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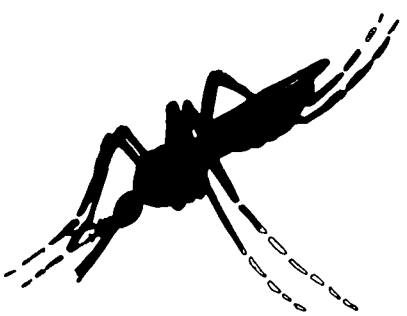

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# EXECUTIVE SUMMARY

1. The present investigation of knowledge, perception and behavior of malaria was based on a questionnaire survey of 1878 households in villages, classified in control, consolidation, and partial-integration phases of the national malaria control programme, of 8 provinces in central Thailand served by the Malaria Region 5. Participation observation and depth interview were also used to supplement the sample survey in regard to people's co-operations with DDT insecticide house spray and illness behavior of malaria.

2. Although small differences were found among people residing in different malarious areas, knowledge of malaria and malaria control was generally low. The areas in which knowledge was markedly inadequate include breeding place and hunting time of anopheles, cause and spread of malaria, and the effect of DDT insecticide house spray. Respondents in endemic control area were better informed about malaria and malaria control than those in consolidation and partial-integration areas. Yet the differences were too small to form good justifications for changes of existing population coverage policy of malaria health education programme which has focused mainly in control area.

3. People residing in control area significantly perceived themselves more susceptible to malaria than those in consolidation and partial-integration areas. This partly implies that people's sensitivity to malaria is conditioned by local disease endemicity. Due to measurement problems, definite conclusions could not be made about perceived severity of malaria. Controlling for malarious areas, perceived susceptibility did not appear to be related to demographic and socio-economic characteristics of individuals. In general perceived efficacy of malaria control measures of chemoprophylaxis, blood-smear examination as diagnostic procedure, and insecticide house spray was high. Validity of this information is however questionable due to the likelihood of the respondents' interactions with the items. On the another hand, about half of the total sample reported side-effects (e.g. nausea, vomiting) of anti-malarial drugs. About a third of the control area respondents perceived negative effects of insecticide house spray.

4. Illness behavior of malaria was found similar to the general pattern of care-seeking behavior of rural villagers the main feature of which is the sequential use of alternative treatment resorts, starting from the more to the less geographically and socially accessible treatment resorts. The majority of

self-suspected malaria patients started with self-medication. However only about half of them deliberately took anti-malarial drugs for self-treatment. The rest were non-deliberate malaria self-medication, taking analgesic medicines either because the initial symptoms were assessed as common cold or simply to relieve the malaria symptoms before visiting the malaria clinic. Only after the initial treatment resort failed to effect the cure, were decisions for choices of alternative treatment resorts taken by the patients and their family/social networks. Alternative treatment resorts for malaria include lay doctors/injectionists, varieties of private clinics/drugstores, and government health establishments including the malaria clinics attached to the malaria zone and sector offices. The popularity of the malaria clinic as the most preferred second treatment resort should be noted. Many factors were found to effect the patients' pathways to the malaria clinic. Of notable importance was the presence of knowledgeable significant others (parents, husband/wife, relatives friends, etc.) who effectively played the role of lay referrers for the malaria clinic.

5. Usage of mosquito nets was widely practiced by residents in endemic control area. However, for villagers of consolidation and partial-integration areas who temporarily moved and briefly stayed mainly to work in endemic control area, as high as 30 percent did not use mosquito nets at all during the entire stays. Among the control area respondents, the habit of sleeping outdoor was not a problem. Malria prophylaxis was practiced only by a small number of the control area respondents. Regarding requests for blood-smears in malaria surveillance activities, the majority were cooperative.

6. About 50 percent of the sample households in control area reported being approached fo insecticide house spray, indicating that the existing insecticide spraying operations did not cover all houses in the socalled control area. Quite consistent with results of the whole region 5, our survey data indicated that the problems of DDT house spraying lay not so much in absolute refusal but in the markedly high rate of incomplete house spray (30%). In fact the high rates of incomplete spray implicating limited people's cooperations have been continuing for a number of years. The absolute refusal rate based on the survey was about 12 percent. The refusers were mostly female and better educated (4 years of education and over).

