

Original Research Article

Knowledge, attitude and practices about malaria among gold miners in Shwekyin township, Myanmar

ABSTRACT

Background: Myanmar is one of the countries with the evidence of artemisinin resistance and the greatest burden of malaria in the Greater Mekong Sub region. At present, migrant/mobile populations are considered to play a major role in the potential spread of artemisinin resistant malaria within countries and across borders. On this regard, we conducted this study in Shwekyin township, Bago division of Myanmar from March to April 2013 to investigate knowledge, attitude and practices about malaria among gold miners.

Methodology: A total of nine Key Informant Interviews and five Focus Group Discussions were conducted in randomly selected two gold mines and two villages. Key informants were asked and discussed about local health service, people's perception of malaria, treatment-seeking behaviors. Focus group discussions were focused on knowledge, attitudes, and behaviors regarding malaria prevention and treatment.

Results: Most of villagers and gold miners had high understanding of causes and transmission of malaria though somewhat mixed and confused. Most of the villagers are using bed net to prevent malaria but most of the gold miners mentioned drinking boiled water, eating safe food and cleaning the environment as preventive measures. Though Artesunate and Artemether were the most familiar anti-malarials among all respondents, only a few villagers close to rural health centre knew and could describe just the appearance and color of governmental recommended drug. Though villagers close to rural health centre used to take treatment within 48 hours, those living with social malaria workers and gold miners were still familiar with self-treatment. The use of rapid diagnostic test was well accepted but test negative result was poorly understood and might lead to unfavorable consequences.

Conclusion: Migrant-friendly malaria communication campaigns encouraging healthy lifestyles and prevention should be initiated. Regular assessment and refresher course on quality of service provided by public health care providers are mandatory. Education towards the drug retailers about the link between monotherapy usage and drug resistance should be considered. Bilingual intervention and employment of Karen ethnic people in malaria prevention and control program should be encouraged.

Keywords: *Malaria, Myanmar, Migrants, Qualitative, Knowledge, Attitude and Practices*

1. INTRODUCTION

Malaria is one of the life-threatening infectious-diseases which are widespread in tropical and subtropical regions. In 2012, about 207 million cases of malaria infection and 627,000 deaths were reported globally [1]. Although the number of malaria cases has fallen by more than 50% in 43 countries over the past decade, one of the major growing threats to control effort of malaria is the emergence of parasites that are resistant to artemisinins [1]. Artemisinins produce early remission of clinical symptoms of malaria and therefore,

adherence to the full 7-day treatment regimen is generally poor. Since this incomplete treatment courses induce emergence and spread of artemisinin resistance, WHO called for a ban on artemisinin-based monotherapies (AMTs) and replacement with artemisinin-based combination therapies (ACTs) in 2005.

In Myanmar, one of the four countries in which emergence of artemisinin resistance has been suspected and with the greatest malaria burden in the Greater Mekong Sub region, currently more than 70% of malaria treatments are directly accessed from the private sector and more than 80% of all malaria cases are still treated with AMTs [1,2]. At present, migrant/mobile populations are considered to play a major role in the potential spread of artemisinin resistant malaria within countries and across borders. By their nature, these populations live and work in areas with high malaria transmission, high human–vector contact and limited access to health services including effective malaria prevention tools, accurate diagnosis and treatment with ACTs. Understanding treatment seeking behaviors about malaria among the community (especially migrants) is necessary for developing an appropriate strategy to prevent the emergence of artemisinin resistance. For this reason, this qualitative study aimed to investigate knowledge, attitude and practices about malaria among migrants in Myanmar.

2. MATERIAL AND METHODS

2.1 Study setting

Myanmar Artemisinin Resistance Containment (MARC) defined areas of Tier 1, 2 and 3 according to Global Plan for Artemisinin Resistance Containment (GPARC) guidelines and recognized migrant/ mobile populations as an important target group [3,4]. Our designated area was Shwekyin township, Bago division of Myanmar which is one of the Tier 1 areas of Myanmar [3]. The township includes plains and hilly, forested areas. This township is about 945.44 square miles in area and with a total population of 879 54 (male 42730 and female 45224). In Shwekyin, thousands of people are migrants, working in gold mines. 97% of malaria-confirmed cases were found to be migrants by the study conducted in 16 townships of Bago division under the Malaria control project supported by Japan international cooperation agency (JICA) in 2009.

