soon as the symptom disappeared and 31.5% agreed that they could buy a drug to treat themselves. Moreover, 51.5% of respondents thought that building house close to canal is not a risk factor of malaria, 58.7% thought that having holes in the house can be a greater risk of malaria infection. Besides, 64.9% of respondents thought that lack of ceiling is not the risk factor for malaria. Hence, the program should focus on detail information of the only cause of transmission by vector, anti-malarial drug; especially, drug resistant of malaria parasite, self-medication is risky as fake drugs and mosquito proof housing structure. Therefore, these points are needed to be focused on malaria's intervention programs in this area. It is possible that the more you read, the more you understand and the better understand and the better attitude you will have.

In relation to level of practice out of 430 respondents, only 6.5% had good practice, while most of respondents (70.0%) had moderate practice regarding malaria prevention

and 23.5% had poor practice. This result was similar in good practice (8.4%), lower than in moderate practice (90.1%) while higher than in poor practice (1.4%) of the study conducted in Teikkyi Township, Northeast of Yangon, Myanmar(Kyawt-Kyawt-Swe, 2004).

According to the personal protection to prevent malaria, Most of respondents (67.1%) slept under net every time, 2.1% of respondents use mosquito coil at night. This result was higher than in using bed net (51%) and lowers than in using mosquito coil (18.0%) with a study conducted in Myanmar (Kyawt-Kyawt-Swe, 2004).

According to home environment protection to prevent malaria, only 2.5% and 1.6% of respondents always take indoor and outdoor anti-mosquito spraying respectively, 53.6% clean the bushes around the house every time, 39.5% clean stagnant water near the house every time and 61.4% clear the dark corner of the house. This figure was higher than in indoor residual spraying (0.3%) and clearing dark corner the house (58.3%), similar with cleaning bushes around the house(53.6%) and lower than in outdoor anti-mosquito spraying (2.1%) and cleaning stagnant water (48.3%) with the study conducted in Karen ethnic group (Wahwahpaw Phensaengngam, 2008).

On the other hand, there was very low level or poor practice regarding mosquito repellent, mosquito coil, and indoor and outdoor anti-mosquito spray. It showed that 3.2% always use repellent to prevent them from mosquito bite and the finding was lower than the study in Paksong District, Champasack Provinince, Lao PDR (22.9%) (Thanabouasy, 2008). It was possible that because of economic problem. Unlike bed net these stuffs are not freely contributed by NGOs and difficult for them to afford it. Statistically, there was a significant association between practice and monthly family income (p=0.003).This finding was analogous to a study was done in Binh Ding

Province, Vietnam (p=0.006) (Hung, 2007) and a study conducted in Karen Ethnic group in Umpiem Mai refugee camp, Phobphra District, Tak Province (Wahwahpaw Phensaengngam, 2008).

The association between housing condition and knowledge of prevention regarding home environment of respondents showed that there was significant association between respondents' wall surface(p=0.003), respondents' floor (p=0.040), respondents' roof (p<0.001), total family member of the respondents (p=0.012), number of sleeping per bed room and knowledge of prevention regarding home environment (p<0.001). Moreover we found that there were significant association between respondents' wall surface (p=0.029), respondents' floor (p=0.001), respondents' roof and attitude towards home environment prevention (p=0.016). According to the above associations, we reveal that financial status affect the knowledge and attitude towards malaria. Malaria as a "poor man's disease", while there is agreement that malaria is linked with poverty, there is not debate about to upgrade knowledge about malaria and provide antimalarial supplements, get truthful understanding of housing conditions to prevent malaria for effective intervention to take place.

In this study, there was statistically significant in association with some socioeconomic factors, education level and practices on malaria and home environment prevention, housing condition and practices on malaria and home environment prevention, moreover, knowledge and attitude about malaria and practices on malaria and home environment prevention. Therefore, those factors associated with practices on malaria prevention that have an effect on malaria prevention. This study reveals that age, poor economic condition, working group of occupation, monthly family income,

duration of stay and education level are playing big role in this area and have direct bearing on the problem of malaria and home environment prevention and control in Palaw Township, Tanintharyi Region, Myanmar.