7. The reasons for refusing or allowing only partial house spray as reported by the respondents mostly had somethings to do with perceived negative effects of insecticides. The highly concerned negative effects include house dirtiness caused by whitish mess of DDT suspensions, rusted roof, side-effects on

health of children and pregnant women. Quite consistently, regression results indicated that perceived negative effect of insecticides was relatively the most important predictor of acceptance of DDT house spray. Another significant predictor was family income The relatively well-to-do households tended to refuse or allow only partial house spray more than the poor did. Men were found to be more cooperative to insecticide house spray than women, though not statistically significant. Education had negative effect on acceptance, though not strong enough to be statistically significant. Perceived vulnerability to malaria increased the likelihood of acceptance; statistical significance was not attained, however. Knowledge of the effect of insecticides or purposes of house spraying played negligible role in inducing acceptance. It was found that poor management and lack of health education in the existing DDT spraying operations as well as some misconducts of spraymen toward the villagers might also contribute to people's limited cooperations.

8. Knowledge about malaria transmission and preventive measures did have significantly independent positive effect on usage of mosquito nets and chemoprophylaxis, and negatively on the habit of sleeping outdoor. Yet they were relatively less important than income, sex, and perception variables. The effect of income was positive for mosquito nets usage, and negative for sleeping outdoor, which partly implied that household economic status improvement may associate with lifestyles positive for avoidance of mosquito contact. Consistently men used mosquito nets less often and slept outdoor more frequently than women, suggesting that they were behaviorally more prone to malaria. As predicted, perceived susceptibility was found to be a strong predictor of prevention-motivated behavior. It was relatively the most important variable predicting the extent of mosquito nets usage during the stays in endemic control area of those who temporarily moved from consolidation and partial-integration areas. In chemoprophylaxis, perceived susceptibility was found to be the second most important explanatory variable. On the contrary, perceived side-effects of anti-malarial drugs significantly discouraged people from chemoprophylaxis.

9. Granted that people's knowledge about malaria and malaria control was in general quite limited, it is recommended that the national malaria control programme strengthen and intensify its health education efforts, particularly in hyper-endemic control area. Aspects of malaria knowledge in need for strong emphasis include cause and spread of malaria, effects of DDT insecticide house spray, breeding places and hunting times of anopheline vector. That health education based mainly on dialogue and other similar methods should be carried out as an integral part of all field operational activities, particularly the DDT insecticide

spraying operations and in the malaria clinics. Granted that men are behaviorally more susceptible to malaria and also potentially effective communicators of malaria knowledge, they should be considered a strategic target population group of health education programme in support of malaria control.

10. Because self-help has been an important feature of treatment behavior of malaria, it is recommended that community participation in malaria control is most likely to be successful in the areas of malaria treatment and/or prophylaxis. If started first, it could form the basis for subsequent extension of community involvement in other control activities. Community participation in malaria treatment/prophylaxis programmes should not be narrowly based on the community health worker approach only. Serious efforts should be made to involve local lay doctors/clinics/drugstores who have been providing socially acceptable care for many illnesses including malaria in the localities.

11. In reviewing research proposals in social and economic aspects of tropical diseases, TDR/SER should work with the potential investigators to ensure that the research questions asked are formulated adequately and relevantly in relation to existing problems and contexts of disease control in the country. Because social and economic research in most tropical diseases is a relatively unexplored area, TDR/SER should encourage the use of case studies method which in many circumstances is more effective than other methods in researching basic facts about the problems as well as generating qualitative types of data to supplement other methods.

12. Recommended further research relating to results of the present project includes: a) action research on community participation in malaria treatment/prophylaxis programme which involves innovative health education activities as an important component; b) evaluative study of existing national health education programme in support of malaria control with a view to strengthen and reorient the programme toward support of control activities at the community level; and c) an extended study of DDT insecticide house spraying operations in the national malaria ontrol programme.

