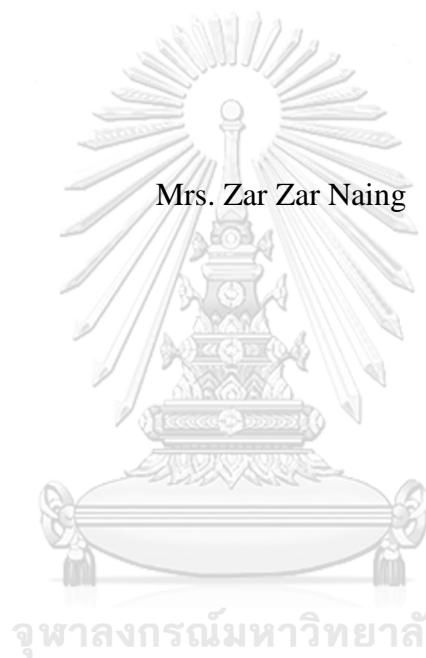Barriers to Prompt and Effective Malaria Treatment among Malaria Infected Patients
in Palaw Township, Tanintharyi Region,Myanmar : Cross Sectional Study

Mrs. Zar Zar Naing

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Public Health Program in Public Health
College of Public Health Sciences
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อุปสรรคต่อการรักษาโรคมาลาเรียให้รวดเร็วและมีประสิทธิภาพของผู้ป่วยมาลาเรียในเมือง
พาลอว์ เขตทะนินทะยีประเทศเมียนมา: การวิจัยภาคตัดขวาง

นางซา ซา เหนียง

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
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By	Mrs. Zar Zar Naing
Field of Study	Public Health
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จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

ซา ซา เหนียง : อุปสรรคต่อการรักษาโรคมาลาเรียให้รวดเร็วและมีประสิทธิภาพของผู้ป่วยมาลาเรียในเมืองพาลอว์ เขต
ทะนินทะยีประเทศเมียนมา: การวิจัยภาคตัดขวาง (Barriers to Prompt and Effective Malaria Treatment among Malaria
Infected Patients in Palaw Township, Tanintharyi Region,Myanmar : Cross Sectional Study) อ.ที่ปรึกษาวิทยานิพนธ์
หลัก: ผู้ช่วยศาสตราจารย์ ดร. เนาวรัตน์ กาญจนาคาร, 129 หน้า.

อุปสรรคต่อการรักษาโรคมาลาเรียให้รวดเร็วและมีประสิทธิภาพของผู้ป่วยมาลาเรียในเมืองพาลอว์ เขตทะนินทะยี
ประเทศเมียนมา: การวิจัยภาคตัดขวาง

บทคัดย่อ

บทนำ ในแถบอนุภูมิภาคกลุ่มน้ำโขงเมียนมาจัดว่าเป็นประเทศที่มีประชากรที่เจ็บป่วยด้วยโรคมาลาเรียมากที่สุดและยัง
พบการดื้อยาอาทีมิซินินของเชื้อฟัลซิปารัมในเขตชายแดนไทย-เมียนมาในช่วงระยะหลายปีมาแล้ว ดังนั้นการรักษามาลาเรียให้
รวดเร็วและมีประสิทธิภาพจึงเป็นสิ่งสำคัญอย่างยิ่งในการลดอัตราการเกิด อัตราการตายและอุบัติการณ์ของเชื้อดื้อยาต้าน
มาลาเรีย แม้ว่าโปรแกรมควบคุมมาลาเรียแห่งชาติเมียนมาจะได้พยายามอุดช่องโหว่ต่างๆแต่อุปสรรคก็ยังคงมีอยู่อันได้แก่ ลักษณะ
ทางสังคมศาสตร์ของประชากร ความรู้เรื่องโรคมาลาเรีย พฤติกรรมการแสวงหาการรักษาโรคมาลาเรีย และปัจจัยทางด้านระบบ
สุขภาพ เช่น การเข้าถึงการรักษา การมีอยู่ของสถานพยาบาล การมีความสามารถในการจ่ายค่ารักษาพยาบาล และความน่าเชื่อถือของ
สถานพยาบาลและผู้ให้บริการการรักษา วัตถุประสงค์ของการวิจัยในครั้งนี้เพื่อสำรวจหาปัจจัยที่เป็นอุปสรรคที่เกี่ยวข้องกับการรักษา
โรคมาลาเรียให้รวดเร็วและมีประสิทธิภาพ อันได้แก่ ลักษณะทางสังคมศาสตร์ของประชากร ความรู้เรื่องโรคมาลาเรีย พฤติกรรมการ
แสวงหาการรักษาโรคมาลาเรีย และปัจจัยทางด้านระบบสุขภาพ โดยทำการศึกษาในกลุ่มผู้ป่วยมาลาเรียในเมืองพาลอว์เขตทะนินทะ
ยีประเทศเมียนมา ซึ่งพื้นที่แถบนี้ยังไม่มีการศึกษาเช่นนี้มาก่อน

วิธีการศึกษา วิธีวิจัยแบบภาคตัดขวางในกลุ่มผู้ป่วยมาลาเรียที่มีอายุระหว่าง18 ถึง 65 ปี ได้รับเชื้อมาลาเรียในช่วงเดือน
มกราคมถึงมีนาคม พ.ศ. 2561 อาศัยอยู่ในหมู่บ้าน 17 แห่งของเมืองพาลอว์ที่มีความเสี่ยงต่อโรคมาลาเรียสูง กลุ่มประชากรที่สำรวจมี
จำนวน 204 ราย ซึ่งถูกคัดเลือกโดยการสุ่มตัวอย่างจากแต่ละหมู่บ้าน ทำการเก็บข้อมูลโดยการใช้แบบสอบถามด้วยการสัมภาษณ์
แบบตัวต่อตัวแล้ววิเคราะห์หาความสัมพันธ์ทางสถิติด้วยการวิเคราะห์สองตัวแปรและการวิเคราะห์แบบถดถอยโลจิสติก

ผลการศึกษา จากผลการศึกษาพบว่าประชากรร้อยละ 85.8 ไม่เคยได้รับการรักษาที่รวดเร็วและมีประสิทธิภาพภายใน
เวลา 24 ชั่วโมงเนื่องจากอุปสรรคหลากหลายโดยพบความสัมพันธ์อย่างมีนัยสำคัญทางสถิติ ได้แก่ ลักษณะทางสังคมศาสตร์ของ
ประชากร กล่าวคือ สถานภาพการสมรส ระดับการศึกษา และรายได้ครอบครัวต่อเดือน (P<0.05) การมีความรู้เรื่องโรคมาลาเรียอยู่
ในระดับดี (P<0.001 AOR=65.3 95%CI) การมีพฤติกรรมการแสวงหาการรักษาอยู่ในระดับดี (P=0.021 AOR=3.889 95%CI)
และอุปสรรคเกี่ยวกับระบบสุขภาพ (P<0.05)

บทสรุป จากผลการศึกษาเสนอแนะว่าการได้รับการรักษามาลาเรียให้รวดเร็วและมีประสิทธิภาพนั้นเป็นผลเกี่ยวข้อง
กับลักษณะทางสังคมศาสตร์ของประชากร การมีความรู้เรื่องโรคมาลาเรีย พฤติกรรมการแสวงหาการรักษาโรคมาลาเรีย และปัจจัย
ทางด้านระบบสุขภาพ โดยเจ้าหน้าที่ด้านสาธารณสุขท้องถิ่นควรจัดให้มีช่วงเวลาของการเรียนรู้เกี่ยวกับโรคมาลาเรีย มีการส่งเสริม
พฤติกรรมการแสวงหาการรักษาโรคมาลาเรียที่ดีและการศึกษาถึงระบบสุขภาพต่างๆที่เกี่ยวข้องแก่ประชากร

สาขาวิชา   สาธารณสุขศาสตร์   ลายมือชื่อนิสิต _____
ปีการศึกษา 2560   ลายมือชื่อ อ.ที่ปรึกษาหลัก _____

6078810653 : MAJOR PUBLIC HEALTH

KEYWORDS: BARRIERS, MALARIA INFECTED PATIENTS,MYANMAR,PROMPT AND EFFECTIVE MALARIA TREATMENT

ZAR ZAR NAING: Barriers to Prompt and Effective Malaria Treatment among Malaria Infected Patients in Palaw Township, Tanintharyi Region,Myanmar : Cross Sectional Study. ADVISOR: ASST. PROF. NAOWARAT KANCHANAKHAN, Ph.D., 129 pp.

Barriers to Prompt and Effective Malaria Treatment among Malaria Infected Patients in Palaw Township, Tanintharyi Region, Myanmar : Cross Sectional Study

Background: In Greater Mekong Sub regions, Myanmar is the highest malaria burden country. At the Myanmar–Thailand border, Artemisinin resistance in *Plasmodium falciparum* has been present for several years . Prompt and effective malaria treatment is the corner stone to reduce malaria morbidity , mortality and drug resistance malaria. Although National Malaria Control Program leads to fill the gaps for prompt and effective treatment of malaria, gaps are still present related to sociodemographic characteristics and knowledge of malaria, treatment seeking behaviors, health system factors such as accessibility, availability, affordability of services and accountability of health providers. There were no previous studies to assess these barriers in this area. The objective of the research is to assess barriers (sociodemographic characteristics, knowledge of malaria, behaviors related to treatment seeking and health system factors) regarding prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar.

Method: The study design is descriptive cross sectional study. The study population were 18 to 65 years old malaria infected patients from January 2018 to March 2018 in 17 high risk malaria villages of Palaw Township. Sample size is 204 malaria infected patients and selected randomly from each village. Face to face interview was done by using structured questionnaires. Bivariate analysis and binary logistic regression were used to assess association, strength of association and determine the model of determinants.

Results: The respondents of 85.8% did not get prompt and effective malaria treatment within 24 hours due to barriers. There were statistically significant with sociodemographic characteristics (marital status, ethnicity, education status and monthly family income) (p value <0.05), good knowledge of malaria (p value < 0.001, AOR= 65.3, 95% CI), good behaviors related to treatment seeking (p value $= 0.021$, AOR $= 3.889$, 95% CI) , health system factors (p value<0.05) and prompt and effective malaria treatment at 95% Confidence interval.

Conclusion: The findings suggested that prompt and effective malaria treatment was influenced by sociodemographic characteristics, knowledge of malaria, behaviors related to treatment seeking and health system factors. Enhancing the knowledge and promotion of good behaviors about malaria should be done through health education sessions and health system factors due to health providers should be managed by Local Health Authority.

Field of Study: Public Health	Student's Signature
Academic Year: 2017	Advisor's Signature

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATION

GMS	-	Greater Mekong Sub region
RDT	-	Rapid Diagnostic Test
ACT	-	Artemisinin – based Combination Therapy
NGO	-	Non-Governmental Organization
INGO	-	International Non-Governmental Organization
ITN	-	Insecticide Treated Nets
LLIN	-	Long Lasting Insecticide Treated Nets
SPSS	-	Statistic Package for Social Sciences
WHO	-	World Health Organization
ICMV	-	Integrated Community Malaria Volunteer
BW	-	Body Weight
NMCP	-	National Malaria Control Program
API	-	Annual Parasite Incidence

CHAPTER I

INTRODUCTION

1.1   Background and Rationale

Malaria, life-threatening disease caused by *Plasmodium* parasites carried by infected female *Anopheles* mosquitoes. There are five different types of *Plasmodium* species; *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium malariae and Plasmodium knowlesi*. The cardinal symptom of malaria is fever and other symptoms are non-specific; fever with chills and rigors, headache, muscle pain, joint pain, anorexia, nausea and vomiting. If malaria is not treated, leading to complicated malaria and can be fatal (CDC, 2015a). The keystone of malaria case management and reduction of severe morbidity and mortality from the disease is the provision of prompt and effective treatment of malaria (WHO, 2017a).

Malaria disease can be occurred mainly in poor subtropical and tropical areas of the world. Malaria is a still leading cause of illness and death in many countries. In 2012, in sub-Saharan Africa, an estimation of 627,000 people died of malaria(CDC, 2015e) .In 2015, there were 212 million of malaria cases worldwide. The WHO African region explained for the most malaria cases globally (90%), accompanied by (7%) of malaria cases in South East Asia Region and (2%) of malaria cases in the Eastern Mediterranean Region. With the occurrence of an estimation of 429,000 malaria deaths, African region (92%), accompanied by South East Asia Region (6%) and Eastern Mediterranean Region (2%) (WHO, 2016).

In the GMS, Myanmar is the highest malaria burden and 77, 842 cases and 37 malaria deaths are reported in 2015. Some 8.5 millions of people (16% of the population) are at high risk of malaria which occurs mainly in or near forests, particularly among remote populations, migrants and ethnic minorities. The border area such as Myanmar-Thailand Border is also associated with the development of artemisinin resistance (WHO, 2015b). As prompt and effective malaria treatment is the corner stone to reduce malaria morbidity and mortality, the National treatment policy for Myanmar was developed in 2002 and now, 2015 is last updated. The policy is based on parasite resistance data to antimalarial drugs and it was updated in line with WHO malaria treatment guidelines that place RDTs and ACTs as the main pillars of diagnosis and treatment. Standby treatment is recommended among migrants in areas where diagnostic facilities are not available (WHO, 2017c).

According to Geographical Situation, Myanmar extents from Himalayas in the North to the Bay of Bengal and Andaman Sea in the South and the only one route for spread of drug-resistant *Plasmodium falciparum* malaria to the India from the South-East Asia Region. Resistance to Chloroquine and Pyrimethamine was due to that path in nearly half a century ago. At the Myanmar–Thailand border, Artemisinin resistance in *Plasmodium falciparum* has been present for several years. After artemisinin-based combination treatments, delayed parasite clearance has also been reported in southeastern part of the Myanmar. In Shwe Kyin and Bago Regions, delayed parasite clearance (a clearance half-life >5 h) was found in approximately 15% of patients in 2011 and 2012 and mutation in the propeller region of the K13 protein was found in a quarter of patients. Although Artemisinin monotherapy use has been banned, it is still

available in the drug market in Myanmar. The availability of Artemisinin Monotherapy decreased from 67% in 2012 to 10% in 2014, but it became 27% in 2015.So, artemisinin monotherapy is still the main problem for drug resistance(WHO, 2017a, Tun et al., 2015).

Tanintharyi Region is situated in the southernmost part of Myanmar, facing Andaman Sea in the West, bordering Thailand in the South and East and Mon State in the North. Its total population is 1,445,639 and ethnic groups are Myanmar, Rakhine, Shan, Mon, Kayin, Salon and Pashues or Malays. There are total 1453 villages where 1216 villages are high risk malaria villages, moderate risk to malaria villages are 113 and low risk malaria villages are 124 in Tanintharyi Region (National Malaria Control Program and WHO-Myanamr, 2015). Malaria morbidity is 6.8 per 1,000 population and mortality rate is 0.01 per 100,000 populations in Tanintharyi Region in 2015. In 2016, morbidity rate is 3.9 per 1,000 population and mortality rate is 0.13 per 100,000 populations. In 2017, morbidity rate of 3.5 per 1,000 population (MODIN.Net and Information, 2002, National Malaria Control Program, 2015, National Malaria Control Program, 2016, National Malaria Control Program, 2017).

In Palaw Township, the population is 80,068 and there are 147 villages where 25 are high risk malaria villages, 28 are moderate risk villages, 8 are low risk villages and the rest of 86 villages are potential to risk of malaria (National Malaria Control Program and WHO-Myanamr, 2015). In 2015, morbidity of 14.23 per 1,000 population and mortality of 1.3 per 100,000 populations. In 2016, the morbidity rate of 11.2 per 1,000 population and mortality rate is 2.5 per 100,000 populations. In 2017, morbidity rate of 8.1 per 1,000 population (National Malaria Control Program, 2015, National

Malaria Control Program, 2016, National Malaria Control Program, 2017). Due to located in the border area of Myanmar, Tanintharyi region including Palaw township is still facing difficult to assess prompt and effective treatment because of many migrant workers across the border and some studies shown that drug resistance in Tanintharyi region due to self-treatment and usage of oral artemisinin monotherapy on behalf of combination therapy. It is also difficult to get prompt and effective treatment of malaria because of low literacy, hard to reach areas and transportation difficulties (WHO, 2015a).

In Myanmar, Prompt and effective treatment of malaria is given through health facilities in rural areas. Integrated Community Malaria volunteers (ICMV) also complement malaria services in high- and moderate-risk villages, hard-to-reach areas and in areas with a high concentration of migrant workers where access to health facilities is difficult. Other Nonprofit and Non-Governmental Organizations cooperate and coordinate the malaria control activities with National Malaria Control Program (Helath, 2016). Although National Malaria Control Program leads to fill the gaps for prompt and effective treatment of malaria, gaps are still present related to sociodemographic characteristics and knowledge of malaria, treatment seeking behaviors, health system factors such as accessibility, availability, affordability and accountability (WHO, 2017c).

1.2   Research Question

What are the barriers to get prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar?

1.3 Research Objectives

General Objectives

- The general objective of this study is to assess sociodemographic characteristics, knowledge of malaria, behaviors related to treatment seeking and health system factors (accessibility, affordability, availability and accountability) regarding prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar.

Specific Objectives

- To assess the association between socio demographic characteristics and getting of prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar

- To assess the association between knowledge of malaria and getting of prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar

- To identify the association between behaviors related to malaria treatment and getting of prompt and effective treatment of malaria among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar

- To identify the association between heath system factors (accessibility, affordability, availability and accountability) and getting of prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi region, Myanmar

1.4   Research Hypothesis

- There is an association between sociodemographic characteristics, knowledge
  of malaria, behaviors related to malaria treatment, health system factors
  (accessibility, affordability, availability and accountability) and prompt and
  effective malaria treatment in malaria infected patients in Palaw Township,
  Tanintharyi Region.

1.5   Conceptual Framework

Independent Variables

Dependent Variable

Socio Demographic Characteristics
1. Age
2. Sex
3. Marital Status
4. Ethnicity
5. Education Level
6. Occupation
7. Length of Stay
8. Family income
9. Family Member

Knowledge on Malaria
1. Anopheles mosquitoes
2. Transmission of malaria
3. Symptoms of malaria
4. Diagnosis and Treatment of malaria
5. Prevention and control of malaria
6. Drug resistance

Behaviors related to Treatment
1. Malaria test within 24 hour or after 24 hour
2. Diagnosis and Treatment at Health Facilities and ICMV
3. Drug Taking Behavior

Accessibility
1. Accessible to Health Facilities and ICMVs
2. Accessible to Diagnosis
3. Accessible to Treatment

Affordability
1. Cost for Treatment (official and unofficial cost)
2. Transportation Cost
3. Time spent for getting services

Availability
1. Opening Hours
2. Drugs and equipment Shortage
3. Staff shortage
4. Patient centered Care

Accountability
1. Promotion of malaria services
2. Work Ethics
3. Trust of community

Prompt and Effective Malaria Treatment in Malaria Infected Patient

1.6   Operational Definitions

1.6.1   Barriers refer to obstacles for getting of prompt and effective treatment of malaria in malaria infected patients which are socio demographic characteristics that are favorable to give obstacles, poor knowledge about malaria, presence of inappropriate treatment seeking behaviors and health system services requirements (Chuma et al., 2010).

1.6.2   Malaria Infected Patient refers to a person who suffered malaria related symptoms caused by malaria parasites that are transmitted to people through the bites of infected female *Anopheles* mosquitoes. The first symptom of malaria is fever with chills and rigors and headache. Malaria was detected by Rapid Diagnostics Test (RDT) or Microscopy (WHO, 2017c).

1.6.3   Socio Demographic Characteristics refers to Age, Sex, Marital Status, ethnicity, education status, Occupation, length of stay at that area, Family income and Family members (Woldu, 2013).

1.6.4   Knowledge on Malaria refers to the knowing about malaria vector, transmission of malaria, symptoms of malaria, prevention and control methods of malaria, diagnosis and treatment of malaria and causes of antimalarial drug resistance (CDC, 2015c).

1.6.5 **Behaviors Related to Malaria Treatment** refers to testing of malaria within 24-hour or after 24-hour onset of malaria symptoms and seeking of antimalarial treatment at Health facilities or Integrated Community Malaria Volunteer and taking of antimalarial drugs completely or not (WHO, 2015a).

1.6.6 **Accessibility** refers to getting of malaria services such as diagnosis of malaria with RDT or Microscopy and prompt and effective treatment of malaria easily at the time of getting malaria symptoms (WHO, 2017d).

16.7 **Health Facilities** refers to places that provide malaria care services. They include hospitals, clinics and Rural Health Centers (WHO, 2017d).

16.8 **ICMV** refers to the malaria volunteers recruited by National Malaria Control Program and Non-Governmental Organizations by giving trainings about malaria knowledge, prevention, diagnosis and treatment. They can provide malaria care services to the community (Ministry of Health, 2015).

1.6.9 **Accessible to Health Facilities** refers to getting of malaria services such as diagnosis of malaria with RDT or Microscopy and prompt and effective treatment of malaria easily at the time of getting malaria symptoms at Health Facilities (WHO, 2017d).

1.6.10 Accessible to ICMV refers to getting of malaria services such as diagnosis of malaria with RDT or Microscopy and prompt and effective treatment of malaria easily at the time of getting malaria symptoms at ICMV (Health et al., 2015).

1.6.11 Accessible to Diagnosis refers to getting of diagnosis of malaria with RDT or Microscopy easily at the time of getting malaria symptoms (WHO, 2017d).

1.6.12 Accessible to Treatment refers to getting of prompt and effective treatment of malaria easily after diagnosis with RDT or Microscopy at the time of getting malaria symptoms (WHO, 2017d).

1.6.13 Affordability refers to the cost that the patient can pay for treatment of malaria, transportation cost and time spent for getting malaria services (WHO, 2017d).

1.6.14 Cost for Treatment refers to official and unofficial payment for diagnosis and treatment of malaria at Health Facilities or ICMVs (WHO, 2017d).

1.6.15 Transportation Cost refers to the cost for transportation from patient's residence to Health Facilities or ICMVs to get malaria services (WHO, 2017d).

1.6.16 Time Spent for Getting Services refers to the time that they spent for getting of malaria services at Health Facilities or ICMVs (WHO, 2017d).

1.6.17 Availability refers to sufficient supply and appropriate stock of malaria drugs, equipment and health workers who can provide patient centered services according to the needs of the community (WHO, 2017d).

1.6.18 Opening Hours refers to the opening hours of Health Facilities or presence of ICMVs at their home for giving of malaria services to the community (WHO, 2017d).

1.6.19 Drug and Equipment Shortage refers to the less or absence of RDTs and anti-malaria drugs at ICMV and also less or absence of glass slides and reagents used for microscopic diagnosis at Health Facilities (WHO, 2017b).

1.6.20 Staff Shortage refers to the less or absence of health staff in the quantity needed in Health Facilities (WHO, 2017b).

1.6.21 Patient Centered Care refers to giving of respect, care, well communicate and educate patients and advocate disease prevention, diagnosis and treatment (AC and E, 2003).

1.6.22 Accountability refers to responsibility of health staff and ICMV for promotion of malaria services, provision of malaria services in line with work ethics and getting of community trust (WHO, 2017d).

