

Social determinants of malaria among gold miners in Shwekyin Township, Myanmar

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ABSTRACT

Background: Myanmar is one of the countries with the evidence of suspected 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 cross-sectional community-based survey in Shwekyin Township, Bago Division of Myanmar from March to April of 2013 to investigate social determinants of malaria among gold miners.

Method: A total of nine Key Informant Interviews and five Focus Group Discussions were conducted in two gold mines and two villages with different accessibilities to health facilities. 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 treatment seeking behaviors of malaria.

Results: Most of villagers and gold miners had fair understanding of causes, transmission and symptoms of malaria though somehow mixed and confused. The villagers had a better knowledge and practices of prevention than the gold miners. Though villagers close to rural health centre used to take treatment within 48 hours of fever, those living with social malaria workers and gold miners were still experiencing self-treatment. Drug retailers played a major role in their first and initial response to malaria. Artesunate and artemether were the most familiar anti-malarials among all respondents. The use of rapid diagnostic test was well accepted but test negative result was poorly understood and sometimes it might lead to self-treatment using artemisinin-based monotherapies.

Conclusion: Limited knowledge and practice of malaria prevention might be social determinants of malaria among gold miners. Self-treatment using artemisinin-based monotherapies was still common, even after negative rapid diagnostic test result in vicinity of health facility.

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

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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 2007 [2].

Along with the emergence of artemisinin-resistant malaria in western Cambodia in 2006-2007, there is growing evidence that artemisinin resistant parasites in other parts of the Greater Mekong Sub-region (GMS), including eastern Myanmar [3, 4]. By WHO malaria report (2013), about 60% of the population in Myanmar is living under malaria risk and 37% are in high transmission area. *Plasmodium falciparum* (65%) and *Plasmodium vivax* (35%) are the major malaria parasites in Myanmar. Regarding vector species, *Anopheles minimus* and *Anophele dirus* are the most prevalent ones. Regarding prevention and control intervention, ITNs/LLINs has been distributed free of charge to all age groups since 2003 [1]. In Myanmar, ACTs has been the first line treatment for *Plasmodium falciparum* malaria since 2002 [1].

According to WHO guidelines, public health care providers are treating the patients of all ages by using RDTs and ACTs free of charge. But 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 in Myanmar [3, 4]. And 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. These populations live and work in areas with high malaria transmission, high human–vector contact and limited access to health services including RDTs and ACTs [4, 5]. Understanding treatment seeking behaviors of malaria among the migrants is necessary for developing an appropriate strategy to prevent the emergence of artemisinin resistance. For this reason, this qualitative study aimed to investigate social determinants of 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 [4, 5]. Our designated area was Shwekyin Township, Bago Division of Myanmar which is one of the Tier 1 areas of Myanmar [4]. The township is composed of 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). There are 82 villages and a number of gold mines in Shwekyin Township. 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 insecticide-treated nets (LLINs) and early diagnosis/adequate treatment (EDAT) through health staffs and village volunteers. In Shwekyin, thousands of people are migrants, working in gold mines. By the study conducted in 16 townships of Bago Division under the Malaria control project supported by Japan International Cooperation Agency (JICA) in 2009, 97% of 28,332 positive (confirmed) cases were migrants [4].

2.2 Study design and sampling

A cross-sectional community-based survey was carried out from March to April of 2013. From the study area, two gold mines and two villages of different population sizes, distances from the city and availabilities of health care services were selected for this qualitative study. A big village V1 with Rural Health Centre and a small village V2 with Social Malaria Worker were chosen to explore their knowledge, attitude and treatment seeking behaviors of malaria. Accordingly, a small gold mine, G1 which was located near V1 and a big gold mine, G2 which was far from the city, were included to reveal the social determinants and treatment seeking behaviors of malaria among gold miners with different accessibilities to health care services. At first, the permission to conduct our study was requested from the authorities of gold mines and villages.