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# CHAPTER I

# STATEMENT OF THE PROBLEM

## 1 THE PROBLEM

Thailand, as other tropical developing countries, has been encountering a resurgence of malaria after the markedly successful national malaria control in the sixties. During 1966-1972 the annual parasite incidence (API) in the country stabilized aroung 2.19 to 3.55 per 1,000 population; however, since then it has been rising to about 11.0 in 1981 (Division of Malaria, 1981). Such continuing resurgence raises a number of difficult questions about both the technical and social adequacies of existing malaria control activities.

Traditionally health education has been an integral part of the national malaria control programme, aiming principally to foster social acceptance of control measures. In most tropical countries where malaria is endemic, it was reported that health education in support of malaria control has been largely ineffective (Gramiccia 1981). In Thailand as well there are reasons to cast doubts on the effectiveness of health education in malaria control. The health education component in the Thai national malaria control programme has been employing the conventional approach of imparting scientific knowledge to the population by means of poster displays, distribution of leaflets, public exhibitions, and mass communication media such as radio and television boardcasting, newspaper coverage. Despite these activities which have been going on for more than two decades of malaria control effort, one recent small study in a central province reported that people's knowledge of malaria was extremely limited (Hongvivatana and Boonmonkol 1980). One of the behavioral evidence of the ineffectiveness of health education is the problem of people's acceptance of DDT insecticide house spray (Pinichponse and Bullner 1967; see also various issues of Warasan Malaria, a journal published by the Division of Malaria, Ministry of Public Health). The non-acceptance problem as such is not crucial if measured in term of absolute refusal rate (about 9-12 percent). It is manifested rather in term of incomplete house surface sprayed which for a number of years has continued to be as high as 35-40 percent of target houses.

The operational phasing design of the Thai national malaria control programme classifies malarious areas into three types

according to epidemiological situations: control, consolidation, and partial-integration areas. Control area is characterized by >1/10,000 incidence rate. Principal control measures are insecticide house spraying, biological control, and other supporting measures as active case detection. Consolidation area has an incidence rate of < 1/10,000. Vector control activities are no longer carried out; control measures are mainly active and passive case detection. Partial-integration area is the locality where malaria transmission is no longer found. Passive case detection is the only control activity available. Supposedly in the area malaria control is partially integrated with government general health services.

Health education activities in malaria control, just like other control activities, have been concentrated in control area. A concern about the appropriateness of scant malaria education activities in consolidation and partial- integration areas was expressed and communicated to the principal investigator by the former Chief of Malaria Region 5.* He made a hypothesis that because of temporary short and long ranged movement of people from consolidation and partial-integration areas to control area principally for employment purpose, malaria education activities should also be equally carried out in the former areas. It was also felt that due to lower prevalence and/or no significant malaria transmission in consolidation and partial-integration areas, the local residents many of whom might be potential migrants to endemic area would be less informed about malaria than the population in control area.

The doubtful effectiveness of health education in the national malaria control programm and the question on area coverage of malaria education activities lead to a more basic question of what people know and perceive about malaria. Literature search revealed however that there was not a single systematic and generalized

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* For implentation of national malaria control programme, the country is divided into 5 regions, each of which being under the charge of a regional malariologist, a doctor of medicine. Each region is further divided into 5-7 zones, and each zone subdivided into sectors. Region 5 serves 22 provinces in central Thailand, with 7 zones and 55 sectors. The sector is the operational level of malaria control programme, performing three major activities: vector control, surveillance, and diagnostic & treatment services.

study on this subject. Though internal evaluation of health education has been continuously undertaken by the Malaria Division, the evaluative criteria are in terms of inputs (e.g. number of leaflets distributed) rather than outputs (knowledge) and/or impacts (behavioral changes). The lack of systematic information to lay the basis for sound health education programme in malaria control does not confine to the area of knowledge and perception. The situation is equally poor with respect to behavior. The problem of people's acceptance of control measures particular the insecticide house spray has been frequently mentioned. Yet to date there is no scientific investigation on these uncooperative attitudes and their underlying causal factors.