1.6.23 Promotion of Malaria Services refers to services related to prevention of malaria by distribution of LLINs and provision of malaria treatment with appropriate drugs to community at all levels (Health et al., 2015).

1.6.24 Work Ethics refers to moral and duties of health staff and ICMV at the time of service provision (WHO, 2017d).

1.6.25 Community Trust refers to feeling of safety and belief on the malaria related services given by health staff and ICMV (WHO, 2017d).

1.6.26 Prompt and Effective Treatment of malaria refers to ability to precisely use of appropriate anti-malarial drugs for the treatment of suspected or confirmed malaria patients within 24 hours' onset of malaria symptoms according to National Malaria Treatment Guidelines under National Malaria Treatment Policy (WHO, 2015b).

1.6.27 High Risk Malaria Village refers to the village having an Annual Parasite Incidence (API) >5 per 1,000 at risk population (National Malaria Control Program and WHO-Myanamr, 2015).

1.6.28 Moderate Risk Malaria Village refers to the village having an Annual Parasite Incidence (API) 1-5 per 1,000 at risk population (National Malaria Control Program and WHO-Myanamr, 2015).

1.6.29 Low Risk Malaria Village refers to the village having an Annual Parasite Incidence (API) <1 per 1000 at risk population (National Malaria Control Program and WHO-Myanamr, 2015).

CHAPTER II

LITERATURE REVIEW

2.1   Malaria

Malaria is a serious disease and can lead to death. Malaria is caused by plasmodium parasites carried by infected female *Anopheles* mosquitoes. There are five different types of *Plasmodium* species; *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale and Plasmodium malariae* that occasionally infect humans and *Plasmodium knowlesi* that normally infect macaques in Southeast Asia and then infects to humans can cause malaria that is the transmission of disease from animals to human ("zoonotic" malaria).*Plasmodium falciparum* can cause severe malaria and present clinical features like fever with chills and rigors, headache, muscular aching and weakness, vomiting, abdominal pain and diarrhea. *Plasmodium falciparum* can cause severe organ failures such as pulmonary edema, acute renal failure, liver failure, circulatory collapse, shock, generalized convulsion and coma leads to death. *Plasmodium falciparum* malaria can be infected between 7 days and 3 months after bite of infected female Anopheles mosquitoes. *Plasmodium falciparum* malaria may lead to death if delay treatment with severe symptoms after 24-hour onset of clinical symptoms. And so, the individuals who suffer from fever should seek diagnosis and treatment within 24-hour onset of fever. The immunosuppressive people such as young children and pregnant have risk of severe

disease and may lead to miscarriage, maternal death, still birth and neonatal death. *Plasmodium knowlesi* malaria infection, travellers' malaria, also known as monkey malaria because the host is monkey and vector is mosquito for this infection. Human staying in rain forests and or fringe areas in South East Asia, Malaysia, Indonesia, Myanmar, Thailand, China, Laos, the Philippines, Singapore, parts of Cambodia, and Vietnam can be infected monkey malaria. Life cycle of the parasite lasts for 24 hours and may develop symptoms after 9-12 days after infection. Severe *Plasmodium knowlesi* infection can cause organ failure and may lead to fatal. Relapse can't be occurred due to absence of persistent liver forms (WHO, 2017a, CDC, 2015a).

2.2 Anopheles Mosquitoes

Under 41 genera groups, roughly 3,500 species of mosquitoes are present. Although there are approximately 430 species of *Anopheles* mosquitoes, only 30-40 species (female vector) can transmit malaria. Different species of *Anopheles* can transmit malaria depending on the environment and the region. Female *Anopheles* mosquitoes suck blood from humans for development of eggs (from gametocyte stage to sporozoite stage). The development process is influenced by several factors such as ambient temperature and humidity and life span of anopheles that survives long enough to complete parasites' cycle. *Anopheles* mosquitoes undergo four stages in their life cycle from egg to larva and then pupa and adult, at last. The first three stages are in water and lasts 5-14 days according to the species and temperature. Only the adult stage female *Anopheles* mosquitoes can act as malaria vector (CDC, 2015d).

2.2.1 Life Span

After entering into the blood stream of mosquito through saliva, malaria parasites start to develop within the mosquito. Ranging from 10 to 21 days is the necessary time for development depending on the species of parasites and temperature. Mosquito cannot transmit malaria infection to human if a mosquito (host) cannot live more than incubation period. Actually, measurement of the life span of mosquitoes directly is impossible. But, it is possible to measure the estimation of daily survivorship indirectly. In Tanzania, estimation of daily survivorship of *An. Gambiae* extent from 0.77 to 0.84 that means 77% and 84% will be survived at the end of one day. There is less than 10% of female *An. gambiae* can survive longer than a 14 –day extrinsic incubation period. Vector Control Measure such as indoor residual spray can effect on adult longevity and has actual impact to reduce malaria transmission (CDC, 2015d).

2.2.2 Patterns of Resting and Feeding

The active time for most *Anopheles* mosquitoes is at dusk and dawn or at night for sucking blood meals. There are two feeding methods of Anopheles mosquitoes. Some *are endophagic (indoor feeding and some are exophagic* (outdoor feeding). Depending on the resting habits, some *Anopheles* mosquitoes are endophilic (prefer to rest indoor) while some are exophilic (prefer to rest outdoor). A good housing condition to prevent mosquito entry (e.g., windows, screens), the use of long lasting insecticide treated nets (LLINs) and insecticide-treated bed nets (ITNs) can effectively reduce biting of endophagic *Anopheles* mosquitoes at nocturnal. Indoor Residual Spray (IRS)

can easily control Endophilic mosquitoes and source reduction (destruction of the breeding sites) can easily control the exophages /exophilic vectors (CDC, 2015d).

2.2.3   Breeding Sites

50 -200 eggs per oviposition can be laid by Adult Female *Anopheles* mosquitoes directly on water. In cold climates, after 2 to 3 weeks, hatching may take place and in dry climates, hatching may only take place within 2-3 days. Most species prefer to lay in clean, unpolluted water. However, *Anopheles* mosquitoes' larvae can be found in rivers, end of the stream, small temporary rain pools, mangrove swamps, marshes, grassy ditches, rice fields and in fresh or salt water. Although many species prefer habitats with vegetation, others prefer habitats that have none. Some prefer to breed in shaded breeding sites in forests while others prefer to breed in open, sun-lit pools. Only a few species like to breed in the leaf axils of some plants or in holes of the tree (CDC, 2015d).

2.3   Transmission of Malaria

Malaria is usually caused by the bite of infected female *Anopheles* mosquitoes. Only female *Anopheles* species mosquitoes can cause transmission of malaria and they got malaria parasites from sucking of blood infected person through their saliva. A small amount of blood they sucked contains tiny malaria parasites that can be seen by

microscope. The mixture of malaria parasites and mosquitoes' saliva is injected into the person during biting when the mosquitoes take its next blood meal about or more than one week. Malaria can also be transmitted through blood transfusion due to the presence of red blood cells of an infected person, sharing of needles or blood contaminated syringes and organ transplants. In vertical transmission, malaria can be transmitted from mother to unborn infant before or during delivery known as congenital malaria. Malaria can be transmitted from neither contact with malaria infected people and secretions nor sexually (CDC, 2017).

2.4 Symptoms of Malaria

The incubation period means a period of time before the first symptoms appear followed by the bite of infected female *Anopheles* mosquitoes. It takes from 7 to 30 days in most cases. Uncomplicated malaria symptoms have 3 stages; sensation of cold and shivering regarded as cold stage, fever, headaches, vomiting; seizures in young children are noted as symptoms of hot stage and a sweating stage include sweats, return to normal temperature, tiredness and last for 6-10 hours with combination of body aches, general malaise, fever, chills, sweats, headaches, nausea and vomiting. Complicated (severe) malaria is occurred when infections are complicated by severe organ failures or abnormalities in patient's blood or metabolism. Symptoms of complicated malaria are Acute respiratory distress syndrome (ARDS), an inflammatory reaction in the lungs that inhibits oxygen exchange, which may occur even after the parasite counts have decreased in response to treatment, Severe anemia due to hemolysis (destruction of the red blood cells), Hemoglobinuria (hemoglobin in the

urine) due to hemolysis, Cerebral malaria with abnormal behavior, impairment of consciousness, seizures, coma, or other neurologic abnormalities, Low blood pressure caused by cardiovascular collapse, Abnormalities in blood coagulation, Acute renal failure , Hyper parasitemia , where more than 5% of the red blood cells are infected by malaria parasites, Metabolic acidosis (excessive acidity in the blood and tissue fluids), often in association with hypoglycemia (low blood glucose). Severe complicated malaria is an acute medical emergency and life threatening condition and so, it have to be treated urgently and aggressively to save life (CDC, 2015b).

2.5   Life Cycle of Malaria

Malaria parasites infects human and female *Anopheles* mosquitoes in their life cycle process (9-14 days). Firstly, the parasites invade, develop and proliferate in the liver cells of the liver (5-7 days) and then in the red blood cells of the humans. Becoming high parasitemia   destroy the RBCs and liberate the merozoites (daughter parasites) that invade the red blood cells and continue the life cycle process (48 hour). The blood stage parasites forms can cause malaria symptoms and gametocyte (certain forms of blood stage parasites) are sucked up during blood meal by female *Anopheles* mosquitoes that start another life cycle in mosquitoes. (Erythrocytic Cycle). After 10-18 days, the parasites (as sporozoites) are found in the salivary glands of mosquitoes. These are injected to another human through saliva when *Anopheles* mosquito suck the blood meal and another human malaria infection is started.

Sporozoites, by inoculation of Infected Female *Anopheles* mosquitoes infect liver cells and develop into schizonts and these schizonts burst and release merozoites.

(also called hypnozoites in *Plasmodium vivax* and *Plasmodium ovale*, can live in the liver longer and entering to the blood stream can cause relapses). The parasites invade into the red blood cells and encounter multiplication asexually in the erythrocytes after proliferation in the liver. (exoerythrocytic cycle). And then, start the process of erythrocytic cycle (CDC, 2015c).
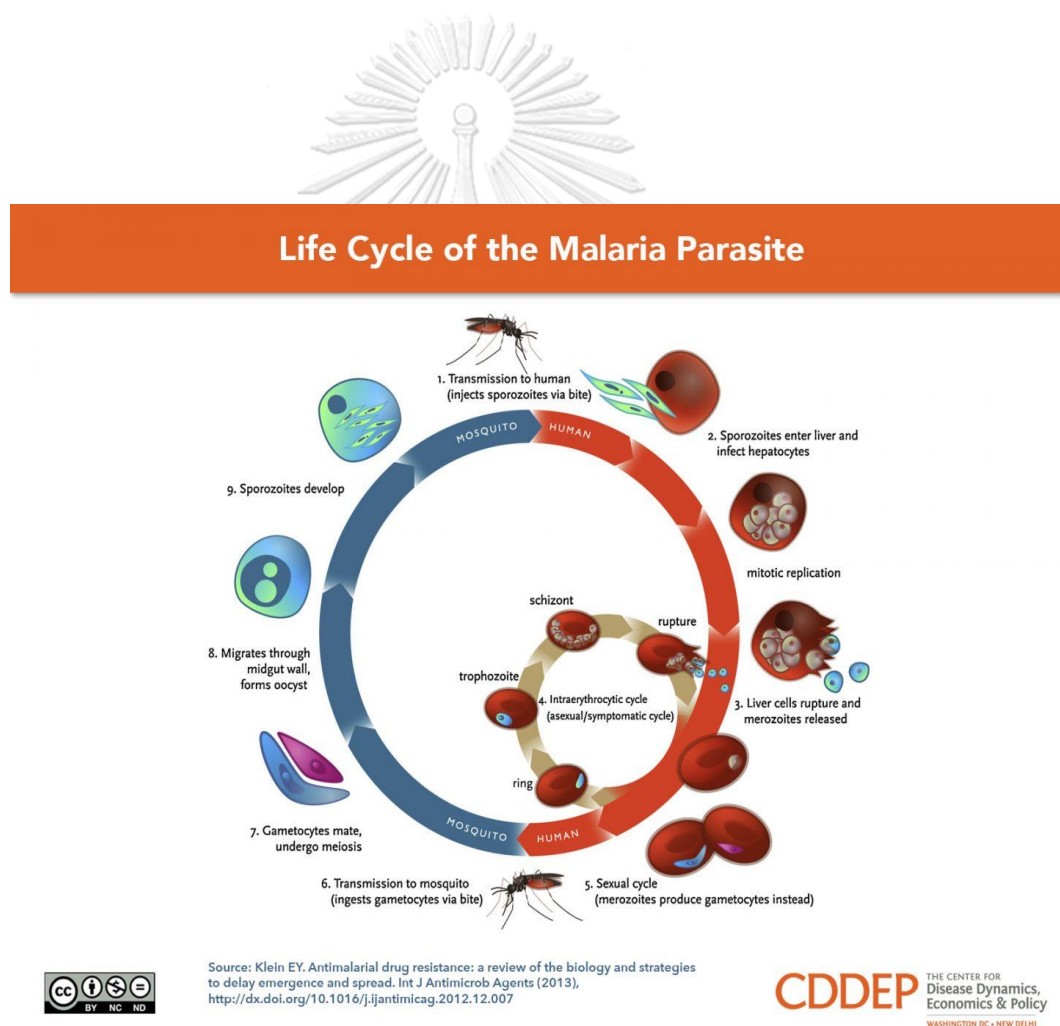
Figure 1: Malaria Life Cycle (CDDEP, 2016)

2.6   Diagnosis of Malaria

2.6.1   Clinical Diagnosis

Clinical diagnosis of malaria is done by symptoms of patients such as fever, chills, sweats, nausea and vomiting, headaches and muscle pains and findings when doing physical examination such as tiredness, elevated temperature and perspiration and other findings such as severe anemia, respiratory difficulties, confusion, coma and neurological focal signs in severe complicated *Plasmodium falciparum* malaria infection. But, it is recommended that confirmation with laboratory test or malaria specific diagnostic tests is more better way of diagnosis (CDC, 2015b).

2.6.2   Microscopic Diagnosis

Malaria parasites can be detected by drawing a thick and thin blood films on the glass slide by taking a drop of blood from patient and examine blood smear under the microscope. Before examination under microscope, the specimen is stained (mostly Gimensa stain) to get the peculiar appearance of parasites for precise identification of malaria species. Microscopic diagnosis is the gold standard for the detection of malaria parasites. But, it depends on the microscope's quality, reagents' quality and laboratory technician's skill (CDC, 2015b).

2.6.3   Antigen Detection

The Rapid Diagnostic Tests" (RDTs), immunochromatographic tests, to detect antigen derived from malaria parasites is an effective complementary test to

microscopic diagnosis in situations where reliable microscopic diagnosis is not accessible. It is a strip type format and give results in 30 minutes and less. According to WHO recommendation, parasites-based diagnostic testing (either rapid diagnostic test or microscopy) can be confirmed in all suspected malaria cases before giving treatment (WHO, 2015b).

Figure 2: Rapid Diagnostic Test (RDT)

2.6.4   Molecular Diagnosis

Malaria parasite's nucleic acids can be detected by using Polymerase Chain Reaction (PCR). This technique of diagnosis is more sensitive than microscopic

diagnosis but can only get limited utility used in the diagnosis of acutely ill patients in the standard healthcare setting. The results of PCR are often not obtainable rapidly enough to be of value in providing the diagnosis of malaria infection. PCR, most useful diagnostic method for confirming the species of malarial parasite after the diagnosis has been done by either RDT or microscopic diagnosis (WHO, 2015a).

2.7   Prompt and Effective Malaria Treatment

Suspected and confirmed malaria patient should be tested with either rapid diagnostic test (RDT) or microscopy before starting of antimalarial drugs. Prompt and effective treatment within 24 hours' onset of malaria symptoms with an effective and safe antimalarial drug according to National Malaria Treatment Guideline is necessary to affect a cure and prevent life-threatening complications.(WHO, 2017c) Achievement of prompt and effective treatment involve both patients and provider's roles. Getting of prompt treatment is done by testing of malaria within 24 hours by patients and giving of appropriate and safe malaria drugs within 24 hours according to National Malaria Treatment to patients by providers. Effective treatment is a follow up activity of providers to patients for checking of taking of full course of anti-malaria drugs for 3 days (Health et al., 2015).

2.7.1   National Malaria Treatment Guideline in Myanmar

2.7.1.1 Treatment of Uncomplicated Malaria

 (1) **Treatment of Uncomplicated *Plasmodium falciparum* Malaria Infection**

First line treatment regime of uncomplicated *Plasmodium falciparum* malaria is Artemisinin based Combination Therapy (Artemether+ Lumefantrine) for 3 days and

Primaquine stat at Day 0. The dose of drugs differs from age and body weight of the patient and Primaquine is not given in patients < 5 years. If the patient is **pregnancy** mother in first trimester, Quinine and Clindamycin is to be given for 7 days. If these drugs are not available and fail to response to Quinine and Clindamycin, ACT alone can also be given. In second and third trimester, ACT alone to be given for 3 days and Primaquine drug is contraindicated in pregnancy due to its teratogenic effect. For lactating mother, ACT to be given for 3 days and Primaquine is not to be given to breast feeding mothers of infants < 6 months of Age (Health et al., 2015).

Age Group (Years)	Artemether + Lumefanteriene (ACT)						
	Day 0			Day 1		Day 2	
	1st Dose	Primaquine (7.5mg)	2nd Dose	1st Dose	2nd Dose	1st Dose	2nd Dose
<1	½	-	½	½	½	½	½
1 – 4	1	-	1	1	1	1	1
5 – 9	2	15mg	2	2	2	2	2
10 – 14	3	30 mg	3	3	3	3	3
15+above	4	45 mg	4	4	4	4	4

Table 1: Treatment of uncomplicated *Plasmodium falciparum* infection

ACT is the fixed dose formulation with standard tablets containing 20 mg of Artemether and 120 mg of lumefantrine. In *Plasmodium falciparum* infection, Primaquine act as gametocytocidal drug to interrupt infectivity of malaria to *Anopheles* mosquitoes and subsequent transmission to human (Health et al., 2015).

(2) Treatment of Uncomplicated *Plasmodium vivax, Plasmodium malariae and*

Plasmodium ovale **Infections**

Treatment with chloroquine for 3 days is still the treatment of choice for these

malaria infections followed by Primaquine is started at Day 2. Drug dose differ from

age and body weight of the patients. Although health staffs are asked to give Primaquine

0.25mg base/kg/day for 14 days, ICMV must give Primaquine 0.75mg/kg once a week

for 8 weeks to prevent hemolysis in unknown G6PD deficiency patients. In these

malaria infections, Primaquine act as hypnozoidal drug for the radical cure of

hypnozoites in liver to prevent relapse. In **Pregnancy and lactating** mother, treatment

regime is the same with general population except in Primaquine. In Pregnancy mother,

Primaquine is contraindicated and in lactating mother, Primaquine is not to be given

breastfeeding mother of infants less than 6 months of age (Health et al., 2015).

Age group (Years)	Chloroquine tablets (150mg base Tablet)			Primaquine 7.5mg (for Health Staff)	Primaquine 7.5mg (for ICMV)
	Day 0	Day 1	Day 2	Day 2 (2 weeks regime)	Day 2 (once a week for 8 week regime)
<1	⅓	⅓	⅓	-	-
1 – 4	1½	1½	1	-	-
5 – 9	2	2	1	7.5 mg	15mg
10 – 14	3	3	1½	10.75 mg	30mg
15+above	4	4	2	15 mg	45mg

Table 2: Treatment of Uncomplicated *Plasmodium vivax, Plasmodium malariae* and *Plasmodium ovale* malaria infections

(3) Treatment of Uncomplicated Mixed Malaria Infection (*Plasmodium falciparum + Plasmodium vivax*)

First line treatment regime of uncomplicated mixed malaria infection is Artemisinin based Combination Therapy (Artemether+ Lumefantrine) for 3 days and Primaquine is started at Day 0. The dose of drugs differs from age and body weight of the patient and Primaquine is not given in patients < 5 years. Although health staffs are asked to give Primaquine 0.25mg base/kg/day for 14 days, ICMV must give Primaquine 0.75mg/kg once a week for 8 weeks to prevent hemolysis in unknown G6PD deficiency patients. If the patient is **pregnancy** mother in first trimester, Quinine and Clindamycin is to be given for 7 days. If these drugs are not available and fail to response to Quinine and Clindamycin, ACT alone can also be given. In second and third trimester, ACT alone to be given for 3 days and Primaquine drug is contraindicated in pregnancy due to its teratogenic effect. For lactating mother, ACT to be given for 3 days and Primaquine is not to be given to breast feeding mothers of infants < 6 months of Age (Health et al., 2015).

Age Group (Years)	Artemether + Lumefanteriene (ACT) + Primaquine							
	Day 0				Day 1		Day 2	
	ACT 1ⁿᵈDose	Primaquine (7.5mg) (2 weeks regime) (Health Staff regime)	Primaquine(7.5mg) (once a week for 8 weeks regime) (ICMV regime)	ACT 2ⁿᵈDose	ACT 1ⁿᵈDose	ACT 2ⁿᵈDose	ACT 1ⁿᵈDose	ACT 2ⁿᵈDose
<1	½	-	-	½	½	½	½	½
1 – 4	1	-	-	1	1	1	1	1
5 – 9	2	7.5 mg	15mg	2	2	2	2	2
10 – 14	3	10.75 mg	30mg	3	3	3	3	3
15+above	4	15 mg	45mg	4	4	4	4	4

Table 3: Treatment of Uncomplicated Mixed Malaria Infection

2.7.1.2 Treatment of Severe Complicated Malaria

The recommended treatment for severe complicated malaria in **all patients including pregnancy and lactating mothers** is giving injection of Artesunate or Artemether. For Artesunate injection, 2.4 mg/kg BW is given intramuscularly or intravenously on admission (time=0 hour) followed by 2.4 mg/kg BW at 12 and 24 hours followed by once daily for 7 days. For Artemether injection, 3.2 mg/kg BW is given on admission (time=0hr) followed by 1.6mg/kg BW daily for 7 days. Once the patient can tolerate oral therapy, treatment should be switched to a complete dosage of ACT for 3 days and Primaquine single dose with the first dose of ACT. Quinine Infusion can be also used in treatment of severe complicated malaria. As a loading dose**,** Quinine dihydrochloride 20mg/kg BW diluted in 10ml/kg BW of 5% D/W or D/S can

be administered by IV infusion over a period of 4 hrs. As a Maintenance dose, Quinine dihydrochloride 10mg/kg BW diluted in 10ml/kg BW of 5% D/W or D/S can be administered by IV infusion over a period of 4 hours and repeated every 8hrs. A loading dose of quinine should not be given if the patient has received or suspected to have received Quinine, Quinidine or Mefloquine within the preceding 12 hours and facilities for controlled rate of flow of Quinine infusion are not available. At Rural health facilities level, the recommended pre-referral treatment for severe complicated malaria is giving injection of Artesunate 2.4mg/kg BW is given Intravenously or Intramuscularly or giving of injection Artemether 3.2mg/kg BW is given Intramuscularly and early referral to the Hospital. At ICMV level, the recommended pre-referral treatment is giving of first dose of ACT according to age and early referral to the Hospital (**Health et al., 2015**).