Public health care is provided by one township hospital, one regional hospital, 5 rural health centers, 18 sub rural health centers and one malaria campaign. The control strategy includes provision of long lasting insecticidal nets (LLINs) and early diagnosis/adequate treatment (EDAT) through health staffs and village volunteers. While there is no clear trend in the incidence of malaria, there has been a steady reduction in recorded malaria deaths from 23 in 2004, to 2 in 2010. There are 82 villages and a number of gold mines in Shwekyin township. Among these villages and gold mines, two gold mines and two villages of different population sizes, distances from the city and availabilities of health care services were purposely selected for this qualitative study.

2.2 Study design and sampling

From the study area, a non-probability, purposive sample of the target group was used to recruit study participants from a randomly selected big village V1 with Rural Health Centre and small village V2 with Social Malaria Worker. At the same time, two randomly selected gold mines: small gold mine, G1 which was located near V1 and big gold mine, G2 which was far from the city were included. A cross-sectional community-based survey was carried out in from March to April of 2013. Our study included people from randomly selected two gold mines and two villages. At first, the permission to conduct our study was requested from the authorities of gold mines and villages.

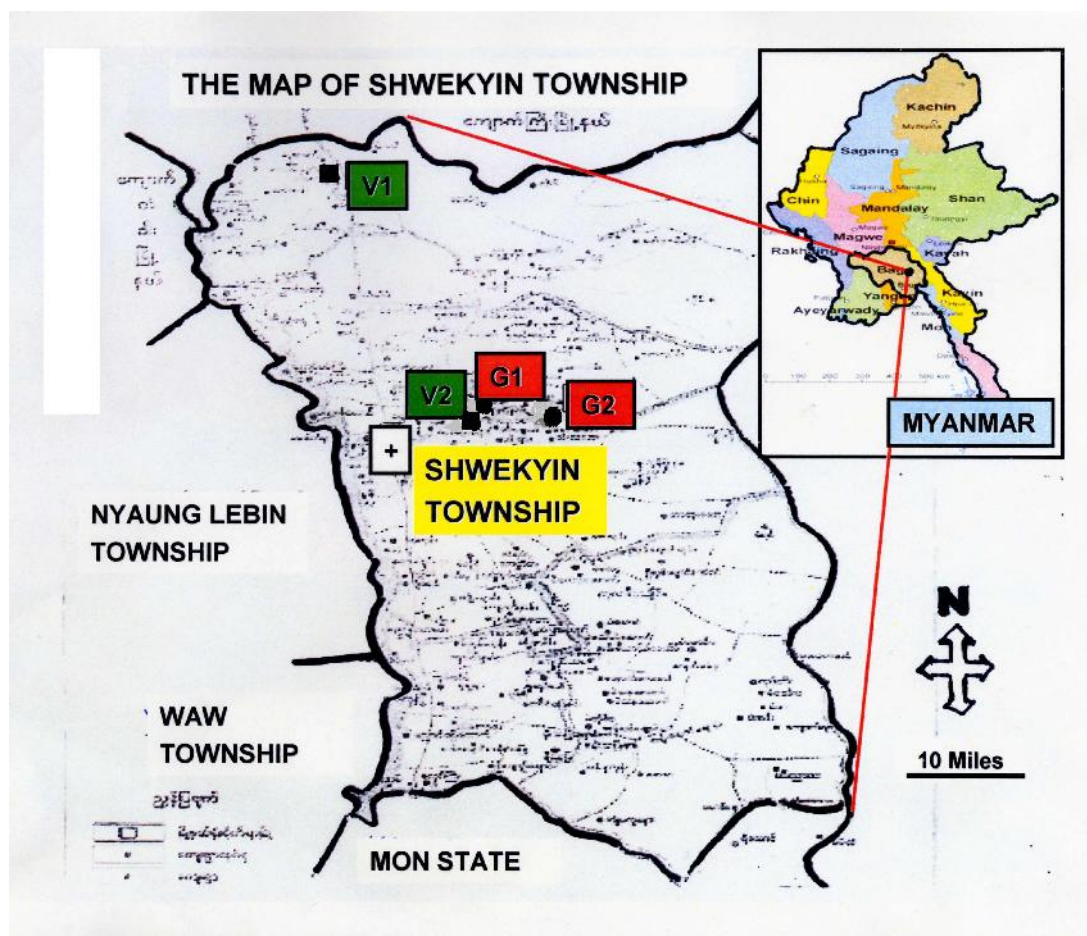


Fig: The map of Shwekyin township showing study sites. V1 and V2 represent two villages. [G1 and G2 represent two gold mines. A rectangle with positive sign indicate the city.]