Inadequate consideration of people's attitudes and beliefs towards the disease and control programmes leads to low acceptance and community participation which in turn render failure to the programmes despite their technical soundness (WHO 1977). WHO categorically indicated that the existing malaria control programmes and their implementations usually neglect the social aspects of the problem. In the context of Thailand, it is fair to conclude that the control programme in general and the health education component in particular have been implemented without adequate understanding of the receipient population. Specific to malaria education, it is important to acquire adequate information on what people know, perceive, and behave in relation to malaria and the control programme in order to form a basis for more effective health education programme in support of malaria control.

## 2 OBJECTIVE

In light of the stated problem, the present investigation has three general research objectives:

1. To provide baseline data on people's knowledge, perception, and health behavior relating to malaria;

2. To establish possible relationships between behavior relating to malaria and knowledge, perception, as well as incidence rates or types of malarious areas (control, consolidation, and partial-integration areas);

3. On the basis of empirical findings, to recommend appropriate and effective health education program in malaria control.

# 3 CONCEPTUAL FRAMEWORK

The basic conceptual framework adopted for the present investigation is the Health Belief Model with certain modifications to allow possible role played by knowledge in influencing preventive behaviors. A general depiction of the links among knowledge, perception, and preventive behavior based on this conceptual framework is schematically shown in Figure 1.

Knowledge of malaria includes five major aspects relating to the anopheline mosquito vector, cause and spread of malaria, preventive and control measures, signs and symptoms of malaria, and functions of local malaria unit.

Perception is classified into perceived susceptibility, perceived severity of malaria, and perceived benefits and disbenefits of control measures. Perceived susceptibility refers to the individual's subjective risks of contracting a pathogenic condition, while perceived severity is the subjective difficulties the individual believes a given health condition will create for him (Rosenstock 1975). Perceived benefit of preventive actions refers to the likelihood of reducing susceptibility and/or severity of the condition, whereas perceived disbenefit is the negative effects acting as subjective barriers to actions.

Two major aspects of health behavior relating to malaria, preventive and illness behaviors, are considered. Preventive behavior is conceptually distinguished between personal initiated protective behavior (e.g. usage of mosquito nets) and acceptance or participation in control measures as insecticide house spraying, blood-smear taking, and chemoprophylaxis. Attempts to statistically relate knoledge and perception to behavior are made only for preventive behaviors. For illness behavior, a qualitative analysis of decision making process involved in the choices of alternative treatment resort is preferred.

Incidence of malaria is appoximated by malarious areas, acting as area or community variable influencing individuals knowledge and perception. Presumably human sensitivity to a disease manifested in knowledge, perception, and behavior is conditioned by the disease endemicity in the localities where they reside. Previous studies using the Health Belief Model consistently reported that socio-economic variables influence preventive behavior both directly and indirectly through perception and knowledge variables.