2.7.1.3 Treatment of Malaria in Special Situations

(1)   Management of Treatment Failure

Treatment failure is defined as an inability to clear malarial parasitaemia or resolve clinical symptoms of malaria in spite of administration of an anti-malarial drug. Treatment failure is not always due to drug resistance and many factors can contribute such as incorrect dosage, poor patient compliance either dose or duration of treatment, poor drug quality and drug interactions. Even after taking of full dose regime, may cause treatment failure because of poor absorption and rapid elimination. (for example; vomiting and diarrhea). Treatment failure within 28 days can be given by alternative ACT, Artesunate and Mefloquine (or) Dihydroartemisinin and Piperaquine for 3 days and Primaquine at Day 0 according to Age and body weight of the patient. Treatment

failure after 28 days is considered as new infection and it can be treated with Artemether and lumefantrine and Primaquine at Day 0 according to age and body weight of patient. In **pregnancy** and lactating mothers, treatment regime is the same except the primaquine is contraindicated **(Health et al., 2015)** .

(2)   Treatment of Malaria in G6PD Enzyme Deficiency Patients

In 2011, 16 G6PD enzyme deficiency patients were occurred in Kyah State and Rakhine State, Myanmar, where 11 are moderately deficient and 5 are severe deficient. The side effect of Primaquine can often cause hemolysis and the recommended treatment regime for known G6PD deficient patients is the same as the above treatment regime except Primaquine dose. The recommended dose of Primaquine is 0.75mg/kg once a week for 8 weeks in mixed malaria infection, *Plasmodium vivax, Plasmodium ovale and Plasmodium malariae* infections.G6PD deficient in **pregnancy** and lactating mothers are very rare and if it found, treatment regime is the same except the primaquine is contraindicated **(Health et al., 2015)** .

Figure 3: Artemisinin based Combination Therapy (ACT)

2.8   National Malaria Treatment Policy

In Myanmar, National Malaria Treatment policy and guideline was first developed in 2002, and then 2015 is latest. Malaria case management is key component in malaria control strategies; early diagnosis and prompt and effective treatment through effective antimalarial medicines. The scope of malaria treatment policy is not only from malaria morbidity and mortality but also to prevent malaria transmission. The guidelines are primarily aimed towards medical personals in the public and private sectors and monitor the antimalarial drugs for quality assurance and quality control. Without understanding of the malaria treatment policy and updated regimes, the availability of obsolete and substandard antimalarial in the market may hinder the private sector and recipient communities from adhering to the National Malaria Treatment Guideline. Banning Oral artemisinin monotherapy policy is implementing

through collaborative efforts among respective government departments and pharmaceutical companies. National Malaria Control Program (NMCP) target to treatment policy and guidelines on malaria for covering from the community to institutional levels and all aspects of malaria treatment at every stage, from uncomplicated to complicated, and any infection from the Plasmodia species. The biology of vectors, epidemiology of malaria, socio-behavioral characteristics of the communities and geographical areas also create a challenge to achieve further progress in the implementation of malaria control interventions. Although malaria morbidity and mortality has reduced, the resistance of parasites to multiple antimalarial medications including artemisinin is evolved (WHO, 2015a).

2.9   Prevention and Control of Malaria

Malaria can be prevented by evading the bites of infected female *Anopheles* mosquitoes. Malaria can be prevented by Vector control and the purpose is to lower the contacts between humans and mosquitoes. Some of the vector control measures such as insecticide spraying inside the houses and destruction of breeding sites of larvae and these measures require organized and coordinated teams (for example; from the Ministry of Health) and resources. Personal protective measures such as wearing of long sleeves and usage of mosquito's repellents, usage of Insecticide treated nets (ITN) or long lasting insecticide treated nets (LLIN) can also prevent malaria. Malaria also can be prevented by improvement of knowledge of malaria by giving health education (Information-Education-Communication; IEC materials) and training and supervision of Integrated Community Malaria volunteers, to improve the

ability to provide health education about malaria prevention to the community. Malaria can be prevented by provision of equipment and supplies (eg; RDTs and bed nets) to allow the health staffs and communities to conduct the interventions by Ministry of Health, International Organizations, Governmental and Non-Governmental Agencies and the Private Sectors. Diagnosis within 24-hour onset of fever and effective treatment can also prevent malaria transmission. Stand by curative treatment with ACT for those who will travel to the malaria endemic areas where malaria services are not accessible is also one of the preventive measure of malaria (Malaria.com, 2012, Health et al., 2015).

2.10   Malaria Drug Resistance

Artemisinin drug resistance is characterized by lower sensitivity of ring stage parasite development and is related with raising rates of failure to artemisinin-based combination treatments. In South East Asia, mutations that change the primary amino acid sequence of K13 gene, a main causal determinant of artemisinin resistance. Various K13- propeller mutations have been documented in population surveys in the region. The most prevalent mutations are associated with delayed parasite clearance after artemisinin treatment and reduced in-vitro responses. Propeller mutations associated with normal rates of parasite clearance have no frequently identified. Increasing evidence shows that mutations in the K13 propeller are absent at significant frequencies and the total prevalence of the K13-propeller mutation is less than 5% in surveys from a range of transmission settings when away from artemisinin resistance

areas. Before Global spread, discovery of a molecular marker of artemisinin resistance provides opportunity for surveillance in containment and elimination strategies (Tun et al., 2015).

2.11   Behaviors Related to Treatment Seeking

Treatment seeking behavior of malaria patients and young children's caretakers is closely related to achievement of prompt and effective malaria treatment strategies. Treatment-seeking behavior usually depends on age, sex, educational level, socio-economic status, and cultural beliefs about the cause and cure of illness, perceived severity of disease, the local epidemiology of malaria, access to health care providers, attitudes towards providers and costs of services. In spite of being recommended for seeking treatment in formal health sectors if getting fever, self-medication through drug sellers and pharmacies is still consistently exist. Underdoing of antimalarial received through public or private sector providers is virtually universal, resistance development of drugs used and side-effects and costs are of increasing concern (ller et al., 2003).

Although treatment seeking behaviors of malaria patients are important for achievement of prompt and effective treatment of malaria and to reduce drug resistance, facts related to these are rare. Generally, treatment seeking behavior of patients can be identified by treatment seeking time, places and behavior of taking drugs. In Myanmar, the recommended time for early treatment seeking behavior is within 24-hour onset of malaria symptoms. If the patient can test malaria within 24-hour onset of malaria symptoms, it can reduce malaria transmission and cannot lead to severe complicated

malaria and so it can reduce malaria morbidity and mortality. However, most of the fever patients do not test malaria within 24 hour and they take analgesic and anti-pyretic drugs to relieve the symptoms and they test malaria when only they don't relieve the symptoms or developing of severe symptoms due to complications(Wittet, 2014).

In Rural Areas, malaria diagnostic tests (RDTs) are distributed in rural health facilities and Integrated Community Malaria Volunteers from National Malaria Control Program and Non-Governmental Organizations. Every village have either Rural Health facilities or ICMV for accessibility of early diagnosis and treatment by community. Taking of anti-malaria drugs only after testing of malaria test is one of the indication for getting for prompt and effective treatment of malaria and reduction of drug resistance. Even filling of gaps with ICMV in villages without Rural Health Facilities for malaria services, most of the patients still diagnosing and treating with quacks, self-medication and drug store(Xu et al., 2012).

Taking full course of anti-malaria drug is one of the indication of getting prompt and effective treatment of malaria and it can reduce malaria transmission and hence, reduce malaria morbidity and mortality and drug resistance. Most of the patients do not take malaria drugs full course and stop when they relieve symptoms. In ACT, Artemether has rapid action for relieving of symptoms after one-day course. Actually, parasites are not killed completely. Incomplete course of malaria drugs can cause barrier to prompt and effective treatment of malaria and developing of drug resistance(Uzochukwu and Onwujekwe, 2004).

2.12   Health System Factors

Health system is the people, institutions and resources, arranged together corresponding with authorized policies, to improve the health of the population they provide, while responding to people's legitimate expectations and protecting them against the cost of ill-health through a variety of activities whose primary intent is to improve health.(WHO, 2017d)Any deficit in this system arrangement such as source of treatment, treatment seeking, systems according to the recommended antimalarial treatment, adherence with the drug regimen, and quality of the antimalarial medication on effectiveness of malaria case management, poor work ethics of health actors, low quality of care to patient, low drugs supply, poor provider patient relationship related to accessibility, affordability, availability and accountability can cause destructive health system and so, patient cannot easily access to early diagnosis and prompt and effective treatment of malaria (Galactionova et al., 2014).

Accessibility means getting of malaria services such as diagnosis of malaria with RDT or Microscopy and prompt and effective treatment of malaria easily at the time of getting malaria symptoms (WHO, 2017d) Accessibility can be measured by how extent of accessible malaria services such as accessible to health facilities and ICMV and diagnosis and treatment of malaria. In Myanmar, malaria endemic areas are mostly hard to reach areas such as near forest or within forests. Although either health facilities or ICMVs are present in each village for filling of malaria service gaps, community still have problem for getting of prompt and effective treatment due to

transportation problems. Barriers to accessibility can be contributed by not only transportation difficulties but also socio demographic status, knowledge and behaviors of the community(Rao et al., 2013, Galactionova et al., 2014).

Affordability is the cost that the patient can pay for treatment of malaria, transportation cost and time spent for getting malaria services (WHO, 2017d).Affordability can be measured by affordable cost for treatment of malaria, transportation cost for getting malaria services and time spent for getting of malaria services. Although malaria services are given with free of charge through the support of National Malaria Control Program and Non-Governmental Organizations, community still spend on cost for malaria services with either officially or unofficially. In some cases, getting of prompt and effective treatment depends on the affordability of cost. Unaffordability of treatment cost is superimposed by transportation cost. Most of the malaria patients are in hard to reach areas and they take much time and much transportation cost to get malaria services. So, affordability is the one of the barrier to get prompt and effective treatment of malaria (Rao et al., 2013, Galactionova et al., 2014).

Availability is the sufficient supply and appropriate stock of malaria drugs, equipment and health workers who can provide patient centered services according to the needs of the community (WHO, 2017d).Availability can be measured by opening hours of health facilities, enough drugs and equipment supply, presence of enough health staff and they can treat patients with giving of respect, care, well communicate and educate patients and advocate disease prevention, diagnosis and treatment (AC and E, 2003). Opening hours of health facilities and presence of ICMV at home are

important so that the patients can get malaria services with early diagnosis and effective treatment. In Myanmar, the stock of the malaria drugs and equipment are managed by health staff and ICMVs and they can ask for the stocks to either Logistic Supply Chain Unit or Non-Governmental Organizations according to the consumption focus of the stocks. If the health staff or ICMVs didn't calculate the consumption focus of the stocks according to needs of the community and not well managed, shortage and stock out of drugs and equipment can cause the barrier for getting of prompt and effective treatment of malaria in malaria infected patients.(Rao et al., 2013, Galactionova et al., 2014).

Accountability means responsibility of health staff and ICMV for promotion of malaria services, provision of malaria services in line with work ethics and getting of community trust (WHO, 2017d).Accountability can be measured by the responsibilities of health staff and ICMV about promotion of malaria services such as early diagnosis and effective treatment of malaria can reduce malaria mortality and services can be got free of charges for community awareness. The service providers can give health services according to their work ethics and community trust is one of their accountability. Community trust is important for service providers because patients do not go to the service provider they don't believe in (Rao et al., 2013, Galactionova et al., 2014).

2.13 Role of Integrated Community Malaria Volunteers in Malaria Treatment

National Malaria Control Program (NMCP) and Non-Governmental Organizations (NGO) recruit malaria volunteers from malaria endemic villages and

conduct the trainings about malaria for volunteers. After training, ICMVs have to know about knowledge of malaria such as malaria vector, malaria parasites, bleeding places of mosquitoes, resting places of mosquitoes, vector active time, vulnerable populations, symptoms of malaria, prevention methods of malaria and ICMVs are able to conduct Health Education sessions in villages and can share these malaria knowledges by using pamphlets, posters and flip charts supported by NMCP and NGOs. They can also diagnose malaria with Rapid Diagnostic Tests skillfully and can give appropriate treatment correctly and they have to advocate the community for early diagnosis and prompt and effective treatment of malaria within 24-hour onset of malaria symptoms. They can give malaria services to the community with free of charge. They can manage the stocks of drugs and equipment supported by NMCP and Organizations and can submit stock report monthly. They have to send malaria Case Report monthly to NMCP and Organizations in time. They have to attend Volunteer refresher trainings held by NMCP and Organizations. They have also responsibility for notification if outbreak is occurred in the community (Ministry of Health, 2015).

2.13   Reviews of relevant research findings

In 2010, World Health Organization (WHO) announced a policy that all suspected malaria cases should be diagnosed by using microscopy or rapid diagnostic tests (RDTs) and that treatment should be based on diagnosis result according to National Malaria Treatment Guidelines. A key element of Malaria Care Strategy is to reduce barriers for improvement of case management through policy, behavioral change intervention among decision makers, health care providers and the community. In 2013, Malaria Care partnership used two approaches to gather data related to policy

and behavioral change barriers by reviewing of select current reports and peer-reviewed publications and by series of in depth interview with 24 International and National experts based in United States, Europe and Africa. In this study, patient awareness, demand and behaviors is the one of the issues in findings. Furthermore, patients are still concerning that malaria may still be present although the RDT result is negative. Patients routinely pressure health workers for ACT even RDT result is negative because they feel unsatisfied for leaving the clinics without medications. Patients do not comply with malaria treatment, do not understand how to comply, afraid of malaria drugs and discontinue treatment early. Sometimes, patients save ACT for future use or use by other people with fever (Wittet, 2014).

One study from South East Nigeria, cross sectional study and used structured questionnaires and the sample size is 1594 household head or female household primary care givers on their socio-economic status and used of diagnosis and treatment services of malaria. Principal Components analysis for socio-economic status index and chi-square for trends were used. The study shown that diagnosis by self was the most common form of diagnosis and followed by diagnosis with laboratory tests such as RDTs and microscopy, community health workers, family members and traditional healers. The primary choice of care for malaria was a visit to the patent medicine dealers, followed by visit to government hospitals, Health Centers, traditional Medicine healers, private clinics, community health workers and does nothing at home. Self-diagnosis and self-treatment is more in poorer households and low socio economic status. The least poor groups had a higher probability of seeking treatment at the Health Centers, Hospitals and Private Clinics. The richer households complained more about lack of drugs and poor staff attitude as their reasons for not attending the health centers.

Closeness of the health centers to the homes, polite health workers and availability of good services are the factors that favor the people to use services in health centers (Uzochukwu and Onwujekwe, 2004).

In Northern Sri Lanka, there has been affected by armed ethnic conflicts, heavy impact on number of health professionals and health delivery services last 18 years. It has severe malaria burden with less than 5% of a national population suffering 34% of malaria reported cases. Health providers studied the treatment seeking behaviors and treatment failure due to lack of adherence to prompt and effective malaria treatment. Qualitative study with pre-and post-treatment, in depth interviews and focus group discussions with patients who are seeking treatment in the outpatient department (OPD). As a result, in completed interviews to 271 persons, there are 54.4% of patients seek treatment within 2 days of the onset of symptoms and 91.9 % of patients are self-treated with drugs mainly with paracetamol before seeking treatment. Self-treatment was associated with delay treatment (RR = 3.55, CI is between 1.23 and 10.24 and p value is 0.002). Self-reported default was 26.1%, not taking the entire regime due to side effects is 57.6% and 16.7% is due to disappearance of symptoms. Lack of confidence in Chloroquine treatment and prophylaxis is the indication of Focus Group Discussion. Many factors are contributing to prompt and effective malaria treatment such as perception of malaria as a routine illness, lack of access, lack of confidence in treatment, a lower quality of care for malaria; lack of medical staff and facilities because of the fighting (Reilley et al., 2002).

In a highly endemic rural Tanzanian community, treatment seeking behavior of

malaria is related to access to treatment was revealed by this research. This research provides a better understanding of barriers to treatment access. Study design is Case Control study of community based treatment seeking survey, including 226 recent fever events. Additional households in information were provided by local Demographic Surveillance System. Availability and location of treatment sources were provided by the enumeration of health facilities and drug retailers. It was found that 87.5% of fever cases in children and 80.7% in adults were treated with recommended antimalarial drugs. But, only 22.5% of the children and 10.5% of adults received prompt and effective treatment. Health facility attendance increased the odds of receiving an antimalarial (OR = 7.7) but did not have an impact on right dosage. The Community did not get quality of case-management and private drug retailers involved as a main role for complementing existing formal health services to give antimalarial treatment. This research revealed that health system factors are associated with prompt and effective antimalarial treatment and have to be tracked urgently for equitable community-effectiveness and health impact (Hetzel et al., 2008) .

One of the studies of obstacles to effective malaria treatment in Kenya, Africa shown that multiple factors related to availability, acceptability and affordability access to prompt and effective treatment. In poorest areas of four malaria endemic districts in Kenya, the study was conducted. A cross sectional study with 708 number of households, 24 focus group discussions and semi structured interviews with 34 health workers and exit interviews with 359 patients. About 40 percent of self-treated individuals using shop-bought drugs and 42 percent individuals who visited a formal health facility reported for not having enough money to pay for treatment are regarded as affordability. Seasonality of illness, seasonality income, transportation costs and

unofficial payments are other factors influencing the affordability. The major related factors such as provider patient relationship, patients' expectations, poor adherence to treatment regimes, distrust in the health system, effectiveness of treatment and beliefs on illness causation are regarded as acceptability. Availability barriers are opening hours of health facilities, drug and staff shortage and organization of health care services. All individuals are suffering to access to effective malaria treatment, a challenge for resources constrained health system. Malaria will remain a major cause of morbidity and mortality unless additional efforts towards accessing for obstacles among poor and vulnerable population (Chuma et al., 2010).

In Myanmar, a study was done in Wa ethnic people, Shan Special Region II, to assess the treatment seeking behaviors of malaria and the factors that affect the households. A cross sectional study with two methods, household surveys to household head with questionnaires and in depth interviews to among population. Statistical method of logistic regression was used to assess the factors affecting the treatment seeking and by using Text Analysis Markup System, qualitative data were analyzed. Among 87.5% (323) of the fever patients searched for treatment; 118 patients (32%) searched it within 24 hours, 24 (6.5%) sought it within 24–48 hours and 181 (49.2%) seeking for treatment after 48 hours. Among 323 fever patients who searched treatment, 257 (79.6%) went to the retail sectors such as shops, market stalls and drug peddlers, 31 (8.4%) searched from village health workers who are regarded as the lowest level public health facility, 8 (2.2%) went to community health centers for treatment and 27 (7.3%) asked for advice or treatment from a traditional healer, a relative or a friend. The proportion of accessing the retail sectors was statistically significantly higher than accessing the public sectors (P<0.0001). Among the 46 patients who stayed at home,

34 patients (73.9%) already had drugs in home and 31 patients (67.4%) asked for help from supernatural spirit. Of only 20.08% of fever patients received microscopy for diagnosis and only 8.1% received RDT test. Of 8 patients (7.7%) received laboratory based diagnosis at the community health Centre and 96 patients (92.3%) received it in NGOs' outreached services among 104 fever patients. Of 169 patients (65.8%) received under-dosed paraquin in retail sector, taking herbs were 42 patients (13.0%) in retail sectors and 11 patients (3.4%) took only paracetamol among 257 febrile patients. Identification of family income, family decision and patient characteristics and distances from health facility are independently associated with delayed malaria treatment by analysis of multivariate logistic regression (Xu et al., 2012).

Prompt and effective treatment of malaria, a main malaria control strategy which reduces morbidity and mortality. One of the study in Zambia, Southern Africa shown that, only 19% caretaker of under five years old children accessed prompt and effective treatment in 2010 at Health Facilities. An Analytical cross section study using both quantitative and qualitative methods with sample size 380 caregivers and 8 Focus Group Discussions. The study found that malaria infected children with prompt and effective malaria treatment was only 13.9%. The independent variables were found to significantly predict uptake of prompt malaria treatment; distance of less than five kilometers to the health facility (Adjusted Odd Ratio is 2.45 at 95%CI: 1.22 – 5.11 p = 0.012, adequate household income (AOR 2.27 95%CI: 1.18 – 4.39 P = 0.014), taking the child to the health facility (AOR 2.45 95%CI: 1.26 – 4.76 p = 0.008 and having health education (IEC) done in the community (AOR 2.14 95%CI: 1.10 – 4.13 p= 0.024). Self-treatments with antipyretics or herbal medication and non-availability of antimalarial drugs at health facilities and were reported in FGDs to be associated with

delays in seeking prompt and effective malaria treatment. The findings in this study highlight the barriers that exits in accessing prompt malaria treatment in rural areas (Silweya, 2016).

Cross-sectional study design with institutional based was done among 311malaria suspected patients in malaria endemic public health institutions of Bale Zone, Southeast Ethiopia. The data were analyzed by using Descriptive statistics, binary and multiple logistic regressions to determine the factors that effects on treatment seeking behavior of malaria. Of 260 (87.8%) of respondents did not search treatment within 24 - hours onset of fever. Before coming to the health institution, 45 (15.2%) of the patients searched for the treatment from non-medical center. Those respondents who had low perceived susceptibility of malaria diseases searched the treatment 0.24 times less likely than those respondents who perceived malaria as a deadly disease (AOR= 0.24; CI 95%: 0.07-0.85). Most of the respondents did not search for the treatment of disease at the right time (Dida et al., 2014).

CHAPTER III

RESEARCH METHODOLOGY

3.1 Study Design

This study was descriptive cross sectional study targeting to the population of 18 to 65 years old malaria infected patients who stay in Palaw Township, Tanintharyi Region, Myanmar. This study was conducted to assess barriers for prompt and effective treatment of malaria among malaria infected patients from January 2018 to March 2018 in Palaw Township, Tanintharyi Region of Myanmar. Barriers were involved such as Socio economic factors, Knowledge of malaria, treatment seeking behaviors and health system factors for prompt and effective treatment of malaria according to National Malaria Treatment Guidelines Recommendations. It is not only less costly and less time consuming but also effective for the National Malaria Control Program to reduce barriers between community and prompt and effective treatment of malaria.

3.2 Study Area

This study was conducted in Palaw Township, Tanintharyi Region in Myanmar. Their occupations are mainly in rubber plantation, oil palm planation, forest related and fishing. Palaw Township is included in most malaria endemic township

among 10 townships of Tanintharyi Region. All of the 147 villages in Palaw township are malaria endemic because most of the villages are in or near forests, hilly mountainous regions and involved in very hard to reach areas. There are many mobile and migrant workers in Palaw Township. Total population in Palaw Township is 80,068. There are 25 high risk malaria villages, 28 moderate risk villages and 8 low risk villages and the rest are potential to risk of malaria. There are total 1,139 Cases in 2015 where confirmed *Plasmodium falciparum* malaria cases are 522 and *Plasmodium vivax* malaria are 617 and 1 malaria death. Palaw is the only one township where malaria death was occurred in Tanintharyi Region in 2015. In 2016, total confirmed malaria cases were 899 where *Plasmodium falciparum* malaria cases were 611 and *Plasmodium vivax* malaria cases were 288.