A total of nine Key Informant Interviews (KIIs) were conducted in two gold mines and two villages. According to the recommendation of household heads and workers, people like authorized persons, religious leaders, village heads, village health workers, midwives, local healers or teachers and worker heads from gold mines were selected as key informants for interview. Key informants were asked and discussed about local health service, people's knowledge and perception of malaria, anti-malarial drugs, rapid diagnostic tests (RDTs) and their treatment-seeking behaviors. A total of five Focus Group Discussions (FGDs) were conducted: one each in two gold mines, two in V1 and one in V2. Each FGDs included about 7 people. FGDs participants were mobilized by the local authorities. The adult males and females of 18-60 years with the history of fever within one month were included. Participants were recruited from different parts of villages and gold mines to maximize diversity. FGDs were conducted with the aim to explore barriers to access in more detail, gathering in-depth information on the interaction between different factors and how they influence access to prompt and effective treatment. Questions were focused on knowledge, attitudes, and behaviors regarding malaria prevention and treatment. All KIIs and FGDs were conducted in school and monastery to provide privacy and digitally recorded and notes were also taken as necessary.

3. RESULTS

3.1 Socio-demographic characteristics of participants

Among the participants of three FGDs in two villages, 11 males and 10 females were included. Most of them were 20-40 years old, native born and married. Regarding ethnicity, the villagers were mostly Myanmar and the remaining ones were Karen. Most of the males are gold mine related workers and female were mostly dependents. Most of the participants have the middle school education. Average daily incomes of males were 1000 – 2000 Kyat of Myanmar currency (about 1-2 US dollars). In case of two FGDs in two gold mines, seven males were included in G1 and four males and three females in G2. Most of them were 30-50 years old, from other townships and married. The gold miners in G1 were mostly Myanmar but in G2 mainly belonged to Karen ethnicity. Their education levels were mostly primary school. Most of them could earn average 3000-4000 Kyat of Myanmar currency (about 3-4 US dollars) per day.

3.2 Major research themes

3.2.1 Understandings of malaria

Most of villagers and gold miners reported at least two major causes of malaria as mosquito bite and drinking contaminated water. People who are going into forest and working in gold mines are perceived to get malaria through mosquito bite and drinking contaminated water. Most frequently, they linked the cause and transmission of malaria infection with drinking contaminated water and unclear environment. A few gold miners mentioned malaria was due to contaminated food touched by a mosquito or fly.

“When we go to forest and mountain, we are bitten by the mosquitoes and also we have to drink unclean water for example like water fermented with fallen leaves, you see? We got malaria in this way, I think.” [54 year old, male FGDs participant, V1]

Most of the villagers and gold miners perceived feeling of hot body with shivering and head ache as the major symptoms of malaria by their experiences. But they could not mention the danger symptoms of severe malaria.

“When I got malaria, I started to feel hot outside of my body and then shivering inside. My head and body became ache and I didn’t want to work anymore. I was thirsty so much. You know, I felt sleepy and could not touch water.” [25 year old, female FGDs participant, G2]

Regarding knowledge about anti-malarial drugs, though Artesunate and Artemether were the most familiar ones among villagers and gold miners, Although most of the villagers and gold miners knew and could call the name Artesunate and Artemether correctly, only a few villagers living in V1 knew and could describe the appearance and color of Coartem (governmental recommended drug).

“This brand (showing the registered brand of artesunate tablets) is the best selling antimalarial drug. Every malaria season, the owners of the gold mines used to come to my shop and buy a large number of boxes of Artesunate tablet for their workers. They can ask and buy by the name Artesunate. Most of them are really familiar with Artesunate and always ready to take it like their snack.” [Key Informant Interview with 45 year old, male, owner of a big drug shop]

149 1.2.2 Preventive measures based on their perception of malaria

150

151 Most of the villagers demonstrated some correct knowledge of malaria prevention.
152 But only a few gold miners knew how to prevent malaria. When asked about prevention
153 methods, most of the villagers named using bed nets as the most common one. Using
154 mosquito coils was the second choice of prevention. But in case of gold miners, as their
155 knowledge and perception about the cause and transmission of malaria were somewhat
156 mixed and confused, they mentioned drinking boiled water, eating safe food and cleaning
157 the environment as preventive measures.

158

159 *"We don't know so much. It depends on sanitation of house and environment. We*
160 *try to keep our environment clean. We need to eat safe food and water, I think. And also we*
161 *need to sleep under bed net, I think."* [43 year old, male FGDs participant, V2]
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163

164 3.2.2 Old friend in their treatment seeking behaviors

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166 When the villagers in V1 were asked about their first action to getting malaria, most
167 of them used to get malaria diagnosis and treatment at the public health facility within 48
168 hours. Though Malaria Social Worker has been serving in V2, most of the villagers in V2 did
169 know his presence and service. They used to buy cocktail of drug containing Artesunate
170 from nearby retailers and took by themselves within 48 hours. Only when their fever was not
171 relieved and still high, they went to township hospital directly. In case of gold miners in both
172 G1 and G2, their first response was self-treatment or treatment provided by their manager or
173 owner. A few big gold mines have their own health care providers who are not well trained
174 and not well acknowledged about government recommended antimalarial drugs and not
175 equipped with RDTs. Most of the gold miners with working experience used to buy and keep
176 Artesunate tablet by themselves.

