BEHAVIORS IN SELF-PREVENTION OF MALARIA AMONG MOBILE POPULATION IN EAST THAILAND

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Abstract. The study investigated preventive behaviors among mobile villagers in Chanthaburi and Trat Provinces where the slide positive rates (SPR) of malaria in 1987 were 10.3 and 11.1%, respectively. The study was conducted in four villages namely Wang Thong, Khao Thong in Chanthaburi, and Manow and Khow in Trat by using a cross-sectional survey. Household and in-depth interviews with the movers were done together with field observations. The sizes of the villages were 52, 180, 184 and 209 households and the movement rates were 23.1, 12.2, 37.5 and 28.7%, respectively. The population involved in short term migration was 729 villagers living in 153 households or 23.7% of the total. Malaria prevalence rates in the four villages were 7.5%, 5.9%, 7.3% and 2.2%, respectively. The results indicate that the mobile population had a moderate 40% rating score of knowledge about malaria. Apparently, the rating score of preventive behaviors of the disease appeared to be as small as 20%. After six months of field investigations, 1,083 thick blood smears were collected from the mobile population, there were 657 episodes (60.7%) of malaria that could be categorized with age specific prevalence of 60.3% in 19-29 years, 80.8% in 30-39 years, 54.8% in 40-49 years, 38.6% in 50-59 years and 35.7% in 60 years and over. Villagers aged between 30-39 years with frequent movement into the forest had the highest impact of malaria risk. Moderate levels of knowledge and attitude scores did not appear to enable the people to protect themselves against malaria.

INTRODUCTION

In Thailand, the problem of population movements into potential transmission sites in the forest and forest-fringe areas contributes to active transmission and poses difficulties in implementing control measures.

The rural-to-rural migration rate among villagers in Chanthaburi and Trat Provinces accounts for 10-40% of total. Socioeconomic status is one of the motivations among villagers to seek more income from activities such as gem mining, forest working and hunting (Butraporn *et al*, 1986). The common pattern of periodic movement is hiking across the Thai-Cambodian border to dig gems in Cambodian forests (Butraporn, 1991). Most of the migrant ranging from young to old ages often contract malaria. The knowledge about malaria transmission, symptoms and prevention are quite high. Preventive behaviors such as bringing bed nets, mosquito repellents of migrant workers into the forest are usually not practical. This problem should be solved by intensifying health education and expansion of the malaria prevention program among the high risk population.

Prevention of malaria encompasses a variety of measures that may protect against infection or development of the disease in infected individuals. Preventive measures protecting malaria infection are directed toward mosquito vectors and can be classified as either personal protection, or household protection against infective bites, or transmission control, aimed at reducing risk of malaria to entire communities or population (Dunn, 1983). The efficacy of any preventive measures should be gauged from the incidence of malaria and its effects. A degree of individual and collective protection can be obtained by various means such as protective clothing, herbal or chemical repellents, house screening, using mosquito nets, mosquito coils, and smoke from fire. Our study tried to determine the characteristics of mobile population and individual preventive behaviors among local villagers moving into hyper-endemic areas of malaria in Chanthaburi and Trat provinces, East Thailand.

MATERIALS AND METHODS

Design

A cross-sectional descriptive study (Kleinbaum *et al*, 1982) was designed to investigate the target

dynamic population living in endemic areas of malaria.

Study area and population

There are two provinces located in most eastern part of the country, Chanthaburi and Trat Provinces which are approximately 350 kilometres east of Bangkok. We selected two villages located in Khlung District of Chanthaburi Province, namely Ban Wang Thong and Ban Khao Thong and the other two villages located in Bo Rai District of Trat Province, Ban Manow and Ban Khow, Malaria endemicity in the four study villages was 14.2% in Bo Rai District and 9.9% in Khlung District (MOPH, 1987). Malaria transmission apparently occurs outside villages where there is movement of villagers. There was also strong evidence of population movements into potential transmission foci of malaria on both sides of the Cambodia-Thai border. The travellers were temporary migrants who travelled back and forth between their villages and gem mines. Some might stay in temporary huts in the mines for weeks or months depending on their ability in digging gems and the amount they could carry.