Tanintharyi region lies in the Southern end of Myanmar. The area of the region is 16,735.5 square miles. Facing to Andaman Sea in the West, bordering Thailand in the East and South, Mon State in the North. Tanintharyi Region has 3 districts, Dawei District, Myeik District and Kawthoung District. Palaw Township is under the Myeik District. In Tanintharyi Region, there are total 10,302 Cases in 2015 where confirmed *Plasmodium falciparum* malaria cases are 4,876 and *Plasmodium vivax* malaria are 5,426 and 1 malaria death. In 2016, 9,761 malaria cases and 2 malaria deaths were reported. Morbidity rate is 3.9 and mortality rate is 0.13. In 2017, total 407 malaria cases are reported with morbidity rate of 8.1 per 1,000 populations. There are many ethnic groups in Tanintharyi Region and different in culture, life style, language and beliefs. Although nonprofit and non-governmental organizations are implementing together with National Malaria Control Programme, malaria cases are still high and accessible to effective malaria treatment are still far due to low literacy rate, living in

hard to reach areas and language barriers (National Malaria Control Program, 2015, National Malaria Control Program, 2016, National Malaria Control Program, 2017, National Malaria Control Program and WHO-Myanamr, 2015).
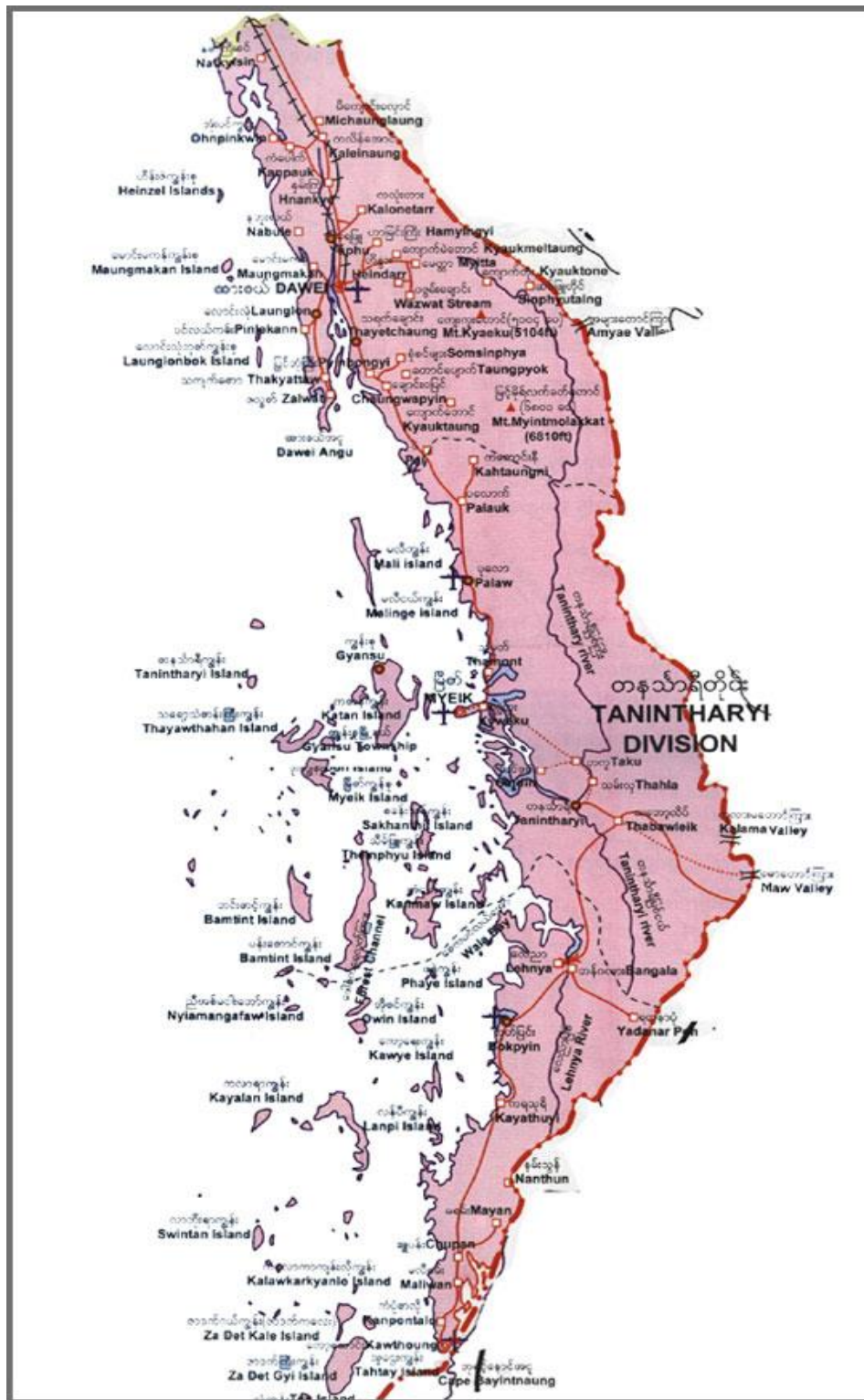
Figure 4: Tanintharyi Region Map

3.3   Study Population

Target population of this study were malaria infected patients from January 2018 to March 2018 at the time of survey, both male and female, 18-65 years old currently living in Palaw Township .Total population of the Palaw Township is 80,068 and total malaria positive patients in 2015 were 1,139 and 899 in 2016 and 407 in 2017 (National Malaria Control Program, 2015, National Malaria Control Program, 2016, National Malaria Control Program, 2017, National Malaria Control Program and WHO-Myanamr, 2015).

3.4   Sample and Sample Size Calculation

The sample for this research was calculated by using Taro Yamane (Yamane, 1973) formula with 95% confidence level. According to 2017   Annual Report, 407 malaria infected patients in Palaw Township are used as number of malaria infected patients in Palaw Township *(N)*   (Yamane, 1973,   National Malaria Control Program, 2017) (Yamane, 1973).

$$n = \frac{N}{1 + N\,(e)^2}$$

where   n = Sample size required

N = Number of malaria infected patients in 2017 in Palaw Township

e = Allowable error (%)

Calculate the sample size by substitution in the formula.

$$n = \frac{407}{1 + 407(0.05)^2}$$

$$n = 204$$

In this study, the estimated calculation is 204 malaria infected patients in Palaw

Township.

3.4.1   Inclusion Criteria

- Respondents who were malaria positive patients when tested with RDTs
  or Microscopy during January 2018 to March 2018

- Both Male and Female of age 18 to 65 years

- Respondents who had willingness to answer the questionnaires

- Respondents who were the residents in the study area more than 3 months

3.4.2   Exclusion Criteria

- Respondents who were unconscious, extremely ill or severe stage of malaria and in need of immediate medical attention at the time of malaria testing.

- Respondents who were severely ill or mental disorder at the time of conduction of survey.

3.5 Sampling Technique

Firstly, 17 high risk malaria villages were chosen from total 147 villages in Palaw Township by purposive sampling method. Malaria infected patients' data within 3 months (January 2018 to March 2018) were got from Malaria Report of National Malaria Control Program, Palaw Township. The sample malaria infected patients were calculated by proportionately based on the total malaria infected patients in each village from January 2018 to March 2018 (Table 4). And then, malaria infected patients were selected randomly from each village. For random selection, total malaria infected patients in each village were divided by sample malaria infected patients and then one numeric value was obtained and that numeric value was an interval for random selection of the sample. And then, a random number was picked and samples were selected from starting of this number. Ten Integrated Community Malaria Volunteers (local dialects persons) were recruited as research assistants from these 17 sample villages and so, they could easily follow the addresses of infected patients and could easily communicate with wide variety of ethnic respondents and so bias was avoided. For the respondents who had more than once infection during 3 months, only one-time infection was included in this survey. To reduce the recall bias, the research team asked all of the

respondents for their last infection if they had more than once infection during 3 months (from January to March 2018).

No.	Name of Villages	Total Population	Malaria Infected Patients (from Jan to March 2018)	Proportionate Malaria Infected Patients (from Jan to March 2018)	Sample Malaria Infected Patients (from Jan to March 2018)
1	Wet Toe	436	27	15	15
2	Mi Chaung Theik	590	18	10	10
3	Min Win	389	12	7	7
4	Ban Khar	98	19	11	11
5	Kyauk Leik	172	17	9	9
6	Yay Shan	320	30	17	17
7	Tharyar Kone	235	16	9	9
8	Ma Daw	363	30	17	17
9	Zar Di WIn	343	26	14	14
10	Than Myay Pyin	272	29	16	16
11	Jenny	266	27	15	15
12	Main Ma Myo	469	24	13	13
13	Kot Dwe	125	11	6	6
14	Lat Pan Pyin	239	21	12	12
15	Mar Go Mar	367	18	10	10
16	Taw Win	262	21	12	12
17	Sel Eain Su	267	23	13	13
	Total	5213	369	204	204

Table 4:Population and Malaria Infected Patients of 17 Sample Villages
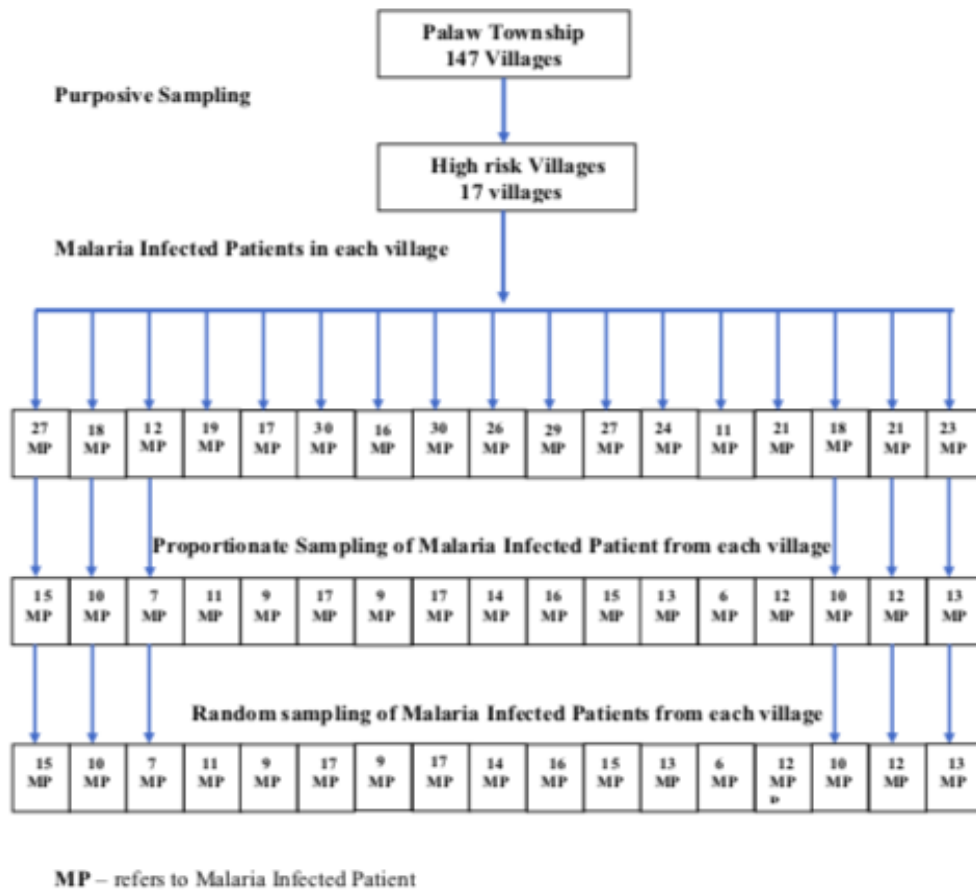
Figure 5: Random Sampling Method Flow Chart

## 3.6	Measurement Tools

A structured Questionnaire was measurement tool for this research and it was comprised with 5 parts.

### 3.6.1	Part A: Questionnaires Related to Socio Demographic Factors

This part of questionnaires consists of 9 items on the socio-demographic characteristics of the sample population which include age, sex, marital status, ethnicity, education status, occupation, length of stay and family income.

### 3.6.2	Part B: Questionnaires Related to knowledge on Malaria

This part of questionnaires consists of 12 items assessing malaria knowledge of study population. Respondents were asked about malaria vector, transmission of malaria, symptoms of malaria, diagnosis and treatment of malaria, prevention and control of malaria and drug resistance. Knowledge items were calculated by giving scores.

The correct answer gets:		1 score

The wrong answer and don't know get:	0 score

The possible score was ranged from 0 to 54. Respondents' knowledge was based on three levels. The cut- off point for Good knowledge was more than 80% of 54 scores and moderate knowledge was from 60% to 80% of 54 scores and poor knowledge was less than 60% of 54 scores (Dhawan et al., 2014). After face to face interviewing process, recommended correct answers were given back to the respondents.

3.6.3 Part C: Questionnaires Related to Malaria Treatment Seeking Behaviors

This part of questionnaires consists of 6 items assessing the behaviors related to malaria treatment of respondents. Respondents were asked about testing of malaria within or after 24 hours' onset of malaria symptoms, diagnosis and treatment seeking places and drugs taking behaviors. The answers were categorized into three levels.

"Always" get   2 scores

"Sometimes" get   1 score

"Never" get   0 score

The cut- off point for Good Behavior was more than 80% of 20 scores and moderate behavior was from 60% to 80% of 20 scores and poor behavior was less than 60% of 20 scores (Xu et al., 2012).

3.6.4 Part D: Questionnaires Related to Health System Factors

(1) Questionnaires Related to Accessibility

This part of questionnaires consists of 7 items for assessment getting of malaria services. Respondents were asked about accessible to malaria health care places, accessible for malaria diagnosis and accessible for prompt and effective treatment.

(2) Questionnaires Related to Affordability

This part of questionnaires consists of 4 items for assessment of affordability for services, which include affordability for cost for the treatment, transportation cost and time spent for getting malaria services.

(3) Questionnaires Related to Availability

This part of questionnaires consists of 10 items for assessment of availability for services, which include the opening hours of health facilities and presence of ICMV at their home, drugs and equipment shortage, staff shortage and availability of patients centered care.

(3) Questionnaires Related to Accountability

This part of questionnaires consists of 5 items for assessment of accountability of the staff and ICMV. Respondents were asked about promotion of malaria services by service providers, work ethic of service providers and trust of community to service providers.

3.6.5   Part E: Questionnaires Related to Prompt and Effective Treatment of malaria

This part of questionnaires consists of 3 items for assessment of getting prompt and effective treatment of malaria. Respondents were asked about getting of malaria treatment within 24-hour onset of malaria symptoms and follow up of health service providers for complete treatment for patients.

3.7   Validity and Reliability

For the validity of the questionnaires, reviewed the literature and consulted with 3 experts from 2 Academic experts and 1local expert. Two academic experts' opinions were got from Assistant Professor Naowarat Kanchanakhan, Ph.D,   Tepanata

Pumpaibool, Ph.D and One local expert, Dr. Kyaw San Win, Malaria Training Consultant and Central Supervisor (Training Consultant Assistant - Dr. Sann Minn) Quality Diagnosis and Standard Treatment of Malaria Project, Myanmar Medical Association, Central, Myanmar. The average IOC (Item-Objective Congruence) result was 0.98. Translation and back translation of questionnaires were done.

For testing of reliability, pilot study was conducted in Myeik Township, Tanintharyi Region, Myanmar. The questionnaires were tested in 30 participants among population. The questionnaires related to knowledge were tested with KR 20 and the result was 0.73 and questionnaires related to treatment seeking behaviors were calculated with reliability coefficient (Cronbach's Alpha) and the result was also 0.71.

3.8 Data Collection

Face to face interview method was used. In this study, ten research assistants were recruited from Integrated Community Malaria Volunteers *(local dialects persons)* from sample villages and they were well trained about the objectives of the study, contents in the questionnaires, sample household selection and data collection process to avoid bias. Myanmar Language questionnaires were used in conduction of survey. Before starting the interview process with respondents, the interviewer explained the instructions of the questionnaires, purpose and benefits, confidentiality, consideration and duration of interview process. Then, the consent form was provided to respondents and they had right to withdrawal if they were unwilling to participate in this survey. After interview process, we gave the correct answers and good recommendations for knowledge on malaria to the respondents. As, the health staff from Malaria Control

Program in Palaw Township wanted to follow up the malaria infected patients and do malaria test screening, they were allowed to go together with survey team. The interview process took 30 minutes and so we provided compensation for respondents (incentives like snacks).

3.9   Data Analysis

- After collection of data, questionnaires were coded before calculation with SPSS.

  SPSS license version 22 was used to analyze the data.

a. Descriptive Statistics

Descriptive Statistics; frequency, percentage, mean, median, mode, standard deviation, range were used for analyzing the sociodemographic characteristics of the respondents, knowledge, behaviors and health system factors regarding prompt and effective treatment of malaria.

b. inferential Statistics

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

Binary Logistic Regression test was used to access strength of association between the independents and dependent variables at 0.05 significant level and to determine the model of determinants.

3.10 Ethical Consideration

The research proposal was submitted to the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University. After receiving the approval from ethical Committee, researcher contributed to collect data. The objective and purpose of this study were clearly explained to respondents before signing the consent form and voluntary participation. Every completed questionnaire was kept carefully and confidentially. The respondents could refuse to join this study and no need to explain for reasons. This data was used only for this study and their information were kept secretly and confidentially.

3.11 Expected Benefits and Application

This study provided the information about barriers to prompt and effective treatment of malaria such as knowledge of malaria, behaviors related to treatment of malaria and superimposing health system factors and so, this information can be used in Guidelines for improvement of knowledge of malaria, treatment seeking behaviors and health system involvement for prompt and effective treatment of malaria in Myanmar Border area (Coastal Region). This study can help Governmental and Non-Governmental sectors in Palaw Township for better understanding in malaria situation

and better policy planning to promote malaria prevention, control, treatment and malaria drug resistance.

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CHAPTER IV

RESULTS

This study was descriptive cross sectional research to assess the barriers to prompt and effective treatment of malaria such as socio demographic characteristics, knowledge about malaria, behaviors related to treatment seeking and health system factors; accessibility, affordability, availability and accountability in Palaw Township, Tanintharyi Region in Myanmar. This section exhibits the findings from data analysis. The data analysis reports on the survey, outcomes and results in the following array;

1) Sociodemographic characteristics of respondents

2) Level of malaria knowledge of respondents regarding with malaria vector, transmission of malaria, symptoms of malaria, diagnosis and treatment of malaria, prevention and control of malaria and drug resistance

3) Behaviors related to malaria treatment seeking of respondents

4) Health system factors (accessibility, affordability, availability and accountability) in this township

5) Prompt and effective malaria treatment

6) Association between sociodemographic characteristics of respondents and prompt and effective malaria treatment

7) Association between knowledge of malaria and prompt and effective malaria treatment

8) Association between treatment seeking behaviors and prompt and effective malaria treatment

9) Association between health system factors and prompt and effective malaria treatment

10) Multivariate model of association between measured independent variables and prompt and effective malaria treatment

The total number of respondents in this study were 204 malaria infected patients from January 2018 to March 2018 with age ranging from 18 to 65 years' old who are living more than 3 months in villages of Palaw Township, Tanintharyi Region, Myanmar.

4.1 Sociodemographic Characteristics of the respondents

Table 5 showed the sociodemographic factors such as age, gender, marital status, ethnicity, education status, occupation, length of stay, monthly family income and family members of respondents in Palaw Township, Tanintharyi Region, Myanmar. The age of the respondents was ranged into three groups. The first group was from age 18 to 35 years and the second group was from 36 to 50 years and the third group was from 51 to 65 years. Majority of them 98 (48.0%) were age group from 18 – 35 years and some of them 66 (32.4%) were age group 36 – 50 years and 40 (19.6%) were age group from 51 to 65 years respectively. Most of respondents were male (89.7%) and the rest of them were female (10.3%) respectively. Relating to ethnicity, majority of respondents were Kayen (58.3%) and some of them were Bamar (24.0%),

Mon (15.7%) and Salon (2.0%) respectively. Most of the respondents were married (43.6%), some were single (23.0%), some were divorced (13.2%), some were separated (11.3%) and some were widowed (8.9%). Some of respondents (32.4%) were in secondary education, some of them (23.5%) were in primary education, (21.6%) were in never attend to school, (20.5%) were high school educated and the least (2%) were in College/University education.

Regarding to the occupation, percentage of respondents in each type of occupation is not much different. Some of respondents worked in Animal Husbandry 17.2%, 13.2% were rubber planters, 12.3% were water suppliers, another 12.3% were small shop owners, 11.3% were Garbage keepers, 8.8% were housewives, 7.4% were fishermen, 4.9% were vendors and 2.5% were teachers. The duration of stay of the respondents in the study area was grouped into five groups. The first group was duration of stay from 1 to 5 years (67.2%), the second group was duration of stay from 6 to 10 years were (25.5%), (5.4%) were the third group from 11 to 15 years and another group (1.5%) stayed from 16 to 20 years and (0.4%) were group who stayed at the study area from 21 to 25 years. The economic status of the respondents was assessed according to monthly family income of respondents, majority of respondents were middle income (34.8%) from 73 USD to 108 USD, (23.5%) were group of income from 109 USD -144 USD, (14.2%) were group of income from 36USD – 72 USD, (13.2%) were group of monthly income from 145 USD to 180 USD, (11.4%) were group of income from 181 USD to 216 USD and the highest income group (2.9%) per month was more than 216 USD. Majority of the respondents (67.6%) had 4 -6 family members, some (24.5%) had 1-3 family members and some respondents (7.9%) had 7-9 family members.

Table 5: Number and Percentage Distribution of Sociodemographic factors of malaria infected patients (n=204)

Sociodemographic Factors	Frequency	Percentage
Age		
18 - 35 years	98	48.0%
36 - 50 years	66	32.4%
51 - 65 years	40	19.6%
Mean = 36.89, SD = 12.36		
Median = 36.5, Range = 18-60		
Gender		
Male	183	89.7%
Female	21	10.3%
Marital Status		
Single	47	23.0%
Married	89	43.6%
Divorced	27	13.2%
Separated	23	11.3%
Widowed	18	8.9%
Ethnicity		
Bamar	49	24.0%
Mon	32	15.7%
Kayen	119	58.3%
Others (Salon)	4	2.0%
Education Status		
Never attend School	44	21.6%
Primary School	48	23.5%
Secondary School	66	32.4%
High School	42	20.5%
College/University	4	2.0%

Table 5: Number and Percentage Distribution of Sociodemographic factors of Malaria Infected Patients (n= 204) (Continued)

Sociodemographic Status	Frequency	Percentage
Occupation		
Housewife	18	8.6%
Teacher	5	2.5%
Health Personnel	21	10.3%
Small Shop Owner	25	12.3%
Vendor	10	4.9%
Animal Husbandry	35	17.2%
Plantation	27	13.2%
Garbage Keeper	23	11.3%
Water Supplier	25	12.3%
Fisherman	15	7.4%
Length of Stay		
1 to 5 years	137	67.2%
6 to 10 years	52	25.5%
11 to 15 years	11	5.4%
16 to 20 years	3	1.5%
21 to 25 years	1	0.4%
Mean = 4.9, SD = 3.6		
Median = 4.0, Range = 1-21		
Monthly Family Income (USD)		
36 USD – 72 USD	29	14.2%
73 USD – 108 USD	71	34.8%
109 USD – 144 USD	48	23.5%
145USD -180 USD	27	13.2%
181USD -216 USD	23	11.4%
>216 USD	6	2.9%
Mean =131.6, SD = 47.5		
Median = 115, Range = 57.5 - 251.6		
Family Members		
1-3 members	50	24.5%
4-6 members	138	67.6%
7-9 members	16	7.9%
Mean =4.6, SD = 1.4		
Median = 5, Range = 2-9		

4.2 Knowledge about Malaria of Malaria Infected Respondents

Table 6 showed knowledge about malaria infected respondents such as good knowledge, moderate knowledge and poor knowledge of respondents. The possible score ranged from 0 to 52 for knowledge on malaria and respondent's knowledge was classified into three levels. The cut-off point for Good knowledge greater than 80% of 52 scores, moderate knowledge from 60 to 80% of 52 scores, Poor knowledge less than 60% of 52 scores. Around (60%) of total respondents had moderate knowledge, (32.4%) of total respondents had good knowledge and (6.8%) of total respondents had poor knowledge. Most of the wrong answers came from questions about breeding and resting places of malaria mosquitoes, misbeliefs about malaria transmission and antimalarial drug resistance.