177

178 *"Last year, I, myself experienced of being owner of gold mine in the forest on the*
179 *mountains. When I went to my gold mine, I brought a package of boxes of Artesunate tablets*
180 *together with me. So, when my workers got malaria, I treated them by using these drugs.*
181 *Although some people wished to go to health facility, the motorcycle transportation fee was*
182 *about 20 000 Myanmar Kyat (20 US dollars) for one way and it was time consuming to get*
183 *hospital, you see?"* [Key Informant Interview with 43 year old man, the owner of biggest drug
184 shop in Shwekyin]

185

186 *"We use to take a cocktail containing Artemether for malaria. I use to buy and store*
187 *cocktails containing Artemether in my gold mines. Drug retailers in the city said Artemether*
188 *is a strong medicine. So, I first treat them with soft medicine, you see? Like Paracetamol and*
189 *Burmeton. I don't always give cocktail containing Artemether to my workers when they get*
190 *malaria, only when their fever is high."* [Key Informant Interview with 30 year old man, the
191 owner of gold mine in Shwekyin]

192

193 3.2.3 Beyond the complete adherence to RDTs

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195 AMTs: A consequence of negative RDTs?

196

197 The use of RDTs was well accepted among villagers and gold miners. Most of the
198 villagers thought they got malaria every time they were febrile. So, they were willing to go
199 and take RDTs at the public health facility. But, when RDTs was negative and they did not
200 get any anti-malarials, they were unsatisfied with the service. It led them to self-treatment
201 and the most commonly used medication was cocktails of drugs containing Artesunate or
Artemether tablet, a kind of analgesic and antibiotic available at the nearby shop.

201

202 *"In my last fever, I was quite sure it was malaria because I got so many times of*
 203 *malaria since birth. That is why I went to health care provider who tested my blood by using*
 204 *his test. Then, he said I had no malaria and gave me only paracetamol. But, as I was still*
 205 *suffering from fever, I went to drug shop and took the cocktail they mixed. Then, my malaria*
 206 *was completely cured."* [36 year old, male FGDs participant, V1]

207
 208 *"You see, every time the local people get fever, they said it was malaria.*
 209 *Sometimes, they even think they know better than us about malaria. They never use the*
 210 *term Fever, ever say Malaria. If the RDTs is negative, they are not satisfied with the result.*
 211 *By the Ministry of Health, we are ordered not to prescribe RDTs negative patients. If we*
 212 *don't prescribe any anti-malarials to them, they are not satisfied with our service. Then, they*
 213 *go to buy Artesunate outside and take by themselves."* [Key Informant Interview with 36 year
 214 old male, Health Assistant of V1]

215 216 **4. DISCUSSION**

217
 218 Regarding knowledge about the cause of malaria, most of the gold miners and
 219 villagers believed that malaria was caused by both mosquito bite and drinking contaminated
 220 water in the forest. They knew the cause of malaria by mosquitoes bite via health education
 221 through various media like TV, radio and new papers and via the behavioral change
 222 campaign of VBDC of Ministry of Health, Myanmar. But through their traditional belief and
 223 living experience and malaria attacks, they still perceived malaria was linked to drinking
 224 contaminated water and other causes [5,6,7].

225 Most of the villagers (native residents) knew malaria can be prevented. Regarding
 226 preventive measures for malaria, using Insecticide Treated Net was the best known and the
 227 most commonly used method among the villagers. Coverage of LLINs and health education
 228 along with activities of MARC in Shwe Kyin may have contributed to this result. But based on
 229 their perception on the cause of malaria, the most common preventive measures they said
 230 were to use bed net and not to drink contaminated water. These findings highlight the
 231 coexistence of traditional and modern beliefs and practices in these societies similar to other
 232 studies in developing countries [8,9,10]. Most of the gold miners working there were from the
 233 other townships near by and around the country and some of them have never experienced
 234 malaria before. That is why their knowledge regarding cause, transmission and prevention of
 235 malaria were poor.