There were 625 households in four villages which could be divided into 52 households in Ban Wang Thong, 180 in Ban Khao Thong, 184 in Ban Manow and 209 in Ban Khow. We visited all houses to ask the families having an experience of temporary movement and we recruited them into this study. The households which never had experience of migration into the forested area at the time or in the future or they might have long term movement (over six months) were excluded from this study. However, all visited villagers were asked to have blood examination for malaria using thick blood smears.

Data collection

Residents in households having movement experience were interviewed using questionnaires which encompassed population characteristics, knowledge, attitudes and practices of malaria prevention, aims of movement, places of destination, period of stay, preventive methods used during stay overnight outside the villages and sleeping bahaviors. Questions were given to the head of each household (in most cases a man) by our trained interviewers in the presence of one of the authors. Each villager who was involved in active movement, was asked to have blood smears every time before and after his/her movement into the high risk areas. Blood smears were done by 2 project staff who resided in the villages. Slides were sent for examination at Tok Prom Malaria Sector in Chanthaburi Province and San Tung Malaria Sector in Trat Province. If a slide was positive, the villager would receive radical treatment from the respective malaria sector.

RESULTS

Malaria prevalence in four study villages

Out of 625 households and 2,101 residents living in the four study villages, the overall malaria positive rate was 5.3% by examination from the thick blood smear. The distribution of prevalaence by villages appears in Fig 1. Ban Wang Thong had the highest rate of 7.5%, Ban Manow 7.3%, Ban Khao Thong 5.9% and Ban Khow the lowest 2.2%. There was significant difference among the prevalence of malaria by the villages ($X^2 = 20.31$, $df = 3$, $p < 0.001$).

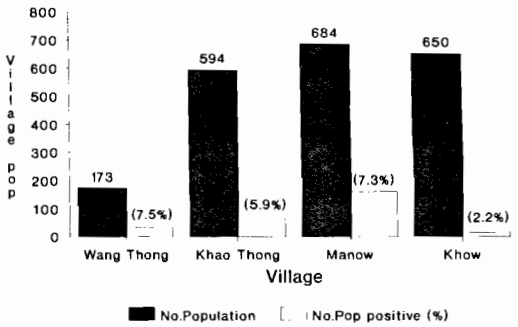


Fig 1–Malaria prevalence rates in the four study villages in east Thailand.

Characteristics of the mobile population

Residents in households who performed a short-term migration and were included into the study had 153 houses with 729 population. There were 12 households from Ban Wang Thong, 20 from Ban Khao Thong, 69 from Ban Manow and 60 from Ban Khow. It was found that there were 23.1% movement rate in Ban Wang Thong, 12.2% in Ban Khao Thong, 37.5% in Ban Manow and 28.7% in Ban Khow (Fig 2). Among the mobile population, the largest age

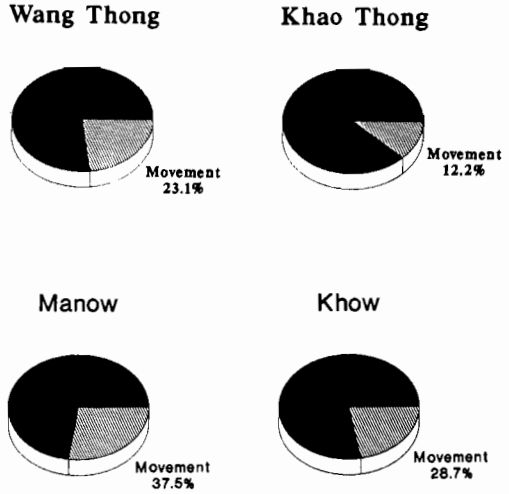


Fig 2–Percents of population migration in the four study villages.

group of 11.8% was 30-39 years. As shown in Table 1, annual family income ranged from 600 to 19,999 baht (34.0%), 20,000 to 49,000 baht (47.7%) and 50,000 to 400,000 baht (18.3%). The main occupation was working in rubber plantations (28.1%), gem mining (15.0%), labor workers (14.4%) and others (42.5%). Other occupation included charcoal making, wood cutting and other forest related works. Most study subjects (84.3%) attained fourth grade schooling and more than 12% did not attend school.