Table 6 : Number and Percentage Distribution of Knowledge about Malaria by Malaria Infected Respondents (n=204)

Knowledge of Malaria	Frequency	Percent
Poor Knowledge	14	6.8%
Moderate Knowledge	124	60.8%
Good Knowledge	66	32.4%

4.3 Behaviors Related to Treatment Seeking of Malaria Infected

    Respondents

Table 7 showed behaviors related to treatment seeking of malaria infected respondents such as good behavior, moderate behavior and poor behaviors of respondents. The possible score ranged from 0 to 12 scores for behaviors related to treatment seeking and respondents' behaviors was classified into three levels. The cut-off point for Good behaviors greater than 80% of 12 scores, moderate behaviors from 60 to 80% of 12 scores and poor behaviors less than 60% of 12 scores. Around 70% of total respondents had poor behavior, (17.2%) of total respondents had moderate behavior and (12.3%) of total respondents had good behaviors. Most of the respondents had poor behaviors related to malaria diagnosis and treatment.

Table 7: Number and Percentage Distribution of behaviors related to malaria treatment by Malaria Infected respondents (n=204)

Behaviors related to Malaria Treatment	Frequency	Percent
Poor Behavior	144	70.6%
Moderate Behavior	35	17.2%
Good Behavior	25	12.2%

4.4 Health System Factors influencing Prompt and Effective Malaria

   Treatment

Table 8 showed that health system factors influencing the getting of prompt and effective treatment of malaria infected respondents in the study area. For the assessment of the accessibility of malaria services, respondents were asked about duration to go to the nearest Rural Health Centre, Integrated Community Malaria volunteers, Clinic and Hospital, mode to transportation to those service providers, getting of diagnosis and treatment easily. Majority of respondents (42.6%) went to nearest Rural Health Centre (RHC) about 3 hours to get malaria services. Some of the respondents (22.1%) went to RHC about 1 hour and (21.6%) of respondents went about 2 hours to nearest RHC to get malaria services, (9.3%) of respondents went about half an hour to nearest RHC and some of them went to nearest RHC about more than 3 hours due to transportation difficulties. For getting malaria services from nearest Integrated Community Malaria Volunteers (ICMV), majority of respondents (43.6%) went about one hour to nearest ICMV's residence, (41.2%) went about 2 hours and some of respondents (5.9%) went about 3 hours and another (5.9%) also went more than 3 hours and a few of total respondents (3.4%) went to nearest ICMV about half an hour to get malaria services. Regarding to the time for going to the nearest clinic, some of the respondents (35.3%) went about 3 hours while some of respondents (34.3%), (16.2%) and (14.2%) went to nearest Clinic about 2 hours, more than 3 hours and 1 hour respectively to get malaria services. Regarding to the duration to go to the Hospital, more than half of the respondents (53.9%) went about 3 hours and some of the respondents (28.4%) and (17.7%) went more than 3 hours and 2 hours respectively to

get malaria services. About mode of transportation to service providers, most of the respondents (43.1%) went by motorcycle while some of the respondents (27.5%), (19.1%) and (10.3%) went by boat, motorcar and walking respectively. Among total respondents, some of them (31.9%) got malaria diagnosis easily while most of them (68.1%) did not get easily. Around 26% of respondents got malaria treatment easily while (74.0%) of respondents didn't get it because of transportation difficulties, absence of service providers at health facilities and stock out of drugs and equipment.

Regarding to the affordability of malaria services, majority of respondents (76.5%) got diagnosis and treatment of malaria services without payment while some of them (23.5%) paid money for it to the service providers. More than half of the respondents (54.9%) paid much transportation cost to get service and some of them (45.1%) did not pay much transportation cost. Majority of respondents (74.5%) didn't borrow money for malaria services while some of them (25.5%) borrowed money from neighbors, relatives and friends to get services. Respondents of (54.9%) did not spend much time for getting services while (45.1%) of respondents spent much time for it.

For availability of malaria services, as the standardized opening hours for RHC was 8 hours per day, most of the nearest RHC (43.1%) opened about 8 hours but some RHCs (21.6%), (20.1%), (7.8%) and (7.4%) opened 7 hours, 6 hours, 5 hours and 4 hours respectively. Most of the nearest clinics of respondents (59.8%) open 3 hours and some of the clinics (30.9%) and (9.3%) open 2 hours and 4 hours respectively. Majority of respondents (60.3%) always got malaria services from nearest ICMV but rest of them (39.7%) don't get malaria services because of absence of ICMV at their home. Most of the Health Centers (91.2%) had enough equipment to test malaria while some of the health centers (8.8%) didn't have enough equipment to test malaria. Majority of Health

Centers (84.3%) also had enough drugs to treat malaria but rest of the health centers (15.7%) didn't have enough drugs to treat malaria. Most of the health centers had service providers (64.2%). Most of the respondents (62.7%) got satisfaction about health services given by health providers. Most of the respondents (65.7%) got good care services from service providers. Around 60% of respondents got good communication with service providers. Respondents of (75%) got health education and advocacy about malaria from service providers.

Relating to the accountability of service providers, respondents were asked about promotion of malaria activities, distribution of LLINs, free of charge services, work ethics and trust of community. Nearly (70%) of respondents got promotion of malaria activities by service providers. Respondents of (60.8%) received Long Lasting Insecticide Treated Nets (LLIN) from the service providers. Although (76.5%) of respondents got malaria services with free of charges, some respondents (23.5%) paid for it. Respondents of (77.9%) thought that the service providers were working according to their work ethics but (22.1%) of respondents didn't think like this. Respondents of (77.5%) trusted the services given by service providers but the rest of respondents (22.5%) didn't trust the services given by providers.

Table 8 : Number and Percentage Distribution of Health system factors influencing the getting of prompt and effective malaria treatment of malaria infected respondents (n=204)

Health System Factors	Frequency	Percent
Accessibility		
Duration to nearest RHC		
1/2 Hour	19	9.3%
1 Hour	45	22.1%
2 Hours	44	21.6%
3 Hours	87	42.6%
>3 Hours	9	4.4%
Duration to nearest ICMV		
1/2 Hour	7	3.4%
1 Hour	89	43.6%
2 Hours	84	41.2%
3 Hours	12	5.9%
>3 Hours	12	5.9%
Duration to nearest Clinic		
1 Hour	29	14.2%
2 Hours	70	34.3%
3 Hours	72	35.3%
>3 Hours	33	16.2%
Duration to nearest Hospital		
2 Hours	36	17.7%
3 Hours	110	53.9%
>3 Hours	58	28.4%
Mode of Transportation to service providers		
Motorcar	39	19.1%
Motorcycle	88	43.1%
Boat	56	27.5%
Walk	21	10.3%
Receiving of Diagnosis easily		
Yes	65	31.9%
No	139	68.1%

Table 8: Number and Percentage Distribution of Health System factors influencing the getting of prompt and effective malaria treatment of malaria infected respondents (n=204) (Continued)

Health System factors	Frequency	Percent
Receiving of Treatment easily		
Yes	53	26.0%
No	151	74.0%
Affordability		
Pay money for diagnosis and Treatment		
Yes	48	23.5%
No	156	76.5%
Paid much transportation Cost		
Yes	112	54.9%
No	92	45.1%
Borrow money for services		
Yes	52	25.5%
No	152	74.5%
Spend much time for getting services		
Yes	92	45.1%
No	112	54.9%
Availability		
Opening Hour of Nearest RHC per day		
4 Hours	15	7.4%
5 Hours	16	7.8%
6 Hours	41	20.1%
7 Hours	44	21.6%
8 Hours	88	43.1%
Opening Hour of Nearest Clinic per day		
2 Hours	63	30.9%
3 Hours	122	59.8%
4 Hours	19	9.3%
Always getting of services from nearest ICMV		
Yes	123	60.3%
No	81	39.7%

Table 8: Number and Percentage Distribution of Health System factors influencing the getting of prompt and effective malaria treatment of malaria infected respondents (n=204) (Continued)

Health System Factors	Frequency	Percent
Absence of equipment to test malaria		
Yes	18	8.8%
No	186	91.2%
Absence of drugs to treat malaria		
Yes	32	15.7%
No	172	84.3%
Absence of Health providers		
Yes	73	35.8%
No	131	64.2%
Satisfaction to service providers		
Yes	128	62.7%
No	76	37.3%
Good care services by service providers		
Yes	134	65.7%
No	70	34.3%
Good communication with service providers		
Yes	123	60.3%
No	81	39.7%
Health Education and Advocacy by service providers	153	75.0%
Yes	51	25.0%
No		
Accountability		
Promotion of malaria activities by service providers		
Yes	142	69.6%
No	62	30.4%

Table 8: Number and Percentage Distribution of Health System factors influencing the getting of prompt and effective malaria treatment of malaria infected respondents (n=204) (Continued)

Health System Factors	Frequency	Percent
Distribution of LLINs by service providers		
Yes	124	60.8%
No	80	39.2%
Getting malaria services with free of charges		
Yes	156	76.5%
No	48	23.5%
Service providers according to work ethics		
Yes	159	77.9%
No	45	22.1%
Trust of services given by service providers		
Yes	158	77.5%
No	46	22.5%

4.5 Prompt and Effective Treatment Malaria Treatment of Malaria Infected Respondents

Table 9 showed the number and frequency distribution of getting prompt and effective malaria treatment malaria infected respondents. Only 16.2% of respondent tested malaria within 24-hour onset of malaria symptoms while 83.8% did not test malaria within 24-hour onset of symptoms. These 16.2% of respondents got prompt and effective malaria treatment within 24-hour onset of malaria symptoms. Rest of 83.8% did not get it. 87.7% of respondents took full course of anti-malarial drugs while 12.3% did not take full course of drugs. As overall getting of prompt and effective

malaria treatment, 14.2% of respondents got prompt and effective treatment while 85.8% didn't get it.

Table 9 : Number and Percentage Distribution of getting prompt and effective malaria treatment of Malaria Infected Respondents (n=204)

Prompt and Effective Treatment	Frequency	Percent
Test within 24-hour onset of symptoms		
Yes	33	16.2%
No	171	83.8%
Getting treatment within 24 hour of symptoms		
Yes	33	16.2%
No	171	83.8%
Taking full course of drugs		
Yes	179	87.7%
No	25	12.3%
Overall Getting of Prompt and Effective Treatment		
Yes	29	14.2%
No	175	85.8%

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4.6 Association between Sociodemographic Characteristics and Getting of Prompt and Effective Malaria Treatment

Table 10 described the association between the sociodemographic characteristics and getting prompt and effective treatment. Among these factors, marital status was significantly associated with getting of prompt and effective treatment of malaria (p value < 0.001). Ethnicity of respondents was significantly associated with getting of prompt and effective malaria treatment. (p value =0.002). Education status of respondents was significantly associated with getting of prompt and effective malaria

treatment (p value = 0.005) and family income was also significantly associated with

getting of prompt and effective treatment (p value = 0.028).

Table 10: Association between Sociodemographic Characteristics and Getting of Prompt and Effective Malaria Treatment (n=204)

Sociodemographic Characteristics	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Age				
18 - 35 years	17 (8.3%)	81 (39.7%)		
36 - 50 years	9 (4.4%)	57 (27.9%)	2.285^a	0.273
51 - 65 years	3 (1.5%)	37 (18.1%)		
Gender				
Male	25 (12.3%)	158 (77.5%)		
Female	4 (1.9%)	17 (8.3%)	0.448	0.503
Marital Status				
Single, Divorced, Separated and Widowed	5 (2.5%)	110 (53.9%)		
Married	24 (11.7%)	65 (31.9%)	21.048	<0.001*
Ethnicity				
Bamar	3 (1.5%)	46 (22.55%)		
Mon	0 (0%)	32 (15.68%)	14.618^a	0.002*
Kayen	26 (12.7%)	93 (45.6%)		
Others (Salon)	0 (0%)	4 (1.96%)		
Education Status				
Never attend School	0 (0%)	44 (21.57%)		
Primary School	11 (5.4%)	37 (18.14%)		
Secondary School	10 (4.9%)	56 (27.5%)	14.166^a	0.005*
High School	8 (3.9%)	34 (16.7%)		
College/University	0 (0%)	4 (1.96%)		

* p value <0.05   a = Fisher's exact test value

Table 10: Association between Sociodemographic Characteristics and Getting Prompt and Effective Malaria Treatment (n=204) (Continued)

Sociodemographic Characteristics	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Occupation				
Housewife	4 (2%)	14 (6.9%)		
Teacher	0 (0%)	5 (2.5%)		
Health Personnel	6 (3%)	15 (7.4%)		
Small shop owner	5 (2.5%)	20 (9.8%)		
Vendor	3 (1.5%)	7 (3.4%)	11.708[a]	0.278
Animal Husbandry	3 (1.5%)	32 (15.7%)		
Plantation	4 (1%)	23 (11.3%)		
Garbage Keeper	2 (1%)	21 (10.3%)		
Water Supplier	2 (1%)	23 (11.3%)		
Fisherman	0 (0%)	15 (7.4%)		
Length of Stay				
1 to 5 years	22 (10.8%)	115 (56.4%)	1.161	0.299
More than 5 years	7 (3.4%)	60 (29.4%)		
Monthly Family Income (USD)				
36 USD -72 USD	8 (3.9%)	21 (10.3%)		
73 USD -108 USD	12 (5.9%)	59 (28.5%)		
>108 USD	9 (4.4%)	95 (47%)	13.309[a]	0.028*
Family Members				
1-3 members	8 (3.9%)	42 (20.6%)		
4-6 members	21(10.3%)	117 (57.4%)	2.731[a]	0.235
7-9 members	0 (0%)	16 (7.8%)		

*p value <0.05   a = Fisher's exact test value

4.7 Association Between Knowledge of malaria by respondents and Getting Prompt and effective Treatment of Malaria

Table 11 showed the association between knowledge regarding malaria and getting prompt and effective treatment of malaria. Knowledge of malaria infected respondents was significantly associated with getting of prompt and effective treatment of malaria by malaria infected respondents. (p value <0.001)

Table 11: Association Between Knowledge of Malaria by respondents and getting of Prompt and Effective Malaria Treatment (n=204)

Knowledge of Malaria	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Poor Knowledge	0 (0%)	14 (6.9%)		
Moderate Knowledge	10 (4.9%)	114 (55.9%)	17.66	<0.001*
Good Knowledge	19 (9.3%)	47 (23.0%)		

*p value <0.05   Significance by chi square test

4.8 Association Between Behaviors related to Treatment seeking and Getting of Prompt and Effective Malaria Treatment

Table 12 described the association between behaviors related to treatment seeking and getting prompt and effective malaria treatment. Behaviors of malaria infected respondents related to the treatment seeking was significantly associated with getting of prompt and effective malaria treatment by respondents (p value <0.001).

Table 12 : Association Between Behaviors related to Treatment seeking and getting of Prompt and Effective Malaria Treatment (n=204)

Behaviors related to Treatment seeking	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Poor Behavior	0 (0.00%)	144 (70.59%)		
Moderate Behavior	5 (2.45%)	30 (14.71%)	124.045[a]	<0.001*
Good Behavior	24 (11.76%)	1(0.49%)		

*p value <0.05   a = Fisher's exact test value

4.9 Association between Health System factors and Getting of Prompt and Effective Malaria Treatment of malaria Infected Respondents

Table 13 showed the association between health system factors and getting of prompt and effective malaria treatment. Among accessibility factors, the duration of going from respondent's residence to the nearest RHC was significantly associated with getting of prompt and effective treatment of infected respondents (p value < 0.001). Duration of going to nearest ICMV from respondent's residence was significantly associated with getting of prompt and effective malaria treatment of malaria infected respondents (p value < 0.000). Mode of transportation by malaria infected respondents to health centers was significantly associated with getting of prompt and effective treatment (p value < 0.001). Receiving of malaria diagnosis easily from health centers was significantly associated with getting of prompt and effective treatment (p value = 0.004). Regarding to affordability factors, borrowing of money for getting malaria services from health centers was significantly associated with getting of prompt and effective malaria treatment (p value = 0.001). Time spending for getting of health

services was significantly associated with getting prompt and effective malaria treatment (p value = 0.001). Related to the availability of health services factors, opening hours of nearest RHC per day was significantly associated with getting of prompt and effective malaria treatment. (p value < 0.001). Getting of services always by respondents from ICMV was also significantly associated with getting of prompt and effective malaria treatment (p value <0.001). Availability of equipment to diagnose malaria, drugs for malaria treatment and service providers to give services were significantly associated with getting of prompt and effective malaria treatment (p value < 0.001, p value = 0.010 and p value = 0.002 respectively). Good communication between respondents and service providers and health education and advocacy about malaria by service providers were significantly associated with getting of prompt and effective malaria treatment (p value < 0.001 each). In relation to the accountability factors, distribution of LLIN by service providers to the malaria infected respondents was significantly associated with getting of prompt and effective malaria treatment (p value < 0.001). Provision of services by service providers according to work ethics was statistically significant with getting of prompt and effective malaria treatment (p value < 0.001). Trust of services given by service providers was significantly associated with getting of prompt and effective malaria treatment (p value = 0.041).

Table 13: Association between Health System Factors and getting of Prompt and Effective Malaria Treatment (n=204)

Health System Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Accessibility				
Duration to nearest RHC				
1 hour	13(6.4%)	51(25%)	28.578	<0.001*
≥ 2 hours	16(7.8%)	124(60.8%)		
Duration to nearest ICMV				
1 Hour	17(8.3%)	79(38.8%)	44.147	<0.001*
≥ 2 hours	12(5.9%)	96(47.0%)		
Duration to nearest Clinic				
≤ 2 Hours	13(6.4%)	86(42.2%)		
≥ 3 Hour	16(7.8%)	89(43.6%)	2.843	0.329
Duration to nearest Hospital				
2 Hour	17(8.3%)	19(9.3%)		
3 Hour	3(1.5%)	107(52.5%)	1.814	0.228
>3 Hour	9(4.4%)	49(24.0%)		
Mode of Transportation to service providers				
Motorcar	4(2.0%)	35(17.2%)		
Motorcycle	13(6.4%)	75(36.8%)	26.987[a]	<0.001*
Boat	1(0.5%)	55(27.0%)		
Walk	11(5.4%)	10(4.9%)		

*p value <0.05   a = Fisher's exact test value

Table 13: Association between Health System Factors and getting of Prompt and Effective Malaria Treatment (n=204) (Continued)

Health System Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Receiving of Diagnosis easily				
Yes	16(7.8%)	49(24.0%)		
No	13(6.4%)	126(61.8%)	8.460	0.004*
Receiving of Treatment easily				
Yes	4(2.0%)	49(24.0%)	2.611	0.106
No	25(12.3%)	126(61.8%)		
Affordability				
Pay money for diagnosis and Treatment				
Yes	10(4.9%)	38(18.6%)		
No	19(9.3%)	137(67.2%)	2.254	0.157
Paid much transportation Cost				
Yes	18(8.8%)	94(46.1%)		
No	11(5.4%)	81(39.7%)	0.701	0.402
Borrow money for services				
Yes	15(7.4%)	37(18.1%)		
No	14(6.9%)	138(67.6%)	12.25	0.001*
Spend much time for getting services				
Yes	5(2.5%)	87(42.6%)		
No	24(11.8%)	88(43.1%)	10.595	0.001*

*p value <0.05   significance by chi square test

Table 13: Association between Health System Factors and getting of Prompt and Effective Malaria Treatment (n=204) (Continued)

Health System Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Availability				
Opening Hour of Nearest RHC per day				
< 8 hours	25(12.3%)	91(44.6%)	11.867	<0.001*
8 hours	4(1.96%)	84(41%)		
Opening Hour of Nearest Clinic per day				
2 Hour	10(4.9%)	53(26.0%)		
3 Hour	15(7.4%)	107(52.5%)	1.239	0.538
4 Hour	4(2.0%)	15(7.4%)		
Always getting of services from nearest ICMV				
Yes	4(2.0%)	119(58.3%)		
No	25(12.3%)	56(27.5%)	30.534	<0.001*
Absence of equipment to test malaria				
Yes	9(4.4%)	9(4.4%)		
No	20(9.8%)	166(81.4%)	20.73[a]	<0.001*
Absence of drugs to treat malaria				
Yes	0(0.0%)	32(15.7%)		
No	29(14.2%)	143(70.1%)	6.289[a]	0.010*
Absence of Health providers				
Yes	3(1.5%)	70(34.3%)		
No	26(12.7%)	105(51.5%)	9.521	0.002*

* p value<0.05   significance by chi square test

Table 13: Association between Health System Factors and getting of Prompt and Effective Malaria Treatment (n=204) (Continued)

Health System Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Satisfaction to service providers				
Yes	17(8.3%)	111(54.4%)		
No	12(5.9%)	64(31.4%)	0.246	0.680
Good care services by service providers				
Yes	17(8.3%)	117(57.4%)		
No	12(5.9%)	58(28.4%)	0.749	0.404
Good communication with service providers				
Yes	8(3.9%)	115(56.4%)		
No	21(10.3%)	60(29.4%)	15.107	<0.001*
Health Education and Advocacy by service providers				
Yes	11(5.4%)	142(69.6%)		
No	18(8.8%)	33(16.2%)	24.775	<0.001*
Accountability				
Promotion of malaria activities by service providers				
Yes	22(10.8%)	120(58.8%)		
No	7(12.3%)	55(27.0%)	0.625	0.517
Distribution of LLINs by service providers				
Yes	4(2.0%)	120(58.8%)		<0.001*
No	25(12.3%)	55(27.0%)	31.316	

*p value<0.05   significance by chi square test

Table 13: Association between Health System Factors and getting of Prompt
and Effective Malaria Treatment (n=204) (Continued)

Health System Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Chi Square	p value
Getting malaria services with free of charges				
Yes	20(9.8%)	136(66.7%)		
No	9(4.4%)	39(19.1%)	1.058	0.345
Service providers according to work ethics				
Yes	9(4.4%)	150(73.5%)		
No	20(9.8%)	25(12.3%)	43.262	<0.001*
Trust of services given by service providers				
Yes	13(6.4%)	145(71.1%)		
No	16(7.8%)	30(14.7%)	20.601	0.041*

*p value <0.05   significance by chi square test

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4.10 Association (Multivariate Model) between Sociodemographic Characteristics and Getting of Prompt and Effective Treatment of Malaria Infected Respondents

Table 14 showed the association (multivariate model) between sociodemographic factors and getting of prompt and effective malaria treatment. According to marital status, married was significantly associated with getting of prompt and effective malaria treatment (p value <0.001, AOR= 5.964). Married respondents got 5.96 times of prompt and effective malaria treatment more than the reference group

(single, divorced, separated and widowed respondents). Regarding to the Ethnicity, Kayen was significantly associated with getting of prompt and effective malaria treatment (p value = 0.003, AOR = 4.287). Kayen ethnics respondents got 4.2 times of prompt and effective malaria treatment more than the reference group (Bamar respondents). Relating to the education status, primary, secondary and high school education were significantly associated with getting of prompt and effective malaria treatment (p value = 0.001). Primary educated respondents got 2.8 times of treatment more than the reference group (AOR = 2.8). Secondary educated respondents got 3.8 times of treatment more than the reference group (AOR = 3.8). High school educated respondents got 4.8 times of treatment more than the reference group (AOR = 4.8). Monthly family income was also significantly associated with getting of prompt and effective malaria treatment (p value = 0.016). Respondents of monthly family income (73 USD – 108 USD) got 2.8 times of malaria treatment more than the reference group (AOR = 2.8). Respondents of monthly family income got 1.6 times of malaria treatment more than the reference group (AOR = 1.6)

Table 14: Association (Multivariate Model) between Sociodemographic Characteristics and Getting of Prompt and Effective Malaria Treatment (n=204)

Socio demographic Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Adjusted OR	95% Confidence Interval		p value
				Lower	Upper	
Marital Status						<0.001*
Single, Divorced Separated and Widowed (ref:)	0	47	1			
Married	29	128	5.964	0.813	8.321	
Ethnicity						0.003*
Bamar (ref:)	3	46	1			
Mon	0	32	1.010	0.112	1.761	
Kayen	26	93	4.287	2.233	11.41	
Others (Salon)	0	4	1.310	0.321	1.931	
Education Status						0.001*
Never attend School (ref:)	0	44	1			
Primary School	11	37	2.802	0.732	5.931	
Secondary School	10	56	3.884	0.231	6.432	
High School	8	34	4.801	0.632	8.873	
College/University	0	4	1.021	0.221	1.921	
Monthly Family Income (USD)						0.016*
36 USD – 72 USD(ref:)	8	21	1			
73 USD – 108 USD	12	59	2.831	0.432	4.643	
>108 USD	9	95	1.631	0.211	3.882	

*p value<0.05   model by binary logistic regression

4.11 Association (Multivariate Model) between Knowledge of Malaria and Getting of Prompt and Effective Treatment of Malaria Infected Respondents

Table 15 described the association (Multivariate Model) between knowledge about malaria by respondents and getting of prompt and effective malaria treatment. Knowledge about malaria was significantly associated with getting of prompt and effective malaria treatment (p value < 0.001). Respondents of moderate knowledge got 14.7 times (AOR = 14.17) and respondents of good knowledge got 65.3 times (AOR=65.3) of prompt and effective malaria treatment more than the reference group.