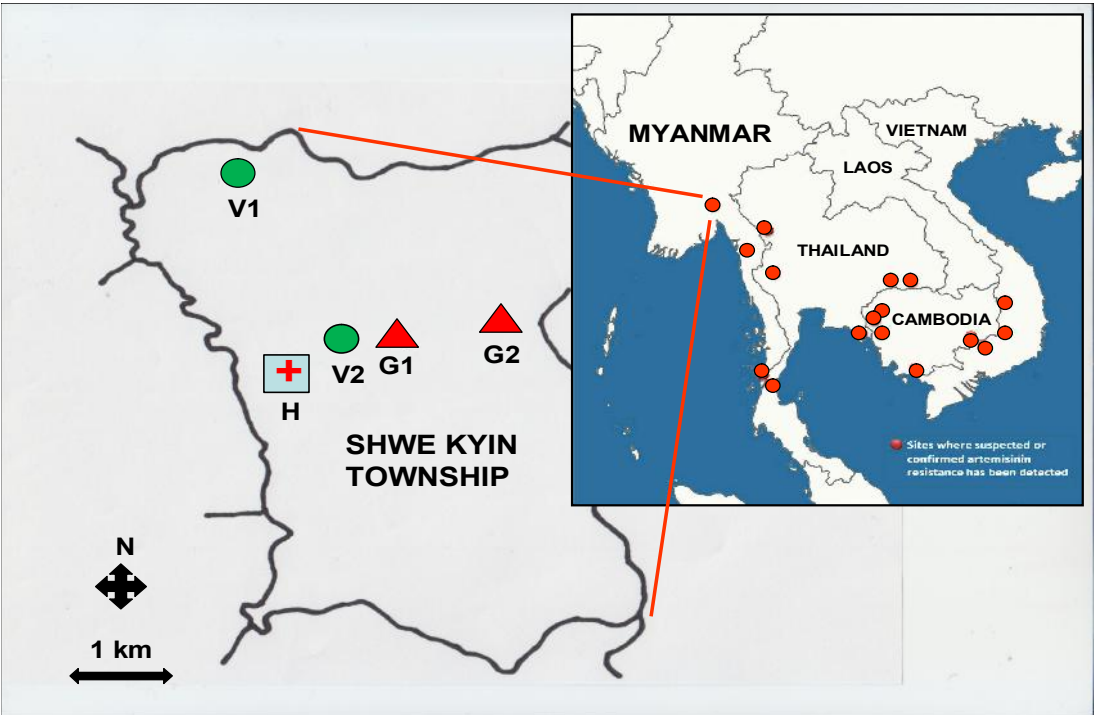


Fig 1: The map of Shwekyin Township showing study sites. [V1 and V2 represent two villages. G1 and G2 stand for two gold mines. H indicates the location of township hospital. Red spots in the map of upper right corner represent sites where suspected or confirmed artemisinin resistance has been detected. (WHO, 2013)]

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, drug retailers 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 treatment seeking behaviors regarding malaria. All KIs and FGDs were conducted in school and monastery to provide privacy and digitally recorded and notes were also taken as necessary.

2.3 Data analysis

Field supervisors checked all data collecting forms for completeness and reliability. Digital recordings of KIs and FGDs were transcribed verbatim in the original Myanmar and then translated into English by a bilingual research member. On completion, another member read and reviewed each translated English transcript, comparing it against the audio recordings and original Myanmar version. Quotations that best mentioned knowledge, attitudes and practices of the respondents regarding malaria were identified.

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 Kyats 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 Kyats 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 unclean 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, 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]

3.2.2 Preventive measures based on their perception of malaria

When asked about prevention methods, most of the villagers named using bed nets as the most common one. Using mosquito coils was the second choice of prevention. But in case of gold miners, as their knowledge and perception about the cause and transmission of malaria were somewhat mixed and confused, they mentioned drinking boiled water, eating safe food and cleaning the environment as preventive measures.