Limitations

There might be some limitations and restrictions since this study was done among population in high risk area of the Palaw Township only; hence, it cannot represent the whole population of Tanintharyi Region. Due to time constraint, the questionnaire items were not able to bring out the details and reasons of all aspects of malaria prevention such as mosquito repellent, insecticide spraying, antimalarial drug use and malaria services provide by NGOs , source of information and questionnaire for those who ever suffered from malaria.

This cross-sectional study, so we cannot find the causality of study factors. We did not know which factor was cause, and which factor was effect. Besides, this study cannot find out the respondent's practice over time. Moreover, there was the source of information bias.

Application benefit

The study assist to increase the knowledge among people in Palaw Township to improve malaria prevention practice such as sleeping under insecticide treated nets. The people will know how to do when they get malaria infection. Moreover, there will be known the status of home environment related to malaria prevention and the finding of this study will help government and non-government sectors involving malaria control and containment in Palaw Township to be better understanding in malaria situation and better for policy planning to promote the malaria prevention and control.

5.2 Conclusion

This research design was a cross-sectional study and it aimed to assess the socioeconomic factors, housing condition, knowledge, attitude and practice of population in Palaw Township, Tanintharyi Region, Myanmar regarding malaria and home environment prevention. Furthermore, it aimed to identify the association between socioeconomic factors, housing condition, knowledge, attitude and practices regarding malaria and home environment prevention in this population. The research was carried out in May 2016 by questioning 430 people. Data was collected by using structure questionnaire.

5.2.1 Socioeconomic and education level of respondents

In term of socioeconomic and education level of the sample, the age range ranged of 18-64 years old with the average age of the respondent was 28-54 years. Majority of respondents were female (75.8%). Most of the respondents were married (67.7%), 21.9% were single and only few of them were divorced and widowed with 1.9% and 8.6% respectively. Majority of the respondents are Burma (77.4%). Most of the respondents (41.9%) of them had completed primary school education while 10.7% of them have never attend school. Most of the respondents were housewife and agriculture with 34.4% and 36.7% respectively. Total monthly family income ranged from 40,000 – 900,000 kyats. The average income was 05744.19 (±96273.09) kyats. Majority of respondents (67.5%) had monthly family income less than 200,000 kyats. There was about 25.6%, 26.7%, 22.8% and 24.9% of respondents had lived for 1-24 years, 25-35 years, 36-49 years and more than 49 years respectively in Palaw Township, Tanintharyi Region.

5.2.2 Housing condition regarding malaria prevention

Regarding housing condition, half of the residents' wall surface was made by wood (53.7%), majority of the residents' house floor was made by wood (73.5%) and nearly three quarters (72.6%) of the residents' roof was made with straw or palm. Most of the respondents (66.5%) had total family member of 4-6 persons and (74.0%) was sleeping 1-3 persons per bedroom. Only 4.2% of the respondents have malaria infected family member in the past 6 months ago. More than half of the respondents' family (66.0%) had no infected family member. The age of infected family member was ranged from 2-58 years. There was about 11.7%, 12.1%, 10.7% and 10.0% of respondents family member suffered from malaria with the aged of <13 years, 13-21 years, 22-34 years and more than 34 years respectively.

5.2.3 Knowledge on malaria prevention

For overall knowledge towards malaria and home environment prevention, there was about 21.2%, 28.1% and 50.7% of respondents had poor, moderate and high level of knowledge respectively. Even through, most of the respondents (62.8%) had high knowledge level about causes, more than half of respondents, (55.6%) had poor level of malaria transmission knowledge. It was shown (60.0%) had high knowledge about malaria symptoms and on the other hand, only 36.3% of respondents had high knowledge level towards malaria and home environment prevention.