Table 15: Association (Multivariate Model) between Knowledge of Malaria and getting of Prompt and Effective Malaria Treatment (n=204)

Knowledge	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Adjusted OR	95% Confidence Interval		p value
				Lower	Upper	
Poor Knowledge (ref:)	0	14	1			<0.001*
Moderate Knowledge	10	114	14.17	2.783	16.31	
Good Knowledge	19	47	65.3	4.629	71.23	

p value <0.05   model by binary logistic regression

4.12 Association (Multivariate Model) between Behaviors related to treatment seeking and Getting of Prompt and Effective Treatment of Malaria Infected Respondents

Table 16 described the association (Multivariate Model) between Behaviors related to malaria treatment by respondents and getting of prompt and effective malaria treatment. Behaviors related to malaria treatment were significantly associated with getting of prompt and effective malaria treatment (p value = 0.021). Respondents of moderate behaviors got 2.6 times (AOR = 2.6) and respondents of good behaviors got 3.8 times (AOR = 3.8) of prompt and effective malaria treatment more than the reference group.

Table 16 : Association (Multivariate Model) between behaviors related to malaria treatment and getting of Prompt and Effective Malaria Treatment (n=204)

Behavior	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Adjusted OR	95% Confidence Interval		p value
				Lower	Upper	
Poor Behavior (ref:)	0	144	1			0.021*
Moderate Behavior	5	30	2.693	0.023	6.321	
Good Behavior	24	1	3.889	0.000	8.037	

p value <0.05   model by binary logistic regression

4.13 Association (Multivariate Model) between Health System Factors and Getting of Prompt and Effective Treatment of Malaria Infected Respondents

Table 17 showed the association between health system factors and getting of prompt and effective malaria treatment of malaria infected respondents. Regarding with the accessibility factors, duration of going to nearest RHC was significantly associated with getting of prompt and effective malaria treatment (p value = 0.031). Respondents who could go to the nearest RHC within one hour got prompt and effective malaria treatment 3.2 times more than the reference group (AOR = 3.231). Duration of going to nearest ICMV was significantly associated with getting of prompt and effective malaria treatment (p value = 0.001). Respondents who could go to the nearest ICMV within one hour got prompt and effective malaria treatment 1.3 times more than the reference group (AOR =1.384). Mode of transportation to the service providers was significantly associated with getting of prompt and effective malaria treatment (p value =0.001). Respondents who could go to the service providers by walking got 9.6 times of prompt and effective treatment more than the reference group (AOR =9.625). Getting of malaria diagnosis easily was significantly associated with getting of prompt and effective malaria treatment. (p value = 0.004). Respondents who got malaria diagnosis easily got 2.3 times of prompt and effective malaria treatment more than the reference group (AOR =2.316). Getting of malaria treatment easily was significantly associated with getting of prompt and effective malaria treatment. (p value = 0.015). Respondents who got malaria treatment easily got 2.4 times of prompt and effective malaria treatment more than the reference group (AOR = 2.431).

Regarding to the affordability factors, respondents who borrowed money to get services was significantly associated with getting of prompt and effective malaria treatment (p value < 0.001). Respondents who didn't borrow money to pay for the services got 1.2 times of prompt and effective malaria treatment more than the reference group (AOR = 1.250). Spending much time for getting services was significantly associated with getting of prompt and effective malaria treatment (p value =0.001). Respondents who didn't spend much time to get services got 4.7 times of getting prompt and effective malaria treatment more than reference group (AOR = 4.745).

Regarding to the availability factors, opening hour of nearest RHC per day was significantly associated with getting of prompt and effective malaria treatment. (p value= 0.021) Respondents whose nearest RHC opened for 8 hours got 1.7 times of prompt and effective malaria treatment more than the reference one (AOR = 1.722). Respondents who always get services from nearest ICMV was significantly associated with getting of prompt and effective malaria treatment. (p value < 0.001) Respondents who got malaria services always from nearest ICMV got 13.2 times of prompt and effective treatment more than the reference group (AOR = 13.281). Absence of equipment to test malaria is significantly associated with getting of prompt and effective malaria treatment. (p value < 0.000). Respondents who didn't experience absence of equipment to test malaria got 3.1 times of prompt and effective treatment more than the reference group (AOR = 3.12). Absence of drugs to treat malaria is significantly associated with getting of prompt and effective malaria treatment (p value = 0.012). Respondents who didn't experience absence of drugs to treat malaria got 3.2 times of getting prompt and effective malaria treatment more than the reference group (AOR = 3.276). Absence of health providers to give services was significantly

associated with getting of prompt and effective treatment (p value = 0.002). Respondents who didn't experience absence of health providers to treat malaria got 5.7 times of getting prompt and effective malaria treatment more than the reference group (AOR = 5.778). Good communication with service providers was significantly associated with getting of prompt and effective treatment. (p value < 0.001). Respondent who got good communication with service providers got 5 times of getting prompt and effective malaria treatment more than the reference group (AOR = 5.031). Health education and advocacy given by health providers was significantly associated with getting of prompt and effective treatment (p value <0.001). Respondents who got health education and advocacy by service providers got 7 times of getting prompt and effective malaria treatment more than the reference group (AOR = 7.041).

Relating to the accountability factors, Distribution of Long Lasting Insecticide Treated Nets (LLIN) by service providers was significantly associated with getting of prompt and effective treatment (p value <0.001). Respondents whose nearest health facilities distributed LLINs got 13.6 times of prompt and effective treatment more than the reference group (AOR = 13.636). Service providers according to work ethics was significantly associated with getting of prompt and effective treatment. (p value < 0.001). Respondents who experienced of service providers who worked according to work ethics got 13.3 times of prompt and effective malaria treatment more than the reference group (AOR = 13.333).

Table 17: Association (Multivariate Model) between Health System Factors and Getting of Prompt and Effective Malaria Treatment (n=204)

Health System Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Adjusted OR	95% Confidence Interval		p value
				Lower	Upper	
Accessibility						
Duration to nearest RHC						
1 Hour	13	51	3.231	0.326	5.231	0.031*
≥ 2 Hours (ref:)	16	124	1			
Duration to nearest ICMV						
1 Hour	17	79	1.384	0.491	3.335	0.001*
≥ 2Hours (ref:)	12	96	1			
Mode of transportation to service providers						
Boat (ref:)	1	55	1			0.001*
Motorcar	4	35	1.821	0.281	2.130	
Motorcycle	13	75	2.355	0.235	5.322	
Walk	11	10	9.625	2.513	36.867	
Receiving of Diagnosis easily						
Yes	16	49	2.316	0.142	3.705	0.004*
No (ref:)	13	126	1			
Receiving of Treatment easily						
Yes	4	49	2.431	0.804	7.345	0.015*
No (ref:)	25	126	1			

*p value<0.05   model by binary logistic regression

Table 17: Association (Multivariate Model) between Health System Factors and Getting of Prompt and Effective Malaria Treatment (n=204) (Continued)

Health System Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Adjusted OR	95% Confidence Interval		p value
				Lower	Upper	
Affordability						
Borrow money for services						
Yes(ref:)	15	37	1			
No	14	138	1.250	0.321	2.565	<0.001*
Spend much time for getting services						
Yes (ref:)	5	87	1			
No	24	88	4.745	2.430	13.004	0.001*
Availability						
Opening hours of Nearest RHC per day						
<8 Hours(ref:)	25	91	1			
8 Hours	4	84	1.722	0.286	4.234	0.021*
Always getting of Services from ICMV						
Yes	4	119	13.281	4.411	39.98	<0.001*
No(ref:)	25	56	1			
Absence of equipment to test malaria						
Yes(ref:)	9	9	1			
No	20	116	3.12	0.043	4.339	<0.001*

*p value<0.05   model by binary logistic regression

Table 17: Association (Multivariate Model) between Health System Factors and Getting of Prompt and Effective Malaria Treatment (n=204) (Continued)

Health System Factors	Got Prompt and Effective Treatment	Did not get Prompt and Effective Treatment	Adjusted OR	95% Confidence Interval		p value
				Lower	Upper	
Absence of drugs to treat malaria						
Yes (ref:)	0	32	1			
No	29	143	3.276	0.342	5.432	0.012*
Absence of health providers						
Yes (ref:)	3	70	1			
No	26	105	5.778	0.684	19.822	0.002*
Good Communication with providers						
Yes	8	115	5.031	2.103	12.034	<0.001*
No (ref:)	21	60	1			
Health Education and Advocacy						
Yes	11	142	7.041	3.039	16.315	<0.001*
No (ref:)	18	33	1			
Accountability						
Distribution of LLINs by service providers						
Yes	4	120	13.636	4.527	41.075	<0.001*
No(ref:)	25	55	1			
Service providers according to work ethics						
Yes	9	150	13.333	5.457	32.579	<0.001*
No(ref:)	20	25	1			

*p value<0.05   model by binary logistic regression

CHAPTER V

DISCUSSION, CONCLUSION AND RECOMMENDATIONs

This chapter first presents the discussions, limitations, conclusion and recommendations of research findings of this study.

A cross sectional study was carried out among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar. Data were collected by using structured questionnaires. The respondents were 204 malaria infected patients aged from 18 years to 65 years resided in the study area.

The general objective of this study is to assess sociodemographic characteristics, knowledge of malaria, behaviors related to treatment seeking and health system factors (accessibility, affordability, availability and accountability) regarding prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar.

More specifically, this study aimed to:

- Assess the association between socio demographic characteristics and getting of prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar.

- Assess the association between knowledge of malaria and getting of prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar.

- Identify the association between behaviors related to malaria treatment and getting of prompt and effective treatment of malaria among malaria infected patients in Palaw Township, Tanintharyi Region, Myanmar.

- Identify the association between heath system factors (accessibility, affordability, availability and accountability) and getting of prompt and effective malaria treatment among malaria infected patients in Palaw Township, Tanintharyi region, Myanmar.

5.1 Discussion

5.1.1 Sociodemographic Characteristics

In this study, regarding to the socio demographic status, we found that marital status is significantly associated with getting of prompt and effective malaria treatment (p value <0.001, AOR= 5.964).This finding agreed with other study in which married persons got prompt and effective malaria treatment than other people (Chukwuocha UM1 et al., 2013). Among different ethnic groups, more than half of the ethnics were Kayen ethnicity (58.3%) and ethnicity of malaria infected patients was significantly associated with getting of prompt and effective malaria treatment (p value = 0.003, AOR = 4.287). One of the study in Africa reported that ethnicity could influence the norms and attitude towards health and education and delay in treatment seeking and cannot get prompt and effective treatment (Olufunke and Obafemi, 2011). Education status was significantly associated with getting of prompt and effective treatment (p value =0.001, AOR =2.802 for primary education, AOR = 3.884 for secondary education and AOR=4.801 for high education). We found that the more education status

was high, the prompter and effective malaria treatment they got. This finding was agreed with other study from South East Nigeria in which education attainment was very significant associated with getting of prompt and effective malaria treatment (Wittet, 2014). Monthly family income was significantly associated with getting of prompt and effective malaria treatment (p value =0.016, AOR =2.831). In fact, low family income can delay treatment not only for malaria but also for other diseases. This finding was agreed with other studies in African countries that low monthly family income could delay treatment seeking time and so respondents didn't get prompt and effective malaria treatment (Dhawan et al., 2014).

5.1.2 Knowledge of Malaria

Concerning to the knowledge of malaria, overall knowledge of respondents was significantly associated with getting of prompt and effective malaria treatment (p value < 0.001, AOR =14.17 for moderate knowledge and AOR = 65.3 for good knowledge). Respondents of 6.8% had poor knowledge, 60.8% had moderate knowledge and 32.4% had good knowledge. We found that the better the knowledge they had, the prompter and effective malaria treatment they got. All of the respondents could answer the right malaria vector (100%). 49% of the respondents misunderstood the feeding time of malaria vector. They thought that malaria mosquitoes could bite both daytime and night time. According to bleeding sites of malaria mosquitoes, 75% of respondents misunderstood that malaria mosquitoes could not breed in clean and slowly flow water sources.56% misunderstood that malaria could be caused by drinking contaminated water and 49% misunderstood that malaria could not be caused by blood transfusion. About symptoms of malaria, 34%,60% and 52% misunderstood that sweating, vomiting

and abdominal pain were not malaria symptoms respectively.14% misunderstood that malaria could be diagnosed by self. 29% of respondents misunderstood that microscopy could not test malaria. 42% of respondents misunderstood that malaria could be treated by taking of Artemisinin monotherapy. In relating to the drug resistance in Tanintharyi region, 61%, 26% and 21% of respondents misunderstood that malaria drug resistance could not be caused by taking of artemisinin monotherapy, incomplete course of Artemisinin combination therapy and taking of fake drugs. This finding was agreed with another study in South Africa, showed that the respondents who had good malaria knowledge got prompt and effective malaria treatment than the respondents who had poor and moderate knowledge because they knew how to prevent, how to seek treatment and how to get prompt and effective treatment of malaria (Oyekale, 2015). One of the qualitative study in Eastern India reported that most of the respondents conveyed the misunderstanding about malaria prevention and treatment and got poor knowledge about it and increase prevalence of malaria and decrease in getting of prompt and effective malaria treatment (Sabin et al., 2010).

5.1.3 Behaviors related to treatment seeking

Regarding to the behaviors related to treatment seeking, behaviors were significantly associated with getting of prompt and effective malaria treatment (p value = 0.021, AOR = 2.693 for moderate behavior and AOR = 3.889 for good behavior). Respondents of 70.6% had poor behaviors while 17.2% and 12.3% of respondents had moderate and good behaviors of treatment seeking respectively. The better behaviors they had, the prompter and effective malaria treatment they got. Respondents of 70.1% could not test malaria within 24-hour onset of fever because they had many problems

to go to the health facilities within 24 hours due to hard to reach areas, transportation problems, affordability for services and availability for services and so on. 58.2% of respondents use Rural Health Centers mostly to test malaria followed by Integrated Community Malaria Volunteers (30.3%) followed by Clinic (10.4%) and then hospital (2.5%). The respondents who were near to the Rural Health Centre went to it and it was their first of choice for diagnosis of malaria and respondents who were very far to the RHC went to nearest ICMV for diagnosis and some of the respondents who were nearer to the Clinic went to the clinic for diagnosis and a few respondents went to Hospital to test malaria because their residences were very far to the Hospital and they had the sense of fear to go to the Hospital. Choice of health facilities to treat malaria by respondents were the same as choice of health facilities to test malaria. According to the treatment of malaria, 71% of respondents sometimes treat and 29% of respondents always treat at their choice of health facilities. 88% of respondents always took full course of antimalarial drugs under supervision of service providers. This finding was agreed with another study in Shan Special Region II, Myanmar which showed that respondents with poor behaviors for treatment seeking didn't get prompt and effective malaria treatment (Xu et al., 2012). Another study in Zambia, Southern Africa reported that respondents with delayed treatment seeking behaviors didn't get prompt and effective malaria treatment. This study highlighted that delayed treatment seeking behavior is one of the barrier of getting prompt and effective treatment (AOR= 2.45, 95%CI) (Silweya, 2016).

5.1.4 Health System Factors

5.1.4.1 Accessibility

Concerning to the accessibility of health services by respondents, duration from the residences of the respondents to nearest Rural Health Centre (p value = 0.031, AOR = 3.231) and nearest ICMV (p value = 0.001, AOR =1.384) was significantly associated with getting of prompt and effective treatment. The less duration to go to the nearest RHC and nearest ICMV from residences of respondents, the prompter and effective malaria treatment they got. Mode of transportation was significantly associated with getting of prompt and effective treatment (p value =0.001, AOR = 9.625). The easier they could go to the nearest health facilities, the prompter and effective treatment they got. Getting services for diagnosis of malaria easily was significantly associated with getting of prompt and effective malaria treatment (p value = 0.004 AOR = 2.316) because they didn't want to go to the health facilities if the services were not got easily (for example; absence of equipment, drugs and health providers). These findings were agreed with one of the study in South East Nigeria reported that the closeness of the health facilities to the homes and receiving of easy diagnosis and treatment could influence getting of prompt and effective malaria treatment.(p value=0.025, 95%CI)(Uzochukwu and Onwujekwe, 2004).

5.1.4.2 Affordability

Relating to the affordability of services by respondents, ready for money to pay for the services was significantly associated with getting of prompt and effective malaria treatment. (p value <0.001, AOR = 1.250) because respondents who couldn't afford to pay the cost and borrowing of money from relatives, friends and neighbors

could delay the prompt and effective malaria treatment. Spending less time for getting services was significantly associated with getting of prompt and effective malaria treatment (p value = 0.001, AOR = 4.745). This finding was agreed with another study in Shan State in Myanmar at where time spending for going to the health facilities was significantly associated with the getting of prompt and effective treatment. (OR=2.13 at 95 % CI) (Rao et al., 2013). The respondents nearer to the health facilities, the more they get prompt and effective malaria treatment. These findings were agreed with the findings in malaria experience of adults in Shan State, Myanmar that perceived costs for malaria treatment (transportation cost and cost for services) were significantly associated with getting of prompt and effective malaria treatment (OR=2.33, 95%CI) (HTUT et al., 2016).

5.1.4.3 Availability

Regarding to the availability of services, duration of opening hours of Rural Health Centre was significantly associated with getting of prompt and effective malaria treatment (p value = 0.021, AOR = 1.722). Getting malaria services always from ICMV was significantly associated with getting of prompt and effective malaria treatment (p value <0.001, AOR=13.281). We found that some of the ICMVs were distance college students and they attended to College to other townships and could not stay always in their home to give services. Some of the ICMVs' works were forest related workers and they couldn't stay always in their home. Respondents who did not experience absence of equipment to test malaria got 3.1 times of prompt and effective treatment more than the reference group (p value < 0.001, AOR = 3.12) Respondents who did not experience absence of drugs to treat malaria got 3.2 times of getting prompt and

effective malaria treatment more than the reference group (p value = 0.012, AOR = 3.276). Respondents who did not experience absence of health providers to treat malaria got 5.7 times of getting prompt and effective malaria treatment more than the reference group (p value = 0.002, AOR= 5.778). We found that absence of equipment, drugs and health providers could delay prompt and effective malaria treatment of respondents. Good communication between health providers and respondents and getting of prompt and effective treatment was significantly associated with getting of prompt and effective malaria treatment (p value < 0.001, AOR = 5.031). We found that the respondents who got good communication with health providers wanted to go to these health providers again when they wanted to get services. Giving of health education and advocacy about malaria by service providers was significantly associated with getting of prompt and effective treatment (p value <0.001, AOR =7.041). Most of the respondents who got health education and advocacy about malaria from their service providers (one by one health education) could get prompt and effective malaria treatment more when they got malaria infection again. These findings were agreed with the findings from the research in Northern Sri Lanka in that absence of equipment, drugs and health care personnel could delay diagnosis and treatment and could not get prompt and effective malaria treatment. (p value = 0.02 ,95% CI) Health centers with full facilities could increase the getting of prompt and effective treatment (Reilley et al., 2002).

5.1.4.4 Accountability

Relating to the accountability of the service providers, provision of LLIN to respondents by service providers was significantly associated with getting of prompt and effective malaria treatment (p value < 0.001, AOR = 13.636). Working of

service providers according to professional work ethics was significantly associated with getting of prompt and effective treatment (p value < 0.001, AOR = 13.333). These findings were agreed with the findings from in Kenya, Africa in that poor provider patient relationship, poor ethics of providers were major barriers to get prompt and effective malaria treatment (OR = 6.3, 95% CI) (Hetzel et al., 2008). One of the qualitative study among poorest population in Kenya, Africa reported that provider patient relationship, distrust in health system were barriers to get prompt and effective treatment (Chuma et al., 2010).

