# BEHAVIOR OF PEOPLE WITH RESPECT TO MALARIA IN ENDEMIC AREAS WITH DIFFERENT LEVELS OF MALARIA TRANSMISSION

Amphorn Ittiravivongs, Suthep Kongrod, Pitak Wuthisen, Supalarp Puang-sa-art, Nipon Thanyavanich and Junya Pattara-arechachai

Department of Tropical Hygiene, Faculty of Tropical Medicine, Mahidol University, 420/6 Rajvithi Road, Bangkok 10400, Thailand.

**Abstract.** The present survey was carried out in two villages of the same malaria endemicity but different levels of transmission in Lamae District, Chumphon Province, southern Thailand with the aim to study whether behavior of people to malaria was similar or not. The total populations in low (village 11) and high (village 13) transmission areas were surveyed twice during low (February 1990) and high (June 1990) transmission periods. All subjects were interviewed by trained interviewers using a structured interview form. Among 410 and 614 people in villages 11 and 13, respectively, it was revealed that during the low transmission period behavior related to chemoprophylaxis and use of bed nets was similar in both villages, whereas risk behavior of night work was significantly higher in village 11 than village 13. This was likely due to their different principal occupations: farming of rubber plantation in village 11 and of coffee plantation in village 13. Concerning pattern of seeking malaria treatment, the malaria clinic and the district hospital were the common places attended by people in both villages. During the second survey in high transmission period, a cohort of 277 in village 11 and 430 in village 13 were available for follow up to study changes in their behavior between low and high transmission seasons. There were significant decrements related to night work and significant increments related to bed net use in both villages.

## INTRODUCTION

Malaria is one of the diseases of major public health importance in Thailand. In 1947 the malaria morbidity rate was approximately 286 per 1,000 population. Following the establishment of the malaria control program in 1951 which included DDT residual spraying and anti-malaria drug treatment of suspected and positive cases, malaria mortality and morbidity was greatly reduced. In the period 1966-1972 the annual parasite incidence (API) in the country stabilized around 2.19 to 3.55 per 1,000 population. However, since then it has been rising to about 6.9 in 1989 (Division of Malaria, 1990). Such continuing morbidity raises a number of problems about both the technical and social aspects of present malaria control measures.

Generally, health education has been an integral part of the malaria control program with the aim of fostering social acceptance of control measures. The activities of health education normally consist of poster displays, distribution of leaflets, public exhibitions and use of mass communication media such as radio, television and newspapers. Despite these activities which have been going on for more than 20 years, it has been reported that people's knowledge of malaria was quite limited. Inadequate consideration of people's attitudes and beliefs concerning the disease and control programs can result in low community participation and acceptance leading to failure of the programs despite their technical soundness (WHO, 1977). In this context a low acceptance rate of DDT house spraying was the most obvious example (Hongvivatana *et al,* 1982).

It was believed that behavior relating to malaria was influenced by socioeconomic factors, culture and disease endemicity. Hongvivatana *et al* (1985) reported that differences in behavior concerning malaria were found among people residing in different malaria endemic areas according to the epidemiological situation: control, consolidation and partial-integration areas. Thus, it is of importance to delineate behavior of people living in the same malaria endemic area but exposed to different transmission levels. The present study sought to

compare behavior relating to malaria between two endemic villages with different levels of malaria transmission.

## MATERIALS AND METHODS

### Study area

Lamae District, Chumphon Province, southern Thailand where the slide positive rate for malaria in 1989 was 14.2% was selected as the study area. The average temperature and relative humidity in Lamae District ranged from 18.1°C to 37.5°C and 31.0% to 99.0%, respectively. The average annual rainfall in the area was 796.8 mm. *Anopheles minimus* is the main vector in the area and *Plasmodium vivax* is the main malaria species. According to epidemiological assessment, Lamae District is classified as a control area in which the main malaria control measure is household DDT residual spraying with a dosage of 2 $g/m^2$, with two rounds a year.