Table 1

Demographic characteristics of the mobile population in the study areas of Chanthaburi and Trat Provinces.

Population characteristics	%
Age groups (years)	
19-29	11.8
30-39	35.3
40-49	27.4
50-59	14.4
60+	11.1
Marital status	
Married	86.2
Single	3.9
Widowed/Separated	9.9
Educational level	
Primary school (4 years)	84.3
Above primary school	3.3
Non attained	12.5
Occupation	
Rubber plantation	28.1
Gem mining	15.0
Labor (daily wages)	14.4
Others (Forest work, wood cutting, charcoal making, etc)	42.5
Annual family income (baht)	
600-19,999	34.0
20,000-49,999	47.7
50,000-400,000	18.3

Knowledge, attitudes and behaviors on malaria

It was discovered that there was no health education program, no specialized malaria services or no particular operation malaria control intervention at the time of this study. From formal interview, inquiry on knowledge level was based on types of mosquito vectors that transmitted malaria, methods of prevention and places for seeking treatments. Significantly, less proportion of respondents knew about malaria, but more than a half of population could seek places for their treatment when getting sick from malaria (Table 2). Another aspects of attitudes toward the disease consistently reported that they had indigenous perception of disease susceptibility, malaria risk places, and its serious symptoms.

Table 3 shows factors concerning living conditions, life styles of mobile population and their practices during the movement. Possession of mosquito nets in the household indicated that the villagers had an average number of 2.1 mosquito nets per family. An average family size was 4.8 persons. Approximately 2-3 persons shared a net at the same time. When travel took place from home for an overnight stay outside the village, only 34.0% could bring their nets with them. In response to queries about their destination, 84.8% reported that they went to work in the forested areas within Thailand but 15.2% went across the country border into Cambodia. It was found that a majority of villagers (68.0%) stayed for less than a week in the forest, 15% less than two and 17% spent more than two weeks. Instead of using mosquito net during the movement, each person brought a sheet of cloth to cover his/her body during sleeping in the field. Other preventive measures being used to protect from insect bites

Table 2

Knowledge, attitudes toward malaria among mobile population in the study sites.

Knowledge and attitudes	%
Knowledge about the vectors of malaria	
Do not know	75.2
Know (Anopheline mosquitos)	24.8
Know how to prevent malaria	
Do not know	60.1
Know (use mosquito nets, apply repellents, spray DDT on house)	39.9
Know the places to treat malaria when sick	
Do not know	49.0
Know (malaria clinics, hospitals, malaria volunteers)	51.0
Attitude towards susceptibility to malaria	
Agree with high susceptible disease	54.9
Disagree due to it's low susceptible	45.1
Attitude towards the movement is malaria risk	
Agree	78.4
Not sure	19.0
Disagree	2.6
Attitude towards the disease is threatening	
Agree	87.6
Disagree	12.4

included mosquito coils, repellents. Very few reported that they made a smoky fire to repel mosquitos.

We assessed the knowledge scores and behavioral scores by summing the knowledge variables and behavioral variables. It was found that knowledge of malaria among this mobile population, those aged 30-39 years had the highest knowledge score of 48%, but in contrast the preventive behavior score was as low as 22% in the same age group. It was observed that the higher the age group, the lower the preventive behavioral scores (Fig 3).

Malaria episodes among the mobile population

There were 1,083 of blood smears from 729 mobile population. They were immediately done after the villagers' return to their villages and included the returned villagers who complained fever

Table 3

Behavioral aspects of movement and self protection against malaria among the mobile population.