5.2.4 Attitude towards malaria prevention

In relation to attitude towards malaria prevention, the result of the research showed that there was about 13.7%, 70.0% and 16.3% of respondents had poor, moderate and high level of knowledge respectively.

5.2.5 Practices on malaria and home environment prevention

Out of 430 respondents, majority of the respondents 70.0% and 23.5% had moderate and poor practice respectively while a few of 6.5% of respondents had high level of practices on malaria and home environment prevention.

5.2.6 The association between socioeconomic factors, housing condition, knowledge, attitude and practice on malaria and home environment prevention

In terms of association between socioeconomic factors and malaria prevention, we found that there were 5 variables of socioeconomic factors were significantly associated which are age ($p<0.001$), education level ($p<0.001$), occupation ($p<0.001$), monthly family income ($p=0.003$) and duration of stay ($p=0.002$).

From association between housing condition and practices on malaria and home environment prevention of respondents showed that there were 7 variables were significant associated which are respondents' wall surface ($p=0.001$), respondents' floor ($p=0.006$), respondents' roof ($p=0.001$), number of sleeping per bed room ($p=0.002$) and malaria infected family member in the past 6 months ago ($p=0.002$).

From association between housing condition and knowledge of prevention regarding home environment of respondents showed that there was significant association between respondents' wall surface ($p=0.003$), respondents' floor ($p=0.040$), respondents' roof ($p<0.001$), total family member of the respondents ($p=0.012$), number of sleeping per bed room($p<0.001$) and knowledge of prevention regarding home environment.

From association between housing condition and attitude towards home environment prevention of respondents showed that there was significant association

between respondents' wall surface (p=0.029), respondents' floor (p=0.001), respondents' roof(p=0.016) and attitude towards home environment prevention.

There was statistically showed a high significant association between knowledge and practice on malaria and home environment prevention, attitude and practice on malaria and home environment prevention (p<0.001 each).

5.3 Recommendations

Founded on the results of this study, the following issues should be well-thought-out for improving the malaria control and home environment prevention program.

1. Enhancement of people's knowledge on malaria prevention is still needed under health education program even though there was considerable awareness of the community. Health education program should emphasize especially on :
    - Malaria vector
    - Malaria transmission
    - Malaria symptom
    - Malaria prevention
    - Moreover, home environment prevention of malaria

In addition, the correct knowledge about housing condition and housing structure to prevent malaria should be provided (for example, lack of ceiling is one of the risk factor about malaria infection) and information about treatment and drug also should be provided and explained in detail what could happen if the medication is not take completely; for example, drug resistant. However, based on this study, the current or

existed health education program needs to be adjusted or modified in term of teaching procedure, teaching method, intervention's activities and planning.

2. A number of respondents did not always use mosquito nets or use impregnated bed nets or use mosquito repellent and use anti-mosquito spray, because of financial problem and insufficient of material. Therefore, making mosquito nets sufficient to all family members and mosquito repellent and spray available should be carried out.
3. Moreover not only personal protection, home environment prevention awareness should be enhanced by encouraging people to build their house far from canals, to have ceiling at their house and repair their house where it has a hole.
4. A simple personal protection and home environment prevention practices should be introduced and encouraged such as:
    - Cleaning bushes and stagnant water around the house
    - Clearing dark corner in the house
    - Using mosquito net when going to and working the forest
    - Using mosquito coil and repellent
    - Wearing long-sleeve cloth when staying outside at night
    - Taking indoor and outdoor anti-mosquito spraying
    - Repairing their house where it has a hole

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Appendix

Work Plan

Project Procedure	OCT 15	NOV 15	DEC 15	JAN 16	FEB 16	MAR 16	APR 16	MAY 16	JUN 16	JUL 16
1.Literature Review										
2.Writing thesis proposal										
3.Submission for thesis proposal										
4.Proposal exam										
5.Ethical consideration from Chulalongkorn University										
6.Pretest questionnaires										
7.Field preparation and data collection										
8.Data Analysis										