“We don’t know so much. It depends on sanitation of house and environment. We try to keep our environment clean. We need to eat safe food and water, I think. And also we need to sleep under bed net, I think.” [43 year old, male FGDs participant, G2]

3.2.3 Old friend in their treatment seeking behaviors

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

“Last year, I, myself experienced of being owner of gold mine in the forest on the mountains. When I went to my gold mine, I brought a package of boxes of Artesunate tablets together with me. So, when my workers got malaria, I treated them by using these drugs.” [Key Informant Interview with 43 year old male, the owner of biggest drug shop in Shwekyin]

“When I got fever in this gold mine, I really wished to go to health facility but the motorcycle transportation fee was about 20 000 Myanmar Kyats (20 US dollars) for one way, you see? Sometimes we could not rent any motorcycle especially at night and during raining season. Then we had to take drugs provided by our head of workers.” [32 year old, male FGDs participant, G2]

3.2.4 Beyond the complete adherence to RDTs

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

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

“You see, every time the local people get fever, they said it was malaria. They never use the term Fever, ever say Malaria. If the RDTs result is negative, they are not satisfied. If we don’t prescribe any anti-malarials to them, they go to buy Artesunate outside and take by themselves.” [Key Informant Interview with 41 year old male, Health Assistant of V1]

4. DISCUSSION

Most of the gold miners and villagers believed that malaria was caused by both mosquito bite and drinking contaminated water in the forest. Similar to findings in Swaziland and India, their perception of mosquitoes in the cause and transmission of malaria was somehow confused [6, 7]. They mentioned feeling of hot body with shivering and head ache as the major symptoms of malaria but they did not know the danger symptoms of severe malaria. The study conducted in remote villages of Bago Division, Myanmar in 2006 after five months initialization of a rapid diagnostic test (RDT) and artemisinin-based combination therapy (ACT) programme explored the low knowledge of malaria among the remote villagers [8]. Frequent health educations through various media like TV, radio and new papers and via the behavioral change campaign of Vector Borne Diseases Control (VBDC) of Ministry of Health; Myanmar might have contributed the better awareness of malaria among the respondents in our study. But through their traditional belief and living experience and malaria attacks, they still perceived malaria was linked to drinking contaminated water and other causes [9, 10].

Regarding preventive measures for malaria, using Insecticide Treated Net was the best known and the most commonly used method among the villagers. Coverage of LLINs and health education along with activities of MARC in Shwe Kyin might have contributed to this result. But in case of gold miners, the most common preventive measures among them were to drinking boiled water, eating safe food and cleaning the environment. These findings highlighted the coexistence of traditional and modern beliefs and practices in these societies similar to other studies in developing countries [9, 10]. Most of the gold miners working there were from the other townships near by and around the country and some of them have never experienced malaria before. Their education level was lower compared to that of the villagers. That may be why their knowledge regarding prevention of malaria was poor.

Though Artesunate and Artemether were the most familiar anti-malarials among villagers and gold miners, only a few villagers living close rural health centre could describe the appearance and color of Coartem (governmental recommended drug). The awareness of Coartem as the first line anti-malarial drug was still low in V2 and both gold mines. The reason which could explain that point is public health staffs in rural health centre were well experienced and could provide not only early diagnosis and prompt treatment but also health education thoroughly to the community [9, 10].

The villagers in V1 close to RHC used to get malaria diagnosis and treatment at the public health facility within 48 hours. But, most of the villagers in V2 living with social malaria worker were still experiencing self-treatment using cocktail of drugs containing AMTs from nearby retailers. It was consistent with the study among Wa ethnic population in Myanmar where significantly higher proportion accessing the retail sector (79.6%) was found [11]. Only when their fever was not relieved and still high, they went to township hospital directly. In case of gold miners, their first response was self-treatment or treatment provided by their manager or owner. Despite of their willingness to adhere diagnosis and treatment which were provided by public health facility free of charge, difficulty in transport was a great barrier especially in raining season. It inevitably led them to take self-treatment or treatment provided by their manager or owner.