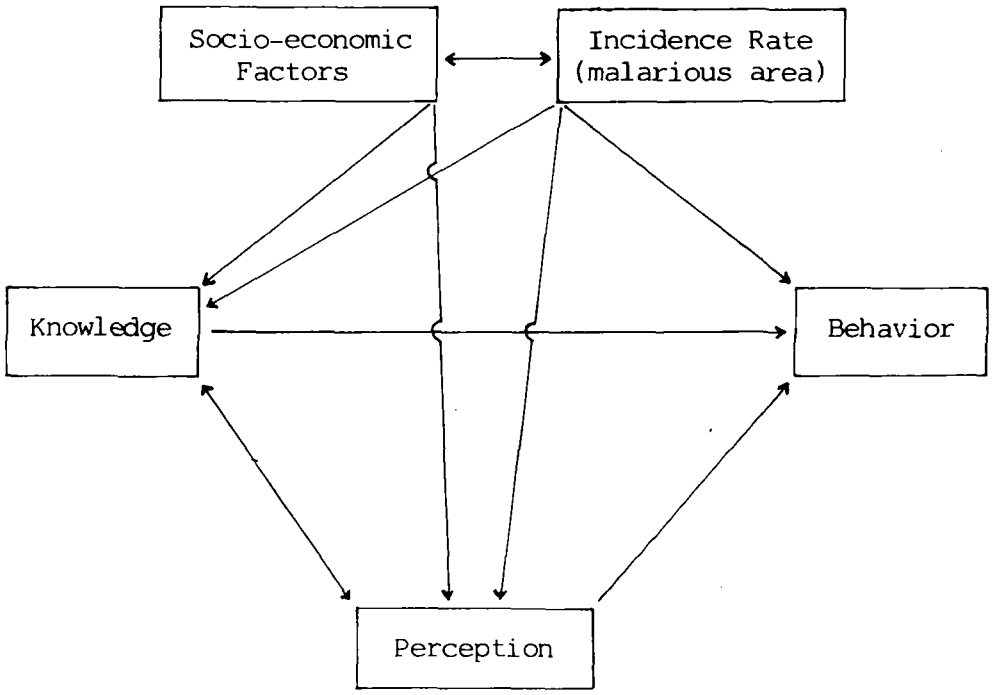


Figure 1. A Conceptual Framework Showing Relationships Between Behavior Relating to Malaria and Knowledge, Perception, and Other Relevant Variables.

## 4 STRUCTURE OF THE REPORT

The research process, particularly the multi-methods of data collection is described in details in chapter 2. Also included in the chapter is description of sampling design and important characteristics of the sample study population in the survey. Limitations of data collected by various methods and difficulties encountered are also discussed. Findings on knowledge and perception of malaria and their assiciations with malarious areas as well as socio-economic factors are separately presented in Chapter 3 and 4. Chapter 5 deals with illness and preventive behavior of malaria. On the basis of regression results, the effects of knowledge, perception, and socio-economic variables on preventive behaviors are discussed. Recommendations are provided in Chapter 6.

# CHAPTER II

# RESEARCH PROCESS

The design of the study was cross-sectional, relying mainly on household sample survey to obtain information relevant to the research objectives. Having in mind possible limitations of standard formal questionnaire survey in obtaining valid data on certain behaviors relating to malaria and the social processes involved, depth interview and participant observation were used to generate qualitative data to supplement the survey data. It was considered that people's cooperation with insecticide house spray and illness behavior of malaria were important areas where maximal and valid information should be gathered. Therefore, to supplement the survey data on these two behavioral aspects, participant observation of insecticide spraying operation in a rural village, and depth interview with patients presenting at 2 peripheral malaria clinics were incorporated in the study.

The chapter was divided into three sections. They discussed designs and field operations in the survey, the participant observation, and the depth interview, respectively.

## 1 HOUSEHOLD SAMPLE SURVEY

The survey aimed to cover a representative sample of households residing in areas classified as control, consolidation, and partial-integration phases of the 22 provinces in central Thailand served by the Malaria Region 5.* The region extends from the mountainous border with Kampujea in the east to the mountainous Burma border in the west. Approximately two-thirds of the area is hilly and forested. The central third incorporates the flat alluvialdelta country aroud Bangkok. Flat coastal strips, of varying width, extent about the Gulf. Under such topographic feature, malaria endemicity is confined mainly to provinces on the mountainous border in the east (e.g. Chon Buri and Chanthaburi) as

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* The present investigation was in fact an extension of an earlier pilot study resported elsewhere (Hongvivatana and Boonmongkol 1980). The pilot study was very much encouraged and supported by the former Chief of Malaria Region 5. This explained why the extended study was confined only to this region.

well as in the west (e.g. Kanchanaburi), and to the provinces bordering the southern part of Thailand (Petchaburi and Prachuap Khiri Khan). The provinces in the central alluvial delta including Bangkok (except Nakhorn Nayok) are mostly now free from malaria.