The survey was conducted in village 11 and village 13, Lamae Canton, Lamae District. The annual malaria prevalence rate in 1989 in village 11 was 4.7% with ratio of 2 : 1 for *P. vivax* and *P. falciparum,* while the annual prevalence rate in village 13 was 19.3% with a *P. vivax* and *P. falciparum* ratio of 3 : 1. However the pattern of malaria infection in both villages was similar, with low and high transmission periods in February and June, respectively. The malaria prevalence rates in February and June in village 11 were 3.1% and 11.6% while those in village 13 were 8.7% and 24.5%, respectively. The topography of village 11 was flat and household distribution in the area was rather scattered. Most of area was occupied by rubber plantations. Thus the main occupation in village 11 was labor on these plantations in which people collected rubber sap, particularly during the night, every day throughout the year except on nights when heavy rain water would contaminate the rubber sap. In contrast, village 13 was located in a hilly area where its household distribution was densely clustered. The main occupation was labor on coffee plantations in which harvest activity was mainly during the dry season; the people did not work at night on the plantations.

### Study subjects

Village 11 consisted of 108 households with 482 population, 410 (85%) of whom were available for survey. Village 13 comprised 183 households with 680 persons, 614 (90%) of whom were surveyed.

### Data collection

There were two periods of data collection in the months of low and high transmission periods in each study area. The first survey was conducted in February 1990 which was the low transmission period. The second survey was carried out in June 1990, the high transmission season. The collection was made by house to house visits, with second visits to the houses of absentees. The subjects in the first survey were followed up in second survey. All subjects were interviewed by structured questionnaire in order to collect information concerning behavior of malaria.

### Data analysis

All information from survey were coded and stored in microcomputer by EPI-INFO software (Dean *et al,* 1990). Statistical analysis was by Chi-square with Yates' correction (Mantel and Haenzel, 1959) and McNemar test (McNemar, 1947).

## RESULTS

The response to the disease of people inhabiting a malaria endemic area consisted of 3 components : health behavior, risk behavior and pattern of seeking treatment. Health behavior here was concerned with chemoprophylaxis and use of bed nets, while night work was considered as a risk behavior. Illness behavior or pattern of seeking treatment was related to the places where people sought treatment for malaria.

Comparing the behavior of people living in two villages with differing work patterns, it was found that uses of bed nets and malaria chemoprophylaxis were quite similar and there was no significant difference in health behavior between villages 11 and 13 ($p > 0.05$). Regarding risk behavior, however, 52.0% and 4.0% of people in village 11 and village 13, respectively, worked at night and this difference was statistically significant

(p=0.00001). This difference was occupation based, as people working in rubber planation (village 11) had to collect rubber sap during the night.

It was observed that malaria clinics and district hospitals were the most common places where people in both villages sought malaria treatment (Table 1). A few people went to see traditional healers for malaria treatment or bought drugs for self-medication. In these respects there was no significant difference in illness behavior between villages 11 and 13 (p=0.131).

As it was postulated that behavior of people would change according to circumstance, the present study followed the behavior of malaria among study subjects from low to high transmission seasons. Only 277 and 430 subjects in villages 11 and 13, respectively, were available in both seasons. The same questions concerning both night work and use of bed nets were used to interview these cohorts in both surveys. The first survey was conducted during the low transmission period, the second survey during the high transmission season.

It was found that there was a significant increase of bed net use from 226 (81.6%) in first survey to 253 (91.3%) in second survey (p=0.001) (Table 2). The 145 persons (52.3%) of cohort 277 in village 11 who worked at night during first survey decreased significantly to 44.8% in the second survey (p=0.001). Even though the second survey was conducted during rainy season, the decrement of night work in village 11 was unlikely to be related to the rain *per se* as collection of rubber sap is done throughout the year except on heavy rainy days.

Assessment of changes in behavior with respect to bed net use and night work among the cohort of 430 in village 13 between the first and second surveys showed that 373 (86.7%) used bed nets in the first survey and this proportion significantly

Table 1

Comparison of behavior of people to malaria between village 11 and village 13.

| Variables | Village 11 | | Village 13 | | p |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| **Health behavior** | | | | | |
| chemoprophylaxis | | | | | 0.128 |
| yes | 41 | 10.0 | 82 | 13.3 | |
| no | 369 | 90.0 | 532 | 86.7 | |
| bed net use | | | | | 0.088 |
| regular | 326 | 79.5 | 515 | 83.9 | |
| no/irregular | 84 | 20.5 | 99 | 16.1 | |
| **Risk behavior** | | | | | |
| night work | | | | | 0.00001 |
| yes | 213 | 52.0 | 25 | 4.0 | |
| no | 197 | 48.0 | 589 | 96.0 | |
| **Illness behavior** | | | | | |
| pattern of seeking treatment | | | | | 0.131 |
| malaria clinic | 94 | 48.0 | 165 | 45.7 | |
| health center | 10 | 5.1 | 17 | 4.7 | |
| district hospital | 77 | 39.3 | 166 | 46.0 | |
| others* | 15 | 7.6 | 13 | 3.6 | |

others* : traditional healer and self-medication

Table 2

Changes in behavior regarding use of bed nets and night work between first and second surveys in villages 11 and 13.