236 Though Artesunate and Artemether were the most familiar anti-malarials among
 237 villagers and gold miners, only a few villagers in V1 which was close to rural health centre
 238 could describe the appearance and color of Coartem (governmental recommended drug).
 239 The awareness of Coartem as the first line antimalarial drug was still low. The reason which
 240 can explain that point is public health staffs in rural health centre are well experienced and
 241 can provide not only early diagnosis and prompt treatment but also health education
 242 thoroughly to the community [11,12].

243 The public health care providers are treating the patients with ACTs after testing with
 244 RDTs according to national malaria treatment guidelines free of charge. Although all the
 245 health care providers are prescribing ACTs free, the residents are still using AMTs by their
 246 self-treatment. The government is preparing to ban AMTs (Brand name Artesunate) officially
 247 but not yet. The best selling anti malarial drug in that area is AMTs (Brand name
 248 Artesunate). ACTs was largely unknown to the local people at the time of the study. All of
 249 them never heard about drug resistance malaria. They could not link the use of AMTs and
 250 drug resistance malaria [11,12].

251 In Cambodia, the program of Village Malaria Worker was established since 2001
 252 and they became well experienced and trained health staffs. That is why they can play the
 253 equivalent role as the health center [13]. In case of Myanmar, Social Malaria Workers
 254 program was recently established in accordance with artemisinin resistance containment in

Myanmar. At this stage, they are trying to provide early diagnosis and treatment of malaria by utilizing RDTs and ACTs in all villages without health center services. They are trying to cover the whole area especially for the migrants in out reach gold mines. But designing special intervention addressing gold miners are still challenging because they are always migrating and their working sites are always changing. Moreover, the workers serving in the remote gold mines are mostly Karen ethnic people. Some cannot speak and understand Myanmar language well. On this regard, they are not fully accessible to currently providing health education and behavioral change communications, all of which are in Myanmar language.

Treatment providing behaviors greatly affect the treatment seeking behaviors of the people with malaria [14,15]. Ministries of health of WHO member countries are trying to set the policy and guidelines for health care provider to adhere fully to RDTs and ACTs. But at the same time, beyond the full adherence to RDTs and ACTs, thorough understanding of the patients' perception and response to the test results. In face of RDTs negative results, health providers could not explain the possibilities and meaning of RDTs results. Provider's knowledge and experience to achieve patient's satisfaction especially in case of negative RDTs result is critically important otherwise it may lead to self-treatment with AMTs [16,17,18]. Moreover, the most concerned issue is the possibility of unsatisfaction and distrust in public health services which will become a major barrier in utilization of public health facilities.

5. STUDY LIMITATION

Owing to the non-random sampling procedure and small sample size in this study, the results are specific to the population sampled and may not be applicable to other areas in Myanmar.

6. CONCLUSION

As drug retailers play a major role in the first and initial response to malaria of people in our study, refresher course or education towards them about the link between monotherapy usage and drug resistance and the importance of adherence to RDTs and ACTs should be considered [19]. Designing special intervention addressing gold miners are still challenging because of their migratory nature and lifestyles. Migrant-friendly malaria communication campaigns encouraging healthy lifestyles and prevention should be initiated. Regular communication between the owners of gold mines, local administrative and health authorities will lead to a better intervention targeting the gold miners to get good access to LLINs, RDTs and ACTs.

At the same time, regular assessment and refresher course on quality of service provided by public health care providers are mandatory. Counseling and health education will be critical in dealing with patients especially RDTs negative ones [16,17,18]. For the effective health education and behavioral change communication among Karen people, all the interventions should be bilingual: not only in Myanmar but also in Karen language. The employment of Karen people in special interventions like Social Malaria Workers and their active participation in community health activities should be encouraged [20].

Elsewhere, trials to evaluate the impact of the introduction of RDTs alongside supporting interventions that include training in improved communication are on-going and will inform methods for undertaking such interventions. Beyond goals to manage expectations from RDTs and promote test-based diagnoses, improved communication may influence patients' and caregivers' understandings of diagnoses and treatment regimens for febrile illness in general, potentially affecting adherence to treatment, perceptions of quality of care, and future care seeking decisions.

306

307 **COMPETING INTERESTS**

308

309 All the authors declare that they have no competing interest.

310

311 **CONSENT**

312

313 All authors declare that 'written informed consent was obtained from the patient (or
314 other approved parties) for publication of this case report and accompanying images. A copy
315 of the written consent is available for review by the Editorial office/Chief Editor/Editorial
316 Board members of this journal.

317

318 **ETHICAL APPROVAL**

319

320 This study was approved by Ethical committees of Military Institutes of Nursing and
321 Paramedical Sciences, Myanmar and Juntendo University, Japan. Before enrolment, written
322 informed consent was taken from each of all participants. Confidentiality and anonymity were
323 maintained.

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