9.Thesis article writing

10.Final thesis exam

11.Submission of article for publication

12.Submission of thesis and article

Budget

No.	Topic	Estimated Expenses (Baht)
1	Research fees	7500
2	Photocopy	6000
3	Stationary items	2000
4	Travel and lodging related to project	7000
5	Hiring Volunteers cost	9000
6	Printing and binding of the research	4000
7	Miscellaneous	6000
8	Compensation for participants	13200
9	Total	54700

Table 17: Frequency and percentage distributions of respondents who answered correctly to each question of knowledge on malaria (n=430)

Knowledge about malaria (n=430)	Correct answer	
	Frequency	Percentage
Vector which can transmit malaria to human		
Rat	390	89.7
Dog	409	94.0
Mosquito	429	98.6
Fly	329	75.6
Cockroach	330	75.9
Feeding time of malaria mosquito		
Day time	150	34.5
Night time	307	70.6
Breeding site of malaria mosquito		
pond or lake	264	60.7
stagnant water	331	76.1
canal	387	89.0
old tires	357	82.1
dry and clean place	389	89.4
Resting place of malaria mosquito		
Bushes	412	94.7
Domestic animal shelters	398	91.5
Tropic forest	263	60.5
Dark corner in the house	354	81.4

Knowledge about malaria (n=430)	Correct answer	
	Frequency	Percentage
Open space where sunlight reach	387	89.0
Malaria can be transmitted through		
Drinking contaminated water	182	41.8
Eating contaminated food	244	56.1
Close contact with malaria infected patient	170	39.1
The bite of malaria infected mosquito	418	96.1
Symptoms of malaria		
Fever	429	98.6
Headache	410	94.3
Chill	424	97.5
Sweating	395	90.8
Vomiting	290	66.7
Abdominal pain	234	53.8
Itching	290	66.7
Personal protection to prevent malaria		
Wearing long-sleeve cloth	413	94.9
Sleep in bed net	427	98.2
Using impregnated bed net	415	95.4
Taking anti-malaria drugs before going to the forest	233	53.6
Using fan	270	62.1

Knowledge about malaria (n=430)	Correct answer	
	Frequency	Percentage
Home environment protection to prevent malaria	401	92.2
Emptying and removing stagnant water		
Trimming bushes around the house	393	90.3
Clearing dark corner in the house	361	83.0
Insecticide spray	415	95.4
Using larvicides	309	71.0
Housing conditions to prevent malaria		
Building house with cement can prevent malaria	105	24.1
Lack of holes in the house can prevent malaria	203	46.7
Having ceiling can prevent malaria	136	31.3

Table 18: Frequency and percentage distributions of attitude towards malaria prevention (n=430)

Statement (n=430)	SA	A	M	D	SD
	f (%)	f (%)	f (%)	f (%)	f (%)
I think malaria is a serious disease and sometimes life threatening.	217(49.9%)	198(45.5%)	18(4.1%)	2(0.5%)	0(0.0%)
In my opinion, malaria can be transmitted directly from person to	12(2.8%)	85(19.5%)	83(19.1%)	208(47.8%)	47(10.8%)

Statement (n=430)	SA	A	M	D	SD
	f (%)	f (%)	f (%)	f (%)	f (%)
person like a common cold					
I believe that if malaria not treated quickly, it can become life-threatening.	111(25.5%)	294(67.6%)	28(6.4%)	2(0.5%)	0(0.0%)
I think the best way to prevent from getting malaria is to keep myself from mosquito bite.	143(32.9%)	278(63.9%)	4(0.9%)	6(1.4%)	4(0.9%)
In my opinion, once people get malaria, it cannot be re-infected.	4(0.9%)	43(9.9%)	117(26.9%)	159(36.6%)	112(25.7%)
I think cleaning the compound and trimming bushes regularly can be a protective factor of malaria.	127(29.2%)	242(55.6%)	47(10.8%)	14(3.2%)	4(0.9%)
I think building house close to canal is not a risk factor of malaria	12(2.8%)	134(30.8%)	78(17.9%)	134(30.8%)	12(2.8%)