| Variables | | Village 11 | | p |
|---|---|---|---|---|
| **Use of bed net** | | | | 0.001 |
| | | First survey | | |
| | | regular | no/irregular | |
| Second survey | regular | 218 | 35 | |
| | no/irregular | 8 | 16 | |
| **Night work** | | | | 0.001 |
| | | First survey | | |
| | | yes | no | |
| Second survey | yes | 116 | 8 | |
| | no | 29 | 124 | |
| **Variables** | | **Village 13** | | **p** |
| **Use of bed nets** | | | | 0.005 |
| | | First survey | | |
| | | regular | no/irregular | |
| Second survey | regular | 354 | 44 | |
| | no/irregular | 19 | 13 | |
| **Night work** | | | | 0.919 |
| | | First survey | | |
| | | yes | no | |
| Second survey | yes | 1 | 12 | |
| | no | 18 | 399 | |

increased during the second survey to 92.6% ($p=0.005$) (Table 2). Among the cohort of 430, 4.4% worked at night during first survey and this was reduced to 3.0% in second survey. However, this reduction was not statistically significant ($p=0.919$).

## DISCUSSION

Three components of behavior in response to exposure to malaria - health behavior, risk behavior and illness behavior - among people residing in endemic areas with different levels of malaria transmission was investigated. Health behavior is defined as the pattern of response relating to health when a person has no specific symptoms : this includes such actions as vaccination, chemoprophylaxis, medical checkups, use of bed nets and prophylactic dentistry (Becker, 1974). Even though the proportions of malaria chemoprophylaxis and bed net use among people in villages with a high transmission level were higher than in a village with a low level of malaria transmission, the use of antimalarial drugs for prophylaxis and of bed nets in these two villages was not statistically different. Because both villages were in an endemic area where people were acquainted with malaria infection their health behavior not surprisingly was similar.

Thus it was noted that a low proportion (10%) using chemoprophylaxis and a high proportion (80%) using bed nets was found in both villages.

This suggested that chemoprophylaxis was less accepted than use of bed nets and might not be a practical malaria control measure, although such a conclusion would require further substantiation.

Risk behavior here refers to the ways in which people are exposed to risk of infection : night work was considered such as risk behavior in the present study. It was noted that village 11, which had a lower malaria transmission, had higher proportion of people working at night than village 13 which had a high transmission rate. This was because the main occupation in village 11 was rubber plantation labor, necessitating work at night for collecting rubber sap from the trees, whereas coffee plantation labor was the main occupation in village 13 and these people did not have to work at night. The higher malaria transmission in village 13 than village 11 was mainly due to environmental factors. Village 13 is located on the hilly area where the environment is favorable for malaria transmission as there was many breeding place for malaria vector. In contrast village 11 is in the plain area where breeding place for malaria vector is limited. Therefore it seemed that risk behavior such as night work would contribute less effect on malaria infection in the latter area than environmental factors.

Illness behavior is defined as any activity undertaken by a person who considers himself ill for the purpose of getting well (Karl and Cobb, 1966). People in the present study were asked their way of seeking treatment when they got malaria infection. It was recorded that most of people in both villages went to malaria clinics and district hospitals regardless the distance. There were a few people who resorted to self-medication or went to see traditional healers for treatment.

The results presented here also confirm the hypothesis that the behavior of people can change according to circumstance. The decrement from a high proportion of night work during the low transmission period to a low proportion during the high transmission period in both villages was an example. The significant increment of bed net use during the high transmission period served as additional evidence.

Thus it was concluded that behavior regarding malaria in terms of health behavior, risk behavior and illness behavior among people living in the two areas of with the same endemicity but different levels of malaria transmission was similar. It was also shown that behavior regarding malaria, especially risk behavior, was dependent both on infection liability and on socioeconomic factors such as occupation.

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