Behavioral factors	%
Place of destination when having migration	
Forested area in Thai country side	84.8
Forested area in Cambodia	15.2
Length of stay whereas they migrated	
Less than a week	68.0
Less than two weeks	15.0
More than two weeks	17.0
Sleep under a mosquito net	
Never	66.0
Yes	34.0
Sleep under a blanket	
Never	16.3
Yes	83.7
Use of mosquito repellents	
Never	95.4
Yes	4.6
Use of mosquito coils	
Never	93.5
Yes	6.5
Make a smoking fire	
Never	74.5
Yes	25.5

within two weeks after migration. Fig 4 shows the distribution of malaria episodes among the mobile population: we found that the age group 30-39 years exhibited 80.8% infection. Lower rates occurred in

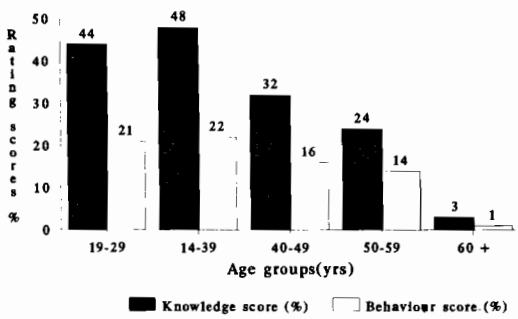
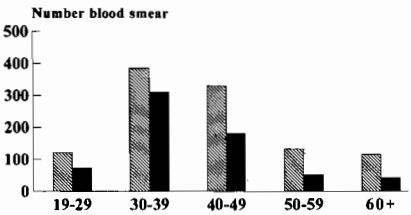


Fig 3–Rating scores of malaria knowledge and preventive behavior among migrant population by age groups.



	19-29	30-39	40-49	50-59	60+
No. slide examed	121	385	330	132	115
No. slide positive	73	311	181	51	41
Percent positive	60.3	80.8	54.8	38.6	35.7

Age groups(Yrs)

No. slide examed ■ No. slide positive

Fig 4–Distribution of malaria episodes by age groups among mobile population in study areas.

those aged 19-29 (60.3%), 40-49 (54.8%), 50-59 (38.6%), 60 and over (35.7%) ($X^2 = 126.95$, df = 4, $p < 0.001$).

DISCUSSION AND SUMMARY

Population movement, particularly short term migration to the forested areas, contributed substantially to the persistence and prevalence of malaria in Chanthaburi and Trat Provinces. This was similar to the situation described in Africa (Prothero, 1961, 1965). The geographical characteristics of the study sites in Chanthaburi and Trat were quite similar to each other in that they are mountainous and covered with tropical rain forest and rubber plantations. The ecology of some areas included gem mines which had been left and had become breeding sites of Anopheline mosquitos. Among the local residents in the study sties, 24.5% of the population were themselves temporary migrants travelling back and forth between the forested area and the villages. Some were fortune seekers travelling across the Thai border into Cambodia to dig for gems. It was found that the majority of these groups of migrants (85%) travelled to work in the forest area within the Thailand boundary; a minority shuttled between Thailand and Cambodia. The proportion of the local residents from the study sites who moved into Cambodia was less than the number we expected. We found the reason was that the local residents here had no skill in digging gems, they preferred to work in their own plantations, such as rubber, fruits and bamboo. On contrary, investigations among gem miners revealed that they were non-resident migrants who moved from the western and northeastern regions of the country. The average frequency of movement was 3.8 times (range 1-36 times) per year. Most of the mobile group were males aged between 19-60 years. The socio-economic status of the migrant population was found to be better than that of the population in other parts of the country on the basis of family income, education attained and household properties. Overall prevalence rates of malaria seem high in Ban Wang Thong (7.5%) and Ban Manow (7.3%). This might be a reflection of high frequency of movement among the people in both villages. Knowledge and attitude levels toward malaria vectors and prevention seemed to be good, although a few questions posed difficulty of response. Rating scores of preventive behaviors were lower in the mobile population. This might relate to an increased exposure to infection or decreased protection or both (Dunn, 1983). High numbers of malaria episodes in the mobile population indicated that males, aged 30-39 years, were at greatest risk and this age group was less compliant to any protective measures against malaria during the time they were based in the forested areas. We thus conclude that the periodic movement is a high risk factor because it exposes people to malaria vectors.

ACKNOWLEDGEMENTS

This study received financial support from the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases. We thank Dr Sanchai Kesrangsee, former Director of Malaria Division, Ministry of Public Health, staff and personnel of Malaria Units in Chanthaburi and Trat Provinces for their supports and assistance. We are also grateful Dr Dwip Kitayaporn for reviewing the manuscript.

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