Statement (n=430)	SA	A	M	D	SD
	f (%)	f (%)	f (%)	f (%)	f (%)
I think good ventilation and lighting can't prevent malaria.	8(1.8%)	72(16.6%)	49(11.3%)	231(53.1%)	73(16.8%)
I believe that sleeping in bed-net during night time is the one way to prevent getting malaria.	172(39.5%)	245(56.3%)	5(1.1%)	9(2.1%)	3(0.7%)
I think I can treat myself well when I got malaria.	8(1.8%)	18(4.1%)	21(4.8%)	210(48.3%)	177(40.7%)
In my idea, children and pregnant women are at risk.	109(25.1%)	195(44.8%)	102(23.4%)	23(5.3%)	5(1.1%)
I think that one can recover from malaria spontaneously without malaria treatment.	9(2.1%)	18(4.1%)	18(4.1%)	217(49.9%)	172(39.5%)
In my opinion, if someone got malaria, people should avoid to be close contact with him/her.	22(5.1%)	114(26.2%)	87(20.2%)	170(39.1%)	39(9.0%)
I think I should take my blood test immediately as soon as I suspect of getting malaria.	178(40.9%)	228(52.4%)	11(2.5%)	12(2.8%)	5(1.1%)

Statement (n=430)	SA	A	M	D	SD
	f (%)	f (%)	f (%)	f (%)	f (%)
I might be in the greater risk of getting malaria when I work and sleep overnight in the forest.	132(30.3%)	239(54.9%)	40(9.2%)	20(4.6%)	3(0.7%)
In my point of view, I can stop the medicine as soon as the symptom is disappeared	3(0.7%)	111(25.5%)	37(8.5%)	213(49.0%)	69(15.9%)
I think it is dangerous if the medicine is not taken completely.	75(17.2%)	190(43.7%)	83(19.1%)	73(16.8%)	13(3.0%)
I think that I can take antimalarial drug from drug-store to treat myself when I get malaria.	8(1.8%)	42(9.7%)	87(20.0%)	178(40.9%)	118(27.1%)
I think that having holes in the house can be a greater risk of malaria infection.	17(3.9%)	159(36.6%)	79(18.2%)	161(37.0%)	18(4.1%)
I think that lack of ceiling is not the risk factor for malaria.	13(3.0%)	98(22.5%)	128(29.4%)	173(39.8%)	22(5.1%)

Table 19: Frequency and percentage distributions of respondent's practices on malaria prevention towards each question about malaria (n=430)

Statement **Personal protection to prevent malaria(n=430)**	Frequency	Percentage
Sleep in mosquito net		
Every times	292	67.1%
Some times	136	31.3%
Never	6	1.4%
Check for a bed-net whether it has a hole		
Every times	121	27.8%
Some times	255	58.6%
Never	58	13.3%
Immediately repair the net if you find out the hole		
Every times	141	32.4%
Some times	222	51.0%
Never	71	16.3%
Use insecticide treated bed net		
Every times	174	40.0%
Some times	187	43.0%
Never	70	16.1%
All family members in the household sleep in the bed net		
Every times	232	53.3%
Some times	167	38.4%
Never	34	7.8%
Use mosquito repellent coil at night time		
Every times	9	2.1%
Some times	165	37.9%
Never	259	59.5%