5.1.5 Barriers to get prompt and effective malaria treatment

According to the results and above discussion, barriers to getting of prompt and effective malaria treatment could be identified. Marital status, ethnicity, poor education status and poor monthly family income were socio demographic barriers to get prompt and effective treatment. Poor knowledge about malaria and poor behaviors related to malaria treatment were also barriers to get prompt and effective treatment. Longer duration to go to the health facilities and ICMVs to get services, difficult transportation, non-getting of diagnosis and treatment of malaria easily were barriers of accessible to malaria health services. Borrowing of money to pay for services and spending much time to get services were barriers of affordable to malaria health services. Opening hour of nearest RHC less than 8 hours, non-getting of services always from ICMV, Stock out of equipment and drugs in health facilities, absence of health providers to give health services, poor communication between patients and service providers and non- getting of health education and advocacy from service providers were barriers to availability of services. Non distribution of LLINs by service providers

and non-working of service providers according to work ethics were poor accountability of service providers and they could cause the barriers for patients to get prompt and effective treatment of malaria.

5.2 Conclusion

5.2.1 Sociodemographic Characteristics

Most of the respondents were Kayen, male, age between 18-35 years, married, attained secondary education, total monthly income between 100,001 -150,000 Kyats and years of staying in this study area was 1 to 5 years with 4- 6 family members. Majority of occupations were Animal Husbandry and plantation.

5.2.2 Knowledge of Malaria

Majority of respondents had moderate knowledge about malaria vector, transmission, prevention, treatment and drug resistance.

5.2.3 Behaviors related to Treatment seeking

Most of the respondents had poor behavior of treatment seeking within 24-hour onset of malaria symptoms.

5.2.4 Accessibility of Health services

Majority of respondents went to nearest RHC for 3 hours, nearest ICMV for one hour, nearest clinic for 3 hours and nearest Hospital for 3 hours. Most of the respondents

went to service providers by motorcycle and they didn't get diagnosis and treatment easily.

5.2.5 Affordability

Majority of respondents didn't pay for services but some of them paid for it. Most of them paid much transportation cost to get services and most of them were afford to pay these costs but some of them borrow money from their relatives, friends and neighbors to pay for these services. But, most of them didn't spend much time for getting of services.

5.2.6 Availability of services

Most of the Rural Health Centers open 8 hours per day but some of the RHCs open less than 8 hours per day. Majority of nearest clinics open 3 hours per day and also got services always from Nearest ICMV. Most of the respondents didn't experience in absence of equipment to test malaria, absence of drugs to treat malaria, absence of health providers to give services. Most of them got good cares services, satisfied the services, got health education and advocacy about malaria and got good communication with service providers.

5.2.7 Accountability

Majority of respondents were promoted malaria activities, distributed LLINs and got malaria services with free of charges. Most of them thought service providers worked according to work ethics and they trusted the services given by service providers.

5.2.8 Association between Sociodemographic Characteristics, Knowledge of Malaria, Behaviors Related to Treatment Seeking, Health System Factors (Accessibility, Affordability, Availability and Accountability) and Prompt and Effective Malaria Treatment

In terms of association between sociodemographic characteristics and prompt and effective malaria treatment, we found that four variables were significantly associated such as marital status (p value < 0.001, AOR= 5.964), ethnicity (p value =0.003, AOR= 4.287), education status (p value = 0.001, AOR =2.802 for primary education, AOR=3.884 for secondary education and AOR = 4.801 for high school education) and monthly family income (p value = 0.016, AOR = 2.831). Married respondents, Kayen ethnics, more educated respondents, more family income respondents got more prompt and effective malaria treatment than other reference groups.

In terms of association between knowledge of malaria and prompt and effective malaria treatment, knowledge of malaria by respondents was significantly associated with getting of prompt and effective treatment (p value < 0.001, AOR=14.17 for moderate knowledge and AOR = 65.3 for good knowledge). Respondents with good knowledge about malaria got more prompt and effective malaria treatment than the reference group.

In terms of association between behaviors related to malaria treatment and prompt and effective malaria treatment, behaviors related to malaria treatment were significantly associated with getting of prompt and effective treatment. (p value=0.021, AOR = 2.693 for moderate behavior and AOR = 3.889 for good Behavior).

Respondents with good behaviors related to treatment seeking got more prompt and effective malaria treatment than the reference group.

For association between accessibility for the services and getting of prompt and effective treatment, we found that five variables were significantly associated with getting of prompt and effective malaria treatment. Respondents who could go to nearest RHC within one hour got more prompt and effective malaria treatment 3.2 times than the reference group (p value = 0.031, AOR = 3.231). Respondents who could go to nearest ICMV within one hour got more prompt and effective malaria treatment than the reference group (p value = 0.001, AOR = 1.384). Respondents who could go to the service providers by walking got more prompt and effective treatment 9.6 times than the reference group (p value =0.001, AOR = 9.625). Respondents who could receive malaria diagnosis easily got more prompt and effective treatment 2.3 times than the respondents who did not get easily (p value =0.004, AOR = 2.316). Respondents who could receive malaria treatment easily got more prompt and effective treatment 2.4 times than the respondents who did not get easily (p value = 0.015, AOR = 2.431). Respondents who could go to the health facilities within short duration with easy transportation and receiving of diagnosis and treatment easily could increase getting of prompt and effective malaria treatment.

In terms of association between affordability of services and getting of prompt and effective malaria treatment, 2 variables were significantly associated with getting of prompt and effective malaria treatment. Respondents who did not need to borrow money for getting services got more prompt and effective malaria treatment 1.2 times than respondents who needed to borrow money (p value < 0.001, AOR = 1.250). Respondents who spent less time for getting services got more prompt and effective

malaria treatment 4.7 times than the respondents who spent much time (p value = 0.001, AOR = 4.745). Respondents who could effort the charges for services and didn't spend much time for services could increase getting of prompt and effective malaria treatment.

For association between availability of services and getting of prompt and effective malaria treatment, 7 variables were significantly associated such as opening hour of nearest RHC per day (p value = 0.021, AOR = 1.722), getting of services always from nearest ICMV (p value < 0.001, AOR = 13.281). It means that the respondents whose nearest health facilities were 8 hours and always getting of services from nearest ICMV got more prompt and effective treatment than the reference group. Respondents who did not experience in absence of equipment to test malaria got more prompt and effective malaria treatment 3.1 times than the respondents who experienced in absence of equipment (p value < 0.001, AOR =3.12). Respondents who did not experience in absence of drugs to treat malaria got more prompt and effective malaria treatment 3.2 times than the respondents who experienced in absence of drugs (p value = 0.012, AOR = 3.276). Respondents who did not experience in absence of health providers to give malaria services got more prompt and effective malaria treatment 5.7 times than the respondents who experienced in absence of health providers (p value = 0.002, AOR = 5.778). Respondents who had good communication with service providers got more prompt and effective malaria treatment 5 times than the respondents who did not have good communication (p value < 0.001, AOR = 5.031). Respondents who got health education and advocacy by service providers got more prompt and effective malaria treatment 7 times than the respondents who did not get (p value < 0.001, AOR = 7.041). Opening hours of health facilities for 8 hours per day with no stock out of equipment

and drugs with routine service providers and giving of advocacy and health education increase getting of prompt and effective treatment.

In terms of association between accountability of health providers and getting prompt and effective malaria treatment, 2 variables were significantly associated with getting of prompt and effective treatment. Respondents who got LLINs got more prompt and effective malaria treatment 13.6 times than the respondents who did not get the LLIN at the health facilities (p value < 0.001, AOR =13.636). Giving of services according to work ethics by health care providers got more prompt and effective malaria treatment to respondents 13.3 times than the reference group (p value < 0.001, Crude OR = 13.333). Service providers who distributed LLINs at the health centers, giving of services according to work ethics could increase getting of prompt and effective malaria treatment.

In this research, barriers could be found relating to the sociodemographic characteristics, knowledge of malaria, behaviors related to treatment seeking and health system factors (accessibility, affordability, availability and accountability). Barriers to prompt and effective malaria treatment should be broken down by increasing health education sessions to improve knowledge of malaria and behaviors related to treatment seeking, recruitment of ICMVs more to reduce the duration to get services and effective supervision of staff for their accountability matters.

5.3 Recommendations

Based on the findings of this study, the following issues should be considered for getting prompt and effective malaria treatment to reduce transmission of malaria and drug resistance.

1.   Enhancing the knowledge of malaria such as breeding and resting places of mosquitoes, misbeliefs about malaria transmission, treatment of malaria and antimalarial drugs resistance. Poor knowledge about malaria decrease getting of prompt and effective malaria treatment and so promotion of health education sessions by Local Health Authorities and Non-Governmental Organizations in this area should be organized and managed by Local Government.

2.   Promotion of having good behavior about treatment seeking of malaria is also essential because poor behavior lower the chance of getting of prompt and effective malaria treatment. In this study, we found that although some respondents had good knowledge about malaria, they didn't get prompt and effective malaria treatment due to poor behaviors. So, health staff and Non-Governmental Organizations should promote health education sessions not only about knowledge of malaria but also having of good malaria treatment seeking behaviors.

3.   Based on the accessibility of health services by respondents in this study, Rural Health Centers should be expanded in hard to reach areas and recruitment of Integrated community malaria volunteers (one volunteer per one village and 2 volunteers per village if the village is large) by Health Authorities and Non-Governmental Organizations.

4.   Based on the affordability of the services by respondents in this study, all of the malaria services in Rural Health Centers, Integrated Community Malaria volunteers, Clinics and Hospitals should be free of charges because all of the equipment to test malaria and all of the malaria drugs to treat malaria are supported by International Donor Agencies (Global Fund). So, the Health Authorities should supervise all of the health staff and ICMVs closely to get services to all malaria patients with free of charges.

5.   Based on the availability of the services, opening hours of Rural Health Centers should be supervised because the recommended opening hours of RHC is 8 hours per day. Some of the RHCs open less than 8 hours per day and the respondents did not get prompt and effective treatment due to less opening hours of RHCs, absence of equipment, drugs and health providers. So, health staff should manage the stocks of equipment and drugs well to prevent stock out. ICMV who can stay their home and can give services all the time should be recruited. Service providers should be trained to give health education and advocacy at the time of testing and good communication with the patients.

6.   Based on the accountability of the health providers, service providers should be trained for working according to work ethics, promotion of malaria services and giving malaria services with free of charges by local health Authority.

5.4 Limitations

Since the study was done among malaria infected patients only in high risk malaria villages of Palaw Township, it could not be represented the whole population

of Tanintharyi Region. The questionnaires items were not involved in most details related to malaria treatment such as services related to anti malaria treatment given by Local and International Non-Governmental Organization implementing in the Tanintharyi Region. This cross-sectional study, we cannot find the causality of study factors. We will not know which factors will be cause and which factors will be effect. The questionnaires were about their last malaria infections within three months and so recall bias could be introduced in this study. As the sample population was included the malaria patients only from Malaria Case Report, the malaria infected patients not from this case report will not be involved.

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จุฬาลงกรณ์มหาวิทยาลัย

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APPENDIX

APPENDIX A: Questionnaires (English Version)

SURVEY TOOL USED FOR DATA COLLECTION

Barriers to Prompt and Effective Malaria Treatment among Malaria Infected Patients in Palaw Township, Tanintharyi Region, Myanmar

There are 5 parts as followings:

Part (A) Sociodemographic Characteristics

Part (B) Knowledge about Malaria

Part (C) Treatment seeking behaviors

Part (D) Health System Factors (Accessibility, Affordability, Availability and Accountability)

Part (E) Prompt and effective treatment of malaria

Thank You so much for your participation.

Respondent's Code No……………   **Date of survey**…………………

Part (A) Questionnaires related to Sociodemographic Characteristics

1. How old are you? .... years old

2. What is your gender?
   - ☐ Male 1
   - ☐ Female 2

3. Are you currently
   - ☐ Single 1
   - ☐ Married 2
   - ☐ Divorced 3
   - ☐ Separated 4
   - ☐ Widowed 5

4. Ethnicity
   - ☐ Burma 1
   - ☐ Mon 2
   - ☐ Kayen 3
   - ☐ Others (please specify) 77

5. What is your education?
   - ☐ Never attend School 1
   - ☐ Primary School 2
   - ☐ Secondary School 3
   - ☐ High School 4
   - ☐ College/ University 5
   - ☐ Others (please specify) 77

6. What is your current occupation?
   - ☐ Housewife 1
   - ☐ Teacher 2
   - ☐ Health Personnel 3
   - ☐ Small shop Owner 4
   - ☐ Vender 5
   - ☐ Animal Husbandry 6
   - ☐ Plantation 7
   - ☐ Garbage Keeper 8
   - ☐ Water Supplier 9
   - ☐ Fisherman 10
   - ☐ Others (Please specify) 77

7. How long have you been here?   ………………....years…………months
8. How much your family income is?   …………………………………...MMK
9. How many family members do you have? …………………………...Persons

Part (B) Questionnaires related to Knowledge of Malaria

No.	Statements	Yes	No	Don't know
10.	**Which vector can transmit malaria to human?**			
a	Rat		√	
b	Dog		√	
c	Mosquito	√		
d	Fly		√	
e	Cockroach		√	
11.	**Feeding time of malaria vector**			
a	Daytime		√	
b	Night time	√		
12.	**Breeding site of malaria vector**			
a	Pond or lake	√		
b	Clean and slowly flow water source	√		
c	Canal	√		
d	Old tires	√		
e	Dry and clean place	√		
13.	**Resting place of malaria vector**			
a	Bushes	√		
b	Domestic Animal shelters	√		
c	Tropical forest	√		
d	Dark Corner in the house	√		
e	Open space where sunlight reach		√	
14.	**Malaria can be transmitted through**			
a	Drinking of contaminated water		√	
b	Eating of Contaminated food		√	
c	Eating of Banana		√	
d	Close contact with malaria infected patient		√	

No.	Statements	Yes	No	Don't know
e	The bite of malaria infected mosquitoes	√		
f	Blood Transfusion	√		
15.	**Symptoms of malaria**			
a	Fever	√		
b	Headache	√		
c	Chills and rigors	√		
d	Sweating	√		
e	Vomiting	√		
f	Abdominal Pain	√		
g	Itching		√	
16.	**Malaria can be diagnosed at**			
a	Rural Health Centre	√		
b	Integrated Community Malaria Volunteer	√		
c	Non-Government Organization	√		
d	Clinic	√		
e	Hospital	√		
f	Self-Diagnosis		√	
17.	**Malaria can be diagnosed with**			
a	Rapid Diagnostic Test	√		
b	Microscopy	√		
18.	**Malaria can be treated by**			
a	Taking artemisinin monotherapy		√	
b	Taking Artemisinin combination treatment	√		
c	Herbal medicines		√	
d	Supernatural Spirit		√	
19.	**Malaria can be prevented or not?**	√		
20.	**Knowing a method of protection against mosquito's bite**			
a	Wearing of long sleeves	√		
b	Long Lasting Insecticide Treated Net utilization	√		
c	Clear Environmental bushes	√		
d	Mosquitoes repellent	√		
e	Insecticide spray	√		

No.	Statements	Yes	No	Don't know
f	Mosquitoes Coil	√		
21.	**Drug resistance can be caused by**			
a	Taking of artemisinin monotherapy	√		
b	Incomplete course of ACT	√		
c	Taking of fake drugs	√		

Part (C) Questionnaires related to Malaria Treatment Seeking Behaviors

22. How often do you test malaria within 24-hour onset of malaria symptoms?
- ☐ Always 1
- ☐ Sometimes 2
- ☐ Never 3

23. Which health facility do you mostly use to test malaria?
- ☐ Rural Health Centre 1
- ☐ ICMV 2
- ☐ Clinic 3
- ☐ Hospital 4

24. Which health facility do you mostly use to treat malaria?
- ☐ Rural Health Centre 1
- ☐ ICMV 2
- ☐ Clinic 3
- ☐ Hospital 4

25. How often do you test malaria at this health facility?
- ☐ Always 1
- ☐ Sometimes 2
- ☐ Never 3

26. How often do you treat malaria at this health facility?
- ☐ Always 1
- ☐ Sometimes 2
- ☐ Never 3

27. How often do you take full course of anti-malaria drugs?
- ☐ Always 1
- ☐ Sometimes 2
- ☐ Never 3

Part (D): Questionnaires related to Health System Factors

(i)   Questionnaires related to Accessibility

28. How long did you go to the nearest Rural Health Centre?
- ☐   1/2 hour 1
- ☐   1 hour 2
- ☐   2 hours 3
- ☐   3 hours 4
- ☐   >3hours 5

29. How long did you go to the nearest ICMV?
- ☐   1/2 hour 1
- ☐   1 hour 2
- ☐   2 hours 3
- ☐   3 hours 4
- ☐   >3hours 5

30. How long did you go to the nearest Clinic?
- ☐   1/2 hour 1
- ☐   1 hour 2
- ☐   2 hours 3
- ☐   3 hours 4
- ☐   >3hours 5

31. How long did you go to the nearest Hospital?
- ☐   1/2 hour 1
- ☐   1 hour 2
- ☐   2 hours 3
- ☐   3 hours 4
- ☐   >3hours 5

32. How did you go to the service providers?
- ☐   Motorcar 1
- ☐   Motorcycle 2
- ☐   Boat 3
- ☐   Walk 4
- ☐   Others (please specify) 77

33. Did you get service for diagnosis of malaria with RDT/Microscopy easily?
- ☐   Yes 1
- ☐   No 2

34. Did you get service for malaria treatment easily?

    ☐   Yes 1
    ☐   No 2

(ii)   Questionnaires related to Affordability

35. Did you pay money for the diagnosis and treatment of malaria at Health Facilities/ICMVs?

    ☐   Yes 1
    ☐   No 2

36. Did you pay much transportation cost for getting of malaria services?

    ☐   Yes 1
    ☐   No 2

37. Did you borrow money to pay for these costs?

    ☐   Yes 1
    ☐   No 2

38. Did you spend much time for getting of malaria services?

    ☐   Yes 1
    ☐   No 2

(iii)   Questionnaires related to Availability

39. How many hours does the nearest Rural Health Centre open per day? ....hours

40. How many hours does the nearest Clinic open per day? ....hours

41. Did you always get malaria services from nearest ICMV?

    ☐   Yes 1
    ☐   No 2

42. Did you experience in absence of equipment to test malaria at health facility?

    ☐   Yes 1
    ☐   No 2

43. Did you experience in absence of drugs to treat malaria at health facility?

    ☐   Yes 1
    ☐   No 2

44. Did you experience in absence of health providers in health facilities?

- ☐   Yes 1
- ☐   No 2

45. Did you get malaria services with satisfaction from the service providers?

- ☐   Yes 1
- ☐   No 2

46. Did you think that you got good care services from the service providers?

- ☐   Yes 1
- ☐   No 2

47. Did you think that you got good communication with the service providers?

- ☐   Yes 1
- ☐   No 2

48. Did the service providers give health education and advocacy about malaria?

- ☐   Yes 1
- ☐   No 2

(iv)   **Questionnaires related to Accountability**

49. Did the service providers promote malaria activities for the community awareness?

- ☐   Yes 1
- ☐   No 2

50. Did the service providers give LLINs to community for malaria prevention?

- ☐   Yes 1
- ☐   No 2

51. Did the service providers give malaria treatment with free of charge?

- ☐   Yes 1
- ☐   No 2

52. Do you think that service providers work according to professional work ethics?

- ☐   Yes 1
- ☐   No 2

53. Do you trust malaria services given by service providers?

- ☐   Yes 1
- ☐   No 2

Part (E) :Questionnaires related to the Prompt and Effective Malaria Treatment

54. Did you test malaria within 24-hour onset of malaria symptoms?
- ☐ Yes 1
- ☐ No 2

55. If yes, did you get malaria treatment within 24-hour onset of malaria symptoms?
- ☐ Yes 1
- ☐ No 2

56. Did you take full course of antimalarial drugs under supervision of providers?
- ☐ Yes 1
- ☐ No 2

Questionnaires (Myanmar Version)

ကုဒ်နံပါတ်............. နေ့.စွဲ...........................

<u>နောက်ဆက်တွဲစာရင်း(က)</u>
<u>အချက်အလက်စုဆောင်းရန်အတွက်အသုံးပြုသည့် စစ်တမ်းကောက်ပုံစံ</u>
မြန်မာနိုင်ငံ၊ တနင်္သာရီတိုင်းဒေသကြီး၊ ပုလောမြို့နယ်တွင် ငှက်ဖျားဖြစ်ပွားသောလူနာများအား ထိရောက်သော ငှက်ဖျားရောဂါကုသမှုရရှိရေးအတွက် တားဆီးနေသော အဟန့်အတားများအား သုတေသနပြုခြင်း။

(က) <u>လူမှုရေး၊ စီးပွားရေးဆိုင်ရာအချက်အလက်များ</u>

၁။ အသက် ------------------------- နှစ်

၂။ ကျား/မ
- ကျား-- ၁
- မ -- ၂

၃။ အိမ်ထောင်ရှိ/မရှိ
- အပျို/လူပျို -- ၁
- အိမ်ထောင်ရှိ -- ၂
- ကွာရှင်း -- ၃
- အိမ်ထောင်ကွဲ -- ၄
- မုဆိုးဖို/မုဆိုးမ -- ၅

၄။ လူမျိုး
- ဗမာ -- ၁
- မွန် -- ၂
- ကရင် -- ၃
- အခြား(ဖော်ပြပါ) -------------------------------------- ၇၇

၅။ ပညာအရည်အချင်း
- ကျောင်းမနေဖူး -------------------------------------- ၁
- အခြေခံပညာအောင်------------------------------------ ၂
- အလယ်တန်းအောင်------------------------------------ ၃
- အထက်တန်းအောင် -------------------------------- ၄
- တက္ကသိုလ်/ဘွဲ့ရ------------------------------------ ၅
- အခြား (ဖော်ပြပါ) ----------------------------------၇၇

၆။ အလုပ်အကိုင်

- အိမ်ရှင်မ-- ၁
- ဆရာမ--၂
- ကျန်းမာရေးဝန်ထမ်း--၃
- ဈေးဆိုင်ရောင်း--၄
- ဆေးရောင်း --၅
- တိရစ္ဆာန်မွေးမြူရေး--၆
- ခြံစိုက်--၇
- အမှိုက်သိမ်းသမား-- ၈
- ရေပိုက်သမား--၉
- တံငါသည်--၁၀
- အခြား (ဖော်ပြပါ) --၇၇

၇။ ဒီမှာနေတာ ဘယ်လောက်ကြာပြီလဲ? -------------------------နှစ် -----------------လ
၈။ မိသားစုဝင်ငွေတစ်လဘယ်လောက်လဲ ? -------------------------ကျပ်
၉။ မိသားစုဘယ်နှစ်ယောက်ရှိလဲ? -------------------------------ယောက်

(ခ) ဂုဏ်ဖျားခရောဂါဆိုင်ရာ ဗဟုသုတများ

စဉ်	အကြောင်းအရာ	မှန်	မှား	မသိ
၁၀။	လူကိုဂုဏ်ဖျားရောဂါကူးစက်နိုင်သောရောဂါပိုးသယ်ဆောင်သောပိုးမွှားမှာ (က)ကြက် --------------------------------- (ခ) ခွေး ------------------------------- (ဂ) ခြင်-------------------------------- (ဃ) ယင်ကောင်------------------------ (င) ပိုးဟပ်------------------------			
၁၁။	ဂုဏ်ဖျားခြင်းဟာ ဘယ်အချိန်မှာ လူသွေးစုပ်သလဲ? (က) မနက်ပိုင်း ------------------------------- (ခ) ညပိုင်း-------------------------------			
၁၂။	ဂုဏ်ဖျားခြင်းဟာ ဘယ်နေရာတွေမှာ ပေါက်ဖွားသလဲ ? (က)ရေကန် ------------------------------- (ခ) ဖြေးညင်းစွာစီးဆင်းနေသောရေကြည်ရေသန့်------------ (ဂ) မြောင်း ------------------------------- (ဃ) တာယာအဟောင်း------------------------ (င) ရောက်သွေ့ပြီး သန့်ရှင်းသောနေရာ ------------------			