1.1 Sampling design

Because significant malaria transmission is limited to about 8 provinces of Chon Buri, Rayong, Chanthaburi, Trat, Kanchanaburi, Prachin Buri, Petchaburi, and Pachuap Khiri Khan, selection of sample villages was planned to be made from these provinces only. Due to security reason, however, it was not possible to conduct field operation in Prachin Buri, and hence Nakhorn Nayok was substitued.* The fact that 6 out of the total 7 Zone offices in the region are located in the sample provinces reflects the epidemiological importance of the sample provinces.

The initial plan for selecting study villages was to randomly select a district in a province, and again a subdistrict from the sample district. Within the selected subdistrict, three villages would be selected on the basis of random sampling, representing control, consolidation, and partial integration areas respectively. Subseguently it was learned that this might not be an appropriate sampling design because villages under the same classified malarious area, particularly control area, were highly heterogenous in term of parasite rates and control activities. For instance, there were villages that were almost no longer malaria endemic and insecticide spraying terminated, but still classified as control areas.

It was determined that, instead of straight-forward multistage random sampling, selection of study areas should be based on "problem areas" as justified by high parasite rates and difficulties in implementing control activities. Focusing on problem areas would help enhance the project's contribution to existing malaria control activities in the selected provinces, and improve epidemiological homogeneity among study villages within the same classification of operational phases.

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* API per 1,000 population of the 8 sample provinces and also Prachin Buri in 1980 were as follow: Chon Buri 14.81; Rayong 33.43; Chanthaburi 110.95; Trat 192.68; Kanchanaburi 14.06; Prachin Buri 19.94; Nakhorn Nayok 7.85; Petchaburi 10.08; Prachuap Khiri Khan 11.23.

After consultations with the responsible malaria zone chiefs in the sample provinces, "problem areas" relevant to each of the three malarious areas were defined as follow:

Control area: 1) slide positivity rates (SPR) at subdistrict level equal or higher than 10%; 2) high incidence of malaria and difficulties in conducting control activities; 3) mainly rural setting.

Consolidation area: 1)large number of imported cases of malaria testifying to prevalence of residents' periodic employment-related movement to malaria-infested control areas; 2) mainly rural setting.

Partial-integration area: 1) prevalence of imported cases of malaria; 2) mainly rural setting.

Within each of the 8 selected provinces, a list of subdistricts which satisfy the requirements of control area as specified was made. Out of the list a subdistrict was randomly selected. Further, one village of control status was again randomly selected. If the selected sub-district comprised all the three phases of control operations (control, consolidation, and partial-integration phases), two villages representing consolidation and partial integration status and fulfilling the specified criteria of problem areas were also randomly selected. If not, consolidation and/or partial-integration villages satisfying the criteria of problem areas were randomly selected from nearby subdistricts.

Initially it was planned that about 40 percent of households in each sample village would be selected for study by systematic random sampling. Subsequently in view of negligible epidemiological importance of partial-integration areas, the household sample size in partial-integration villages was deliberately reduced to about 30-35 percent of total households in each village. The 40 percent household samples in control and consolidation villages were retained, however. Selection of households by systematic random sampling was proposed principally because in an earlier pilot study it was found that village mapping routinely prepared by the local malaria sector office was quite accurate to be used as population frame in listing all the households (Hongvivatana and Boonmongkol 1980) Due to various constraints in the field operation to be discussed later on, systematic random sampling could not be entirely practiced.

## 1.2 Field operation

Ten university students were recruited and fully trained as interviewers. They comprised a single interviewing team working under overall control of a senior field supervisor throughout the entire survey. The principal investigator himself occasionally joined the team and assisted in supervising as well as interviewing. The entire survey was planned to take about 60 days, beginning from August 1, 1980. On the average, 7 working days were used for data collection (inclusive of travel time) in three sample villages in each of the eight sample provinces. An interviewer carried out approximately 5-6 interviews a day. Altogether 1878 households were interviewed. Distribution of the sample households by provinces and malarious areas is shown in Table 2.1 below.