Wear long-sleeve clothing when you are outside at night time	25	5.7%
Every times	218	50.1%
Some times	192	44.1%
Never		
Use anti-mosquito repellent to prevent yourself from mosquito bite		
Every times	14	3.2%
Some times	287	66.0%
Never	132	30.3%
Take antimalarial drugs before going to the forest		
Every times	24	5.5%
Some times	69	15.9%
Never	316	72.6%
Use bed net when you go to the forest		
Every times	122	28.0%
Some times	129	29.7%
Never	151	34.7%
Go to hospital when you suspect that you have malaria		
Every times	208	47.8%
Some times	177	40.7%
Never	37	8.5%
Statement	**Frequency**	**Percentage**
Home environment protection to prevent malaria		
Use indoor anti-mosquito spray in your house		
Every times	11	2.5%
Some times	113	26.0%
Never	311	71.5%

Take outdoor anti-mosquito spraying in your house		
Every times	7	1.6%
Some times	66	15.2%
Never	361	83.0%
Clean the bushes around your home environment		
Every times	233	53.6%
Some times	184	42.3%
Never	14	3.2%
Clean the stagnant water near your home environment		
Every times	172	39.5%
Some times	235	54.0%
Never	25	5.7%
Put oil in to stagnant water at your home environment		
Every times	29	6.7%
Some times	120	27.6%
Never	286	65.7%
Clear the dark corner in your house		
Every times	267	61.4%
Some times	155	35.6%
Never	12	2.8%
Check for your house where it has a hole		
Every times	53	12.2%
Some times	138	31.7%
Never	242	55.6%
Repair your house where it has a hole		
Every times	46	10.6%
Some times	131	30.1%
Never	254	58.4%

Appendix A

SURVEY TOOL USED FOR DATA COLLECTION

ID#_____

Title: Knowledge, attitude and practice regarding home environment to prevent malaria among population in Palaw Township, Tanintharyi Region, Myanmar

Structured Survey Questionnaire

There are composed of 5 parts as following;

Part (A) Socioeconomic and Education level (8 items)

Part (B) Housing condition (8 items)

Part (C) Knowledge about Malaria (41 items)

Part (D) Attitudes Towards malaria (20 items)

Part (E) Practices regarding malaria prevention (19 items)

Thanks You so much for your participation

(A)Socioeconomic and Education level

1. How old are you?

   Years old

2. What is your gender?

   Male, Female

3. Are you currently

   Single, Married, Divorced, Separated, Widowed

4. Ethnicity

   Burma, Mon, Kayen, , Others (Please specify)

5. What is your education?

   a) Never attend school

   b) Primary school

   c) Secondary school

   d) High school

   e) College/University

   f) Others

6. What is your current occupation?

   a) Housewife

   b) Teacher

   c) Health personnel

   d) Small shop owner

   e) Vender

   f) Animal husbandry

   g) Plantation

h) Garbage keeper

i) Water supplier

j) Daily wages

k) Other(Please specify)

7. What is your family income? (Kyats/Month/Household)

8. How long have you been here? (years)

(B) Housing condition

9. Wall's surface (>50%)

a) Block or brick

b) Wood

c) Bamboo

d) Zinc

e) Cardboard or plastic

f) No walls

g) Other (Please specify)

10. Floor (>50%)

a) Ground

b) Cement

c) Wood

d) Other (Please specify)

11. Roof (>50%)

a) Straw or palm

b) Cement

c) Wood

d) Zinc sheet

e) Tile

f) Other (Please specify)

12. Number of people living in the house
13. Average number of people sleeping per bedroom
14. Does any family member has had malaria in the past 6 months

    Yes No

15. How many family members has had malaria
16. Which ages of the infected family members has had malaria

    (1) (2) (3)

(C) Knowledge about Malaria

No	Statement	Yes	No	Don't know
17 a	Vector which can transmit malaria to human Rat			
b	Dog			
c	Mosquito			
d	Fly			
e	Cockroach			
18	Feeding time of malaria mosquito			