စဉ်	အကြောင်းအရာ	မှန်	မှား	မသိ
၁၃။	၄က်ဖျားခြင်းဟာ ဘယ်နေရာတွေမှာ နားလေ့ရှိသလဲ ? (က) ချုံပုတ်--- (ခ) တိရစ္ဆာန်တင်းကုတ်များ----------------------------- (ဂ) သစ်တော-- (ဃ) အိမ်၏မှောင်တဲ့နေရာများ-------------------------- (င) နေရောင်ကျသည့် ပွင့်လင်းသည့်နေရာ---------------			
၁၄။	၄က်ဖျားရောဂါမည်သို့ကူးစက်နိုင်သနည်း။ (က) မသန့်ရှင်းသော ရေသောက်သုံးမိခြင်း -------------- (ခ) မသန့်ရှင်းသော အစားအသောက်စားသောက်မိခြင်း------- (ဂ) ၄က်ဖျောသီးစားသုံးမိခြင်း ----------------------- (ဃ) ၄က်ဖျားရောဂါရှိသူနှင့်နီးကပ်စွာနေမိခြင်း ----------- (င) ၄က်ဖျားပိုးသယ်ဆောင်သောခြင်ကိုက်ခံရခြင်း------------ (စ) ၄က်ဖျားရောဂါရှိသောသူ၏ သွေးသွင်းမိခြင်း-----------			
၁၅။	၄က်ဖျားရောဂါ၏ ရောဂါလက္ခဏာများမှာ (က) အဖျားတက်ခြင်း --------------------------------- (ခ) ခေါင်းကိုက်ခြင်း --------------------------------- (ဂ) ချမ်းတုန်ခြင်း --------------------------------- (ဃ) ချွေးထွက်ခြင်း --------------------------------- (င) အန်ခြင်း --------------------------------------- (စ) ပိုက်အောင့် / ပိုက်နာခြင်း-------------------------- (ဆ) ယားယံခြင်း -----------------------------------			
၁၆။	၄က်ဖျားရောဂါရှိ/မရှိ ကို အောက်ပါတို့တွင် စမ်းသပ်စစ်ဆေးနိုင်သည်။ (က) ကျေးလက်ကျန်းမာရေးဌာန ------------------------ (ခ) ၄က်ဖျားစေတနာ့ဝန်ထမ်း ------------------------ (ဂ) အစိုးရမဟုတ်သော ၄က်ဖျားအဖွဲ့အစည်း---------------- (ဃ) ဆေးခန်း --------------------------------------- (င) ဆေးရုံ --- (စ) ကိုယ့်ဘာသာ၄က်ဖျားရောဂါရှိသည်ဟု ယူဆခြင်း-----------			
၁၇။	၄က်ဖျားရောဂါအား အောက်ပါ ကိရိယာများနှင့် စမ်းသပ်စစ်ဆေးနိုင်သည်။ (က) ၄က်ဖျားပိုး အမြန်သွေးစစ်ကိရိယာ-------------------- (ခ) အနက်ကြည့် မှန်ဘီလူး-----------------------------			
၁၈။	၄က်ဖျားရောဂါသည် အောက်ပါနည်းလမ်းများနှင့်ကုသနိုင်သည်။ (က)အာတီမီစ နှင့် ဆေးတစ်မျိုးတည်းသာသောက်သုံးခြင်း----------- (ခ) ပေါင်းစပ်၄က်ဖျားဆေးသောက်သုံးခြင်း------------------			

စဉ်	အကြောင်းအရာ	မှန်	မှား	မသိ
	(ဂ) ဆေးဖက်ဝင်အပင်ဆေးများအားသောက်သုံးခြင်း----------			
	(ဃ) စုန်း ၊ နတ်များဆုတောင်းခြင်း----------			
၁၉။	ငှက်ဖျားရောဂါမဖြစ်အောင် ကာကွယ်လို့ရပါသလား?			
၂၀။	အောက်ပါနည်းလမ်းများသည်ငှက်ဖျားရောဂါမဖြစ်အောင်ကာကွယ် ပေး နိုင် ပါသလား။			
	(က) အကျီလက်ရှည် ဘောင်းဘီရှည်ဝတ်ခြင်း----------			
	(ခ) ဆေးစိမ်ခြင်ထောင်အသုံးပြုခြင်း ----------			
	(ဂ) ပတ်ဝန်းကျင်ရှိ ချုံနွယ် ပိတ်ပေါင်းများ ရှင်းလင်းခြင်း----------			
	(ဃ) ခြင်လိမ်းဆေးလူးခြင်း----------			
	(င) ခြင်နိုင်ဆေးဖျန်းခြင်း ----------			
	(စ) ခြင်ဆေးခွေအသုံးပြုခြင်း ----------			
၂၁။	ငှက်ဖျားပိုးဆေးယဉ်ပါးခြင်းသည် အောက်ပါတို့ကြောင့်ဖြစ်နိုင်သည်။			
	(က) အာတီမီစနင်းဆေးတမျိုးတည်းအားသုံးစွဲခြင်း----------			
	(ခ) အာတီမီစနင်းဆေးပေါင်းသုံးစွဲခြင်း ----------			
	(ဂ) ဆေးဆါးအတုအယောင်များ သုံးစွဲမိခြင်း ----------			

(ဂ) ငှက်ဖျားရောဂါကုသမှုနှင့် စပ်လျဉ်းသော အမှုအကျင့်များ

၂၂။ ငှက်ဖျားရောဂါလက္ခဏာပြပြီး ၂၄နာရီအတွင်း ငှက်ဖျားပိုးဖောက်စစ်လေ့ရှိသလား။
- အမြဲတမ်းဖောက်စစ်လေ့ရှိ----------၁
- တခါတရံမှဖောက်စစ်လေ့ရှိ----------၂
- �’�’ယ်တော့မှဖောက်စစ်လေ့မရှိ----------၃

၂၃။ ငှက်ဖျားရောဂါကို ဘ’ယ်သ’ည့်ကျန်းမာရေးဌာနမှာ အများဆုံး သွေးဖောက်စစ်လေ့ရှိသလဲ။
- ကျေးလက်ကျန်းမာရေး ဌာန----------၁
- ငှက်ဖျားစေတနာ့ဝန်ထမ်း----------၂
- ဆေးခန်း----------၃
- ဆေးရုံ----------၄

၂၄။ ငှက်ဖျားရောဂါကို ဘ’ယ်သ’ည့်ကျန်းမာရေးဌာနမှာ အများဆုံး ကုသလေ့ ရှိသလဲ။
- ကျေးလက်ကျန်းမာရေး ဌာန----------၁
- ငှက်ဖျားစေတနာ့ဝန်ထမ်း----------၂
- ဆေးခန်း----------၃

- ဆေးရုံ--၄

၂၅။ ငှက်ဖျားရောဂါကို ထိုကျန်းမာရေးဌာနမှာ မည်သို့ သွေးဖောက်စစ်လေ့ရှိသလဲ။
- အမြဲတမ်းဖောက်စစ်လေ့ရှိ------------------------------------၁
- တခါတရံမှဖောက်စစ်လေ့ရှိ ------------------------------၂
- �’ယ်တော့မှဖောက်စစ်လေ့မရှိ----------------------------၃

၂၆။ ငှက်ဖျားရောဂါကို ထိုကျန်းမာရေးဌာနမှာ မည်သို့ ကုသလေ့ရှိသလဲ။
- အမြဲတမ်းကုသလေ့ရှိ---၁
- တခါတရံမှကုသလေ့ရှိ --------------------------------------၂
- ဘယ်တော့မှကုသလေ့မရှိ----------------------------------၃

၂၇။ ငှက်ဖျားပျောက်ဆေးကို ကုန်အောင်သောက်လေ့ရှိပါသလား။
- အမြဲတမ်းကုန်အောင်သောက်လေ့ရှိ-------------------၁
- တခါတရံမှကုန်အောင်သောက်လေ့ရှိ ----------------၂
- ဘယ်တော့မှကုန်အောင်သောက်လေ့မရှိ--------------၃

(ဃ)   ကျေးလက်ဒေသများရှိ ကျန်းမာရေးစနစ်နှင့် ပတ်သက်သော အချက်အလက်များ
(ဃ-၁)   ငှက်ဖျားသွေးစစ်ခြင်းနှင့်ကုသမှု   တို့အား   လက်လှမ်းမှီခြင်းနှင့်   ပတ်သတ်သော
အချက်အလက်များ

၂၈။ အိမ်မှအနီးဆုံးကျေးလက်ကျန်းမာရေးဌာနသို့ဘယ်လောက်ကြာအောင်သွားရပါသလဲ။
- နာရီဝက် ---၁
- တစ်နာရီ --၂
- နှစ်နာရီ ---၃
- သုံးနာရီ --၄
- သုံးနာရီနှင့်အထက် ----------------------------------- -----၅

၂၉။ အိမ်မှ အနီးဆုံး စေတနာ့ဝန်ထမ်း ငှက်ဖျားလုပ်သားဆီသို့ ဘယ်လောက် ကြာအောင်
သွားရပါသလဲ။
- နာရီဝက် --- ၁
- တစ်နာရီ --၂
- နှစ်နာရီ --- ------၃
- သုံးနာရီ ---၄
- သုံးနာရီနှင့်အထက် --၅

၃၀။ အိမ်မှအနီးဆုံးဆေးခန်းသို့ ဘယ်လောက်ကြာအောင်သွားရပါသလဲ?
- နာရီဝက် --၁
- တစ်နာရီ --၂
- နှစ်နာရီ --- -----၃
- သုံးနာရီ --၄
- သုံးနာရီနှင့်အထက် --၅

၃၁။ အိမ်မှအနီးဆုံးဆေးရုံ သို့ ဘယ်လောက်ကြာအောင်သွားရပါသလဲ?
- နာရီဝက် --၁
- တစ်နာရီ --- ၂
- နှစ်နာရီ --၃
- သုံးနာရီ --၄
- သုံးနာရီနှင့်အထက် --၅

၃၂။ ၎င်းဖျားရောဂါ ကုသပေးသောနေရာသို့ ဘယ်လိုသွားခဲ့ ပါသလဲ။
- မော်တော်ကားဖြင့် --၁
- မော်တော်ဆိုင်ကယ်ဖြင့် --၂
- လှေဖြင့် --၃
- လမ်းလျှောက်ခြင်းဖြင့် --၄
- အခြား (ဖော်ပြပါ) ---၇၇

၃၃။ သင်သည်၎င်းဖျားသွေးဖောက်စစ်သော ဝန်ဆောင်မှုကို လွယ်လွယ်ကူကူရခဲ့ပါသလား။
- ရခဲ့သည်--၁
- မရခဲ့ပါ--၂

၃၄။ သင်သည်၎င်းဖျားရောဂါကုသခြင်းဝန်ဆောင် မှုကို လွယ်လွယ်ကူကူရခဲ့ပါသလား။
- ရခဲ့သည်--၁
- မရခဲ့ပါ--၂

(ဃ-၂) ၎င်းဖျားသွေးစစ်ခြင်းနှင့်ကုသမှု အတွက် ကုန်ကျစရိတ်များကို တတ်နိုင်ခြင်းနှင့် ပက်သတ်သော အချက်အလက်များ

၃၅။ ကျေးလက်ကျန်းမာရေးဌာန (သို့) ၎င်းဖျားစေတနာ ဝန်ထမ်း တွင် ၎င်းဖျားသွေး
ဖောက်စစ်ခြင်း နှင့် ကုသမှု အတွက် ငွေကြေးပေးခဲ့ရပါသလား။
- ပေးခဲ့ရပါသည်---၁
- မပေးခဲ့ရပါ---၂

၃၆။ ၎င်းဖျားရောဂါအတွက်ဝန်ဆောင်မှု များ ရရန်အတွက် ခရီးစရိတ်များစွာကုန်ကျခဲ့ပါသလား။
- ကုန်ကျခဲ့ပါသည်---၁

- မကုန်ကျခဲ့ပါ---၂

၃၇။ ကုန်ကျစရိတ်များအတွက် ငွေကြေးချေးငှားခြင်းများရှိခဲ့ပါသလား။
- ရှိခဲ့ပါသည်---၁
- မရှိခဲ့ပါ--၂

၃၈။ ငှက်ဖျားရောဂါအတွက်ဝန်ဆောင်မှုများ ရရန်အတွက် အချိန်များစွာကုန်ခဲ့ပါသလား။
- ကုန်ခဲ့ပါသည်--၁
- မကုန်ခဲ့ပါ---၂

(ဿ-၃) ငှက်ဖျားသွေးစစ်ခြင်းနှင့်ကုသမှု ဝန်ဆောင်မှုများ ရရှိခြင်းနှင့် ပတ်သတ်သော အချက် အလက် များ

၃၉။အနီးဆုံးကျေးလက်ကျန်းမာရေးဌာနတစ်ရက်ဘယ်နှစ်နာရီကြာအောင်ဖွင့်ပါသလဲ။---------- နာရီ
၄၀။အနီးဆုံးဆေးခန်း တစ်ရက်ကိုဘယ်နှစ်နာရီကြာအောင်ဖွင့်ပါသလဲ။-----------------------နာရီ
၄၁။အနီးဆုံး ငှက်ဖျားစေတနာ ဝန်ထမ်းထံတွင် ငှက်ဖျားအတွက်ဝန်ဆောင်မှုများ အမြဲ ရပါသလား။
- ရပါသည်---၁
- မရပါ --၂

၄၂။ကျန်းမာရေးဌာနတွင်ငှက်ဖျားစစ်ရန်အတွက်ငှက်ဖျားပစ္စည်းများပြတ်လတ်ခြင်းအားတွေ့ကြုံခဲ့ ပါ လား။
- တွေ့ကြုံခဲ့ပါသည်---၁
- မတွေ့ကြုံခဲ့ပါ--၂

၄၃။ ကျန်းမာရေးဌာနတွင်ငှက်ဖျားကုသရန်အတွက်ငှက်ဖျားဆေးများပြတ်လတ်ခြင်းအားတွေ့ကြုံခဲ့ ပါ လား။
- တွေ့ကြုံခဲ့ပါသည်---၁
- မတွေ့ကြုံခဲ့ပါ--၂

၄၄။ငှက်ဖျားဝန်ဆောင်မှုပေးသောကျန်းမာရေးဌာနများတွင် ကျန်းမာရေးဝန်ထမ်းများ မရှိခြင်းအားတွေ့
ကြုံ ခဲ့ပါသလား။
- တွေ့ကြုံခဲ့ပါသည်---၁
- မတွေ့ကြုံခဲ့ပါ--၂

၄၅။ ငှက်ဖျားရောဂါအတွက် ဝန်ဆောင်မှုမှုများအားစိတ်ကျေနပ်မှုရရှိခဲ့ပါသလား။
- ရှိခဲ့ပါသည်---၁
- မရှိခဲ့ပါ--၂
-

၄၆။ ဝန်ဆောင်မှုပေးသူထံမှကောင်းမွန်သောဝန်ဆောင်မှုရရှိခဲ့တယ်လို့သင်ထင်ပါသလား။
- ထင်ပါသည်--၁
- မထင်ပါ--၂

၄၇။ ဝန်ဆောင်မှုပေးသူထံမှကောင်းမွန်သော ပြောဆိုဆက်ဆံရေးရရှိခဲ့တယ်လို့သင်ထင်ပါသလား။
- ထင်ပါသည်--၁
- မထင်ပါ--၂

၄၈။ ဝန်ဆောင်မှုပေးသူထံမှဂုက်ဖျားနှင့်ပက်သက်သောကျန်းမာရေးအသိပညာပေးခြင်း ရှိခဲ့ပါသလား။
- ရှိခဲ့ပါသည် --၁
- မရှိခဲ့ပါ--၂

(ဃ-၄) ဂုက်ဖျားသွေးစစ်ခြင်းနှင့်ကုသမှု ဝန်ဆောင်မှုများ နှင့်ပက်သက်သော ကျန်းမာရေး ဝန်ထမ်းများ၏
တာဝန်ယူမှုနှင့် ပက်သက်သော အချက်အလက်များ

၄၉။ ဂုက်ဖျားရောဂါနှင့်ပက်သက်ပြီးလုပ်ဆောင်နေသောလုပ်ငန်းဆောင်တာများကို ကျန်းမာရေးဝန် ဆောင်မှုပေးသူများမှ ရှင်းလင်းပြောကြားခဲ့ပါသလား။
- ပြောခဲ့ပါသည်--၁
- မပြောခဲ့ပါ---၂

၅၀။ ကျန်းမာရေးဝန်ဆောင်မှုပေးသူများမှ ဂုက်ဖျားရောဂါ ကာကွယ်ရန် ဆေးစိမ်ခြင်းထောင်များ ပေးခဲ့ပါသလား။
- ပေးခဲ့ပါသည်--၁
- မပေးခဲ့ပါ---၂

၅၁။ ကျန်းမာရေးဝန်ဆောင်မှုပေးသူများမှ ဂုက်ဖျားရောဂါကို အခမဲ့ကုသပေးခဲ့ပါသလား။
- ပေးခဲ့ပါသည်--၁
- မပေးခဲ့ပါ---၂

၅၂။ ကျန်းမာရေးဝန်ဆောင်မှုပေးသူများသည်ကျင့်ဝတ်နှင့်အညီပြုမှုဆောင်ရွက်တယ်လို့သင်ထင်ပါ သလား။
- ထင်ပါသည်--၁
- မထင်ပါ--၂

၅၃။ ကျန်းမာရေးဝန်ဆောင်မှုပေးသူများမှပေးသောဝန်ဆောင်မှုများကိုသင်ယုံကြည်လက်ခံပါလား။
- ယုံကြည်ပါသည် --၁
- မယုံကြည်ပါ--၂

(ဃ)	**မှန်ကန်ထိရောက်သော ဂုက်ဖျားကုသမှု ရရှိမှုနှင့်ပက်သတ်သောသတင်းအချက်အလက်များ**

၅၄။	ဂုက်ဖျားရောဂါလက္ခကာပြပြီး ၂၄နာရီအတွင်း ဂုက်ဖျားပိုးဖောက်စစ်ခဲ့ပါသလား။
-	စစ်ခဲ့ပါသည်--၁
-	မစစ်ခဲ့ပါ--၂

၅၅။	ဂုက်ဖျားရောဂါလက္ခကာပြပြီး ၂၄နာရီအတွင်း ဂုက်ဖျားကုသမှုရရှိခဲ့ပါသလား။
-	ရရှိခဲ့ပါသည်--၁
-	မရရှိခဲ့ပါ--၂

၅၆။	ကျန်းမာရေးဝန်ဆောင်မှုပေးသူများ၏ကြီးကြပ်မှုဖြင့် ဂုက်ဖျားဆေးအား ကုန်အောင်သောက်
ခဲ့ပါသလား။
-	သောက်ခဲ့ပါသည်--၁
-	မသောက်ခဲ့ပါ--၂

APPENDIX B: Work Plan

Project Procedure	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18
Literature Review	■									
Writing Thesis Proposal		■	■							
Submission for Thesis Proposal				■						
Proposal Exam					■					
Ethical Consideration from Chulalongkorn University						■	■			
Pretest Questionnaires							■			
Field Preparation and data Collection							■	■		
Data Analysis							■	■		
Thesis Article Writing									■	
Final Thesis Exam									■	
Submission of Article for Publication									■	
Submission of Thesis and Article										■

CHULALONGKORN UNIVERSITY

APPENDIX C: Budget

No.	Topic	Expenses (Baht)
1	Travel and accomoddation costs related to project	18,500
2	Hiring 10 research assistants	10,000
3	Photocopy cost	10,000
4	Cost fo stationary	2,500
5	Compensation for respondents	23,400
6	Cost for printing and binding of research paper	5,000
7	Miscellaneous	5,000
	Total	74,400

APPENDIX D: Ethical Approval

AF 02-12

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University
Jamjuree 1 Building, 2nd Floor, Phyathai Rd., Patumwan district, Bangkok 10330, Thailand,
Tel/Fax: 0-2218-3202 E-mail: eccu@chula.ac.th

COA No. 064/2018

Certificate of Approval

Study Title No. 039.1/61 : BARRIERS TO PROMPT AND EFFECTIVE MALARIA TREATMENT AMONG MALARIA INFECTED PATIENTS IN PALAW TOWNSHIP, TANINTHARYI REGION, MYANMAR: CROSS SECTIONAL STUDY

Principal Investigator : MISS ZAR ZAR NAING

Place of Proposed Study/Institution : College of Public Health Sciences, Chulalongkorn University

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP).

Signature: .... Signature: ....
(Associate Professor Prida Tasanapradit, M.D.) (Assistant Professor Nuntaree Chaichanawongsaroj, Ph.D.)
Chairman Secretary

Date of Approval : 16 March 2018 Approval Expire date : 15 March 2019

The approval documents including

1) Research proposal
2) Patient/Participant Information Sheet and Informed Consent Form
3) Researcher
4) Questionnaire

Protocol No. 039.1/61
Date of Approval 16 MAR 2018
Approval Expire Date 15 MAR 2019

The approved investigator must comply with the following conditions:
1. The research/project activities must end on the approval expired date of the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University (RECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the RECCU approval expired date.
2. Strictly conduct the research/project activities as written in the proposal.
3. Using only the documents that bearing the RECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available).
4. Report to the RECCU for any serious adverse events within 5 working days
5. Report to the RECCU for any change of the research/project activities prior to conduct the activities.
6. Final report (AF 03-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.
7. Annual progress report is needed for a two- year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.

VITA

Dr. Zar Zar Naing

M.B., B.S (Ygn)

No. (301), Building – B3, Bo Min Yaung Street, Bo Min Yaung Housing,

North Dagon Township, Yangon, Myanmar

E mail Address   : jasminemay1987@gmail.com

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Brief Profile

       I am a medical doctor holding MBBS Degree graduated from University of Medicine (II), Yangon, Myanmar. I am a registered doctor with SAMA 26435 from Myanmar Medical Council. I had 3 years of extensive clinical experience in Private Hospital and 5 years of field and research experience in public health sectors related to malaria projects of Myanmar Medical Association and Malaria Program in World Health Organization, Myanmar.

Educational Qualifications

1.   Diploma in Developmental Studies for Community (Dip., Ds) in 2015

2.   Certification in Management of Common Clinical Problems in 2014

3.   Certification in Management of Acute Medical Emergencies in 2013

4.   Certification in Public Health, Family Medicine and Research in 2012

5.   Certification in Leadership and Team Building Training in 2011

6.   Certification in Project Cycle Management Training in 2010

7.   Certification in Training of Trainers in 2009

8.   Bachelor of Medicine and Bachelor of Surgery (M.B., B.S) from University of Medicine (II) in 2009