The Malaria Region 5 and the local malaria units generously facilitated the field operation by providing transports and field guides. Normally in the sample control villages, the interviewer team was divided into 2 or 3 subgroups, each was aided by a field guide who was a local malaria worker. Frequently during the first day of field operation in any sample control villages, the field guides were rather attentive to the interviewing and were present during the interview. This caused some uneasiness for the interviewers and the respondents in the course of the interview. Yet their interest in the interview faded away quite very soon. In the control villages which were mostly rough forested terranes, and

Table 2.1 Number of Sample Households in Sample Provinces

| Provinces | Sample size | Control | Consolidation | Partial-integration |
|---|---|---|---|---|
| Chon Buri | 272 | 195 | 151 | 26 |
| Rayong | 167 | 107 | 20 | 40 |
| Chanthaburi | 127 | 69 | 26 | 32 |
| Trat | 284 | 95 | 86 | 103 |
| Petchaburi | 255 | 58 | 160 | 37 |
| Prachuap-Khiri Khan | 337 | 156 | 136 | 45 |
| Kanchanaburi | 235 | 102 | 78 | 55 |
| Nakhon Nayok | 201 | 111 | 61 | 29 |
| Total | 1878 | 793 | 718 | 367 |

houses widely distributed, the malaria field guides were of great help in locating sample houses. As a routine practice, field operation, particularly in control and consolidation villages, was planned in close consultation with chiefs of the concerned local malaria units at sector level.

In the beginning of the field operation, systematically random sampling of households for interview was made beforehand on the basis of the malaria village mappings which provided list of malaria house numbers and their locations. Yet it was soon found out that the village mappings were not so accurate as was first expected. Great difficulties were encountered in locating the selected houses. The rough terrane was made even less accessible by rains (the survey months of August and September were rainny and ploughing/planting season). This meant that in many instances the interviewers had to walk very far to reach a selected house. Yet the field operation was further aggravated by the fact that the houses were closed or the adult members were out in the field during the day. Under these circumstances, it was concluded that systematic random sampling based on the malaria village mappings could not be strictly adhered to. In localities where the terrain was not rough and the village mappings were quite accurate, systematic random sampling was retained with the flexibility, however, of allowing for house replacements (in cases when difficult or not possible to get the pre-selected houses). Elsewhere, when consultation with local malaria workers revealed that pre-selection was not possible or too difficult and time-consuming, systematic random sampling was loosely done in the field with the view to cover most sections in a given village.

The interviews were made with household heads or their spouses. The household questionnaire contained 99 items which were mostly structured with close-end responses. It was given final shape after two rounds of pretesting. Most of the interviewers were involved in pretesting. This greatly enhanced their understandings of the survey and the purposes of questionnaire items. Interview manual was also prepared to aid th interviewers. Validity checks of the completed questionnaires were carried out immediately in the field by the senior field supervisor.

With the exception of th items on perception about malaria, it was experentially felt that most of the questionnairs items were successful in eliciting valid responses. For the rural villagers, particularly those in control and consolidation areas, it was found difficult to querry them about chance of getting a malaria. Perceivingly chance was associated with future which was

Table 2.2 Parasite Incidence in Selected Sample Control Area Villages, August-December 1980.