No	Statement	Yes	No	Don't know
a	Day time,			
b	Night time			
19 a	Breeding site of malaria mosquito pond or lake,			
b	stagnant water			
c	canal			
d	old tires			
e	dry and clean place			
20 a	Resting place of malaria mosquito Bushes,			
b	Domestic animal shelters			
c	Tropic forest			
d	Dark corner in the house			
e	Open space where sunlight reach			
21 a	Malaria can be transmitted through Drinking contaminated water			
b	Eating contaminated food			
c	Close contact with malaria infected patient			
d	The bite of malaria infected mosquito			
22	Symptoms of malaria			

No	Statement	Yes	No	Don't know
a	Fever,			
b	Headache			
c	Chill			
d	Sweating			
e	Vomiting			
f	Abdominal pain			
g	Itching			
23 a	Personal protection to prevent malaria Wearing long-sleeve cloth			
b	Sleep in bed net			
c	Using impregnated bed net			
d	Taking anti-malaria drugs before going to the forest			
e	Using fan			
24 a	Home environment protection to prevent malaria Emptying and removing stagnant water			
b	Trimming bushes around the house			
c	Clearing dark corner in the house			
d	Insecticide spray			
e	Using larvicides			

No	Statement	Yes	No	Don't know
25 a	Housing conditions to prevent malaria Building house with cement can prevent malaria			
b	Lack of holes in the house can prevent malaria			
c	Having ceiling can prevent malaria			

(D) Attitudes Towards malaria

No	Statement	Strongly Agree	Agree	Moderately	Disagree	Strongly Disagree
26	I think malaria is a serious disease and sometimes life threatening.					
27	In my opinion, malaria can be transmitted directly from person to person like a common cold					

No	Statement	Strongly Agree	Agree	Moderately	Disagree	Strongly Disagree
28	I believe that if malaria not treated quickly, it can become life-threatening.					
29	I think the best way to prevent from getting malaria is to keep myself from mosquito bite.					
30	In my opinion, once people get malaria, it cannot be re-infected.					
31	I think cleaning the compound and trimming bushes regularly					

No	Statement	Strongly Agree	Agree	Moderately	Disagree	Strongly Disagree
	can be a protective factor of malaria.					
32	I think building house close to canal is not a risk factor of malaria					
33	I think good ventilation and lighting can't prevent malaria.					
34	I believe that sleeping in bed-net during night time is the one way to prevent getting malaria.					
35	I think I can treat myself well					

No	Statement	Strongly Agree	Agree	Moderately	Disagree	Strongly Disagree
	when I got malaria.					
36	In my idea, children and pregnant women are at risk.					
37	I think that one can recover from malaria spontaneously without malaria treatment.					
38	In my opinion, if someone got malaria, people should avoid to be close contact with him/her.					
39	I think I should take my blood test immediately					

No	Statement	Strongly Agree	Agree	Moderately	Disagree	Strongly Disagree
	as soon as I suspect of getting malaria.					
40	I might be in the greater risk of getting malaria when I work and sleep overnight in the forest.					
41	In my point of view, I can stop the medicine as soon as the symptom is disappeared					
42	I think it is dangerous if the medicine is not taken completely.					

No	Statement	Strongly Agree	Agree	Moderately	Disagree	Strongly Disagree
43	I think that I can take antimalarial drug from drug-store to treat myself when I get malaria.					
44	I think that having holes in the house can be a greater risk of malaria infection.					
45	I think that lack of ceiling is not the risk factor for malaria.					

(E) Practices regarding malaria prevention

No	Statement **Personal protection to prevent malaria**	Every times	Sometimes	Never

46	How often do you sleep in mosquito net?			
47	How often do you check for a bed-net whether it has a hole?			
48	How often do you immediately repair the net if you find out the hole?			
49	How often do you use insecticide treated bed net?			
50	How often do all the family members in the household sleep in the bed net?			
51	How often do you use mosquito repellent coil at night time?			
52	How often do you wear long-sleeve clothing when you are outside at the night time?			
53	How often do you use anti-mosquito repellent to prevent yourself from mosquito bite?			

