

論文の内容の要旨

論文題目 Association between overnight stay in farming hut and malaria
infection in rural Laos

和 訳 ラオス農村における農地での仮小屋宿泊とマラリア感染
の関連

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Introduction

Researches on malaria risk related to farming activities has so far mainly focused on vector abundance and malaria transmission in areas with irrigation for rice farming. Other areas, particularly behaviors related to farming activities, have received much less attention.

Staying overnight in a farming hut is known to be associated with increased risk of malaria infection. However, none of previous studies reported whether the study population used an insecticide-treated bed net (ITN), which is the principal prevention strategy against malaria infection. Moreover, although previous studies reported that risk of malaria infection was different according to rice-farming type, to our knowledge, no study has conducted in Laos to assess a difference between slash-and-burn farming and paddy farming in terms of malaria infection risk.

The objective of this study was to determine risk factors associated with malaria infection among rice-farmers and their family members in rural southern Laos both in dry and rainy seasons, with particular focus on rice-farming-related factors such as overnight stays at farming huts, type of rice-farming, and distance between village main residences and farming huts.

The hypothesis of this study was that rice-farming-related factors would be associated with an increased risk of malaria infection in rural southern Laos.

Methods

We conducted repeated cross-sectional surveys in the Lamarm district of Sekong province, Laos, once each in March (during the dry season) and August (during the rainy season), 2008. For sampling, we employed two-stage cluster sampling. The first stage was at village level and the second at household level. We randomly selected three out of a total of the ten villages from the catchment area of a health center. Out of a total of 148 households, data were collected from 134 households in the March survey and 135 in the August survey. In both of the surveys, seven households that were not engaged in farming were excluded. In total, data from 127 households with 891 people in the March survey, and 128 households with 919 people in the August survey were analyzed.

Each survey consisted of interviews with household members and blood examinations. Five health workers from local health offices were recruited and trained as surveyors. They made household visits and conducted interviews with household heads. Other household members were encouraged to help the household head to correctly respond to the interview questions. Blood examinations were conducted on the

same days as the interviews. Two laboratory technicians collected a finger prick blood sample from the participants for testing by rapid diagnostic test.

The dependent variable in this study was the infection status of *Plasmodium falciparum*, as measured by rapid diagnostic test (Paracheck Pf®, Orchid Biomedical Laboratories, Goa). Malaria infection was defined by positive test result regardless of clinical symptoms. The independent variables included socio-demographic (sex, age, and number of household members); socio-economic (educational attainment and household wealth categorized by wealth index); bed net-related (net use and number of people sharing one family type net); and rice-farming related (frequency of overnight stays in farming huts in the two weeks, type of rice farming, and distance between village main residence and farming huts). We measured these variables by conducting interviews with household members and observing household assets including radio and motorbike, wall materials of the main house, and bed nets.

We divided the data into farmers and non-farmers and analyzed each sub-group individually, considering possible differences in the degree of exposure to rice-farming-related risk factors between them and differences in biological characteristics between adults and children. Whether people were farmers or not totally depended on the

answers from interviewees. People other than farmers were mostly young children, students, and retired people.

The odds ratio (OR) and 95% confidence interval (CI) of malaria infection status for each independent variable was estimated using hierarchical logistic regression analysis. The hierarchical structure included household level (number of household members, household wealth, rice-farming type, and distance between main residences and huts) and individual level (age, sex, educational attainment, net use, number of people sharing one family type net, and frequency of overnight stays in farming huts).

Sensitivity analysis was done to assess the robustness of results which were generated from complete cases analysis.

Results

The mean number of household members was 7.0 in the March survey and 7.2 in the August survey. With the exception of two houses in the March survey, all of the households owned at least one bed net. The mean number of ITNs per household was 3.5 (441/127) in the March survey, and 4.1 (524/128) in the August survey. In the March survey, 74.8% (95/127) of the households practiced rice paddy farming with or

without slash-and-burn rice farming, compared to 71.9% (92/128) in the August survey. The remainder exclusively practiced slash-and-burn rice farming. In both surveys, the median distance between the permanent residence and the rice paddies or slash-and-burn field was 3.0km.

Adults (15 years or older) accounted for 51.5% of the study population in the March survey and 51.2% in the August survey. Nearly half of the population was female (51.4% in March and 51.2% in August).

Farmers accounted for 45.8% (408/891) of the study population in the March survey and 46.0% (423/919) in the August survey. The percentages of the farmers that were male were 46.6% (190/408) and 47.3% (200/423) in the March and August surveys, respectively. The mean age (standard deviation) of the farmers was 33.5 (13.5) years with the range from 12 to 75 years in the March survey, and 35.0 (14.6) years with the range from 12 to 84 years in the August survey.

In March, 13.7% of participants reported staying overnight in a farming hut at least once in the previous two weeks. The percentage increased to 74.6% in August. Not only farmers but also young children stayed overnight as often as adults. The use of an ITN the preceding night was common both in farming huts (66.3% in March, 95.2% in August), and in main residences (85.8% in March, 92.5% in August).

For blood examinations, 73.4% and 69.7% of the study populations participated in the March and August surveys, respectively. The positive rate of *falciparum* malaria was 15.3% in the March survey and 22.9% in the August survey.

We did not find an association between malaria infection status among farmers and rice-farming-related variables both in March and August surveys. In March survey, however, non-farmers whose households were exclusively involved in slash-and-burn rice farming were more likely to have malaria compared to those whose households were involved in paddy rice farming alone (adjusted OR: 2.67, 95% CI: 1.12-6.36). Additionally, non-farmers whose households were involved both in slash-and-burn rice farming and paddy rice farming were more likely to have malaria compared to those whose households were involved in paddy rice farming alone (adjusted OR: 2.15, 95% CI: 1.04-4.41). However, these results were not consistent with those of sensitivity analyses.

Conclusions

In this study, which was conducted in a malaria endemic area of rural Laos both in the dry and rainy seasons, we did not find an association between malaria infection

status among study population and staying overnight in farming huts and distance between main residence and farming huts, where ITNs were widely used in both seasons. However, we found an association between slash-and-burn rice farming and an increased risk in non-farmers in March survey. Caution is necessary when interpreting these findings because of insufficient sample size and the vulnerability of the findings. This study suggests the need for collaborations between the health and agriculture sectors to address the possible risk of slash-and-burn farming practice for malaria infection in rural Laos.