Although the public health care providers were prescribing ACTs after testing with RDTs according to national malaria treatment guidelines free of charge, the residents are still using AMTs by their self-treatment. This finding was similar to that of the study conducted in remote areas of Cambodia where the coverage rates of RDTs and ACTs were disappointingly low and the use of AMTs alarmingly high [12]. The government was preparing to ban AMTs (Brand name Artesunate) officially but not yet. The best selling anti-malarial drug in that area was AMTs (Brand name Artesunate). ACTs was largely unknown to the local people at the time of the study. All of them never heard about drug resistance malaria and they could not link the use of AMTs and drug resistance malaria [13, 14]. As drug retailers play a major role in the first and initial response to malaria, refresher course or

education towards them about the link between monotherapy usage and drug resistance should be considered [15].

In Cambodia, the program of village malaria worker was established since 2001 and they could play the same role as the health center [16]. In Myanmar, social malaria workers program was established in 2005 and now, 6100 malaria volunteers were already trained in 2012 [17]. The role of malaria volunteer in improving timely diagnosis and treatment using RDTs and ACTs was found to be beneficial in Myanmar [18]. At this stage, they were trying to cover all villages without health center services and remote areas including gold mines where the migrants were working. But providing early diagnosis and prompt treatment to gold miners were still challenging because they were always migrating and their working sites were always changing [19, 20]. Moreover, the workers serving in the remote gold mine, G2 in this study were mostly Karen ethnic people. On this regard, they were not fully accessible and understandable to currently providing health education and behavioral change communications, all of which were in Myanmar language. The comprehensive health care could not be achieved without culturally competent communication between patients and providers [21]. For the effective health education and behavioral change communication towards Karen ethnic people, bilingual interventions and employment of trained bi-lingual health workers should be encouraged.

Treatment providing behaviors greatly affect the treatment seeking behaviors of the people with malaria [22, 23]. 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 is of paramount importance [24, 25]. Though experienced basic health staffs could explain to the patients about the possibilities and meaning of RDTs results thoroughly, malaria social workers were not confident and trained enough yet to communicate patients especially in the face of negative RDTs results [25, 26]. Provider's knowledge and experience to achieve patient's satisfaction especially in case of negative RDTs result is critical otherwise it may lead to self-treatment with AMTs and a neglect of other dangerous diseases [25, 26, 27]. Moreover, the most concerned issue is the possibility of dissatisfaction and distrust in public health services which will become a major barrier in utilization of public health facilities.

5. STUDY LIMITATIONS

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 AND RECOMMENDATIONS

Limited knowledge and practice of malaria prevention might be social determinants of malaria among gold miners. Self-treatment using AMTs was still common, even after negative RDTs result in the vicinity of health facility. To achieve patients' satisfaction with test-based diagnoses and adherence to public health facility, counseling and health education will be critical in dealing with patients especially RDTs negative ones. Health education towards drug retailers about the link between AMTs usage and artemisinin drug resistance should be considered. 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.

ABBREVIATIONS

AMTs: Artemisinin-based monotherapies; ACTs: Artemisinin-based combination therapies; FGDs: Focus group discussions; KIIs: Key informant interviews; RDTs: Rapid diagnostic tests for malaria; LLINs: Long-lasting insecticide-treated nets; WHO: World Health Organization; VBDC: Vector Borne Diseases Control

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COMPETING INTERESTS

All the authors declare that they have no competing interest.

AUTHURS' CONTRIBUTIONS

Author Z.Z.Y.W, T.M, K.K and I.K designed the study and drafted the manuscript. Author Z.Z.Y.W and I.K managed the analyses of the study. All authors read and approved the final manuscript.

CONSENT

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

ETHICAL APPROVAL

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

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