54	How often do you take antimalarial drugs before going to the forest?			
55	How often do you use bed net when you go to the forest?			
56	How often do you go to hospital when you suspect that you have malaria?			
No	**Statement** **Home environment protection to prevent malaria**	**Every times**	**Sometimes**	**Never**
57	How often do you use indoor anti-mosquito spray in your house?			
58	How often do you take outdoor anti-mosquito spraying in your house?			
59	How often do you clean the bushes around your home environment?			

60	How often do you clean the stagnant water near your home environment?			
61	How often do you put oil in to the stagnant water at your home environment?			
62	How often do you clear the dark corner in your house?			
63	How often do you check for your house where it has a hole?			
64	How often do you repair your house where it has a hole?			

Appendix B

Criteria for Stratification

Stratum 1 : Malarious village

Stratum 1a : High risk village

Stratum 1b : Moderate risk village

Stratum 1c : Low risk village

Stratum 2 : Potentially malarious village

Stratum 3 : Non malarious village

- Stratum 1
  - Malarious village
  - Considered malarious village if one or more of the following conditions:
    - Presence of indigenous malaria cases
    - Presence of main vectors
    - Topography and altitude of the village indicates the presence of main vectors
    - Historical information that malaria transmission is occurring in the village including outbreak (generally within past 3 years)
- Stratum 1a

- High risk village
- Either halo-endemic or hyper endemic

Halo – endemic

- Parasite rate – constantly over 75% among children aged 2-9 years
- Spleen rate – constantly over 75% in children aged

  2-9 years ; also high in adults (over 25%)

Hyper - endemic village

- Parasite rate – constantly rate 50% among children aged 2-9 years
- Spleen rate – Constantly over 50% in children aged 2-9 years ; also high in adults (over 25%)

A malarious village is considered high risk if it has one or more of the following characteristics:

- Located in the forest
- Plain or hilly mountainous areas within 1 mile from edge of the forest
- Development project sites where main vectors are present
- Resettlement areas where the main vectors are present
- Significant numbers of migrant population (temporary or seasonal settlers/workers/subsistence farmers

- Isolated or remote village where access to the nearest public health facility takes more than three hours by the most common means of travel available

⊡ Stratum 1b

- Moderate risk malarious village
- corresponds to meso-endemic area

Meso-endemic village

- Parasite rate :between 11% and 50% in children aged 2-9 years
- Spleen rate : between 11% and 50% in children aged 2-9 years

A malarious village is considered moderate risk if it has one or more of the following characteristics

- Located between 1-2 miles from the edge of the forest
- Access to the nearest public health facility takes 1-3 hours by the most common means of travel available

⊡ Stratum 1c

- Low risk village
- Corresponds to hypo - endemic area

Hypo-endemic

* Parasite rate – not exceeding 10% in children aged 2-9 years but may be higher for the part of the year

* Spleen rate – not exceeding 10% in children aged 2- 9 years

A malarious village is considered to low risk if it has one or more of the following characteristics

- Plain and foothills located more than 2 miles from the end of the forest.
- Historical information on the existence of local malaria transmission
- The nearest public health facility takes less than 1 hour by the most common means of travel available
- Less population movement to and from the forest

⊡ Stratum 2

- Potentially malarious area
- Coastal, plain and foothill villages where only secondary vectors are present or
- Villages more than 3 miles away from the nearest area where primary vectors thrive but
- No historical information of local transmission in the past three years
- Significant population movement to and from malarious areas and risk of introducing malaria is high.

⊡ Stratum 3

- Either urban or peri-urban or agriculture plains with high altitude with no malaria vectors
- Located more than 3 miles away from or known breeding sites of the main vectors
- No historical evidence of malaria transmission
- Population movement to and from malarious areas may or may not be significant(Myanamr Medical Association)

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