| Provinces (Control villages) | July | | August | | September | | October | | November | | December | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | slides # | SPR % | slides # | SPR % | slides # | SPR % | slides # | SPR % | slides # | SPR % | slides # | SPR % |
| Chon Buri (village # 7, Tabunme subdistrict, Panasnikom district) | NA | NA | 235 | 5.1 | 65 | 6.1 | 305 | 5.6 | 565 | 8.5 | 483 | 8.3 |
| Chanthaburi (village # 6, Chaman subdistrict, Makam district) | NA | - | 19 | 10.5 | NA | - | NA | - | 23 | 13.0 | 120 | 18.3 |
| Trat (village # 6,Dan Chumphol subdistrict, King Bor-rai district) | 188 | 23.4 | NA | - | 12 | 0 | NA | - | NA | - | NA | - |
| Prachuap Khiri Khan (village # 1, Nongplab subdistrict, Huo Hin district) | 162 | 1.8 | NA | - | 235 | 6.8 | 256 | 1.6 | NA | - | NA | - |
| Nakhon Nayok (village # 1, Sariga subdistrict, Muang district | 61 | 3.3 | 189 | 22.7 | 51 | 11.8 | 75 | 6.7 | 202 | 14.3 | NA | - |

Note: Statistics were not available for control villages in Rayong, Petchaburi, and Kanchanaburi provinces. SPR - slide positivity rate.

Source: Division of Malaria, Department of Cummunicable Diseases, Ministry of Public Health.

highly unstable, any things were possible. After identifying the problem (in meetings of interviewers held every two days throughout the entire field operation), instead of reading the questions, the interviewers were asked to be flexible in verbally talking with the respondents to get the most valid responses. Yet this relied on the individuals ingenuities which might vary despite their highly careful training preparation. It was highly questionable that the items intended to measure the respondnets perceived severity were successful in producing valid responses. It seemed that the questionnaires were not based on the knowledge of what people judged about severity of illness or disease. On the whole, the research team thought that a standardized questionnaire survey was less effective in obtaining information about people's perception of malaria or other diseases unless a careful intensive case study was carried out first.

On the whole th research team was convinced about the general validity of responses to the items on knowledge of malaria. However, it was found that direct questioning the helpless rural dwellers about some technical knowledge might inflict uneasiness an embarassment on the respondents, begging th issue of unethical preactice (for more details-see Hongvivatana, 1982).

### 1.3 Characteristics of sample population

Epidemiological data were available only for sample control villages (Table 2.2). Demographic and socio-economic characteristics of the sample control, consolidation, and partial-integration villages as represented by the sample population were shown in Table 2.3. In term of general demographic characteristics there were no significant differences among the three sub-samples, with the exception however that higher proportion of partial-integration respondents were female. Socio-economic differences were more apparent. Although most respondents in all sub- samples had only 4 years compulsory education, higher proportions of control respondents had absolutely no formal education. Obviously th control respondents were poorer than those in consolidation and partial-integration villages. Occupational structures were different too, which implied different economic activities. The control villages were dominated by field crop farmings such as sugarcane, cassava, and maize, while rice farming predominated in consolidation and partial-integration villages. Moreover occupations were more diverse as could be seen by higher proportions in trade and other occupations. The last two items on birth place and years of residence indicated the fact that villages in control area were recent settlement.It also implied continuing movement of people

from consolidation and partial-integration areas into the control area. Since one of th criteria for selecting sample consolidation and partial-integration villages in the study was prevalence of short-term movement of people to control areas, it is necessary to briefly discuss the problem. During the first 8-9 months of 1980, about 40 percent of the total consolidation and partial-integration sample reported ever making over-night trips out of the villages. According to information on the last travel, about 45 percent of these movements were employment related. The duration of stay for employment related movement was markedly longer than the non-employment ones. Approximately 65 percent of the latter had length of stay of 2 days, while the same figure for th former would stay around 7 to 30 days. It was noticeably important that 80 percent of the employment-related trips were made to malarious endemic control area.

Table 2.3 Characteristics of Sample Household Respondents Classified by Malarious Areas

| Characteristics | Whole sample (N=1878) | Control area (N=793) | Consolidation area (N=718) | Partial-integration area (N=367) |
|---|---|---|---|---|
| SEX | | | | |
| - female | 46.9 | 44.6 | 44.6 | 56.1 |
| - male | 53.1 | 55.4 | 55.4 | 43.9 |
| FAMILY STATUS | | | | |
| - head | 61.9 | 62.5 | 64.6 | 55.3 |
| - spouse | 38.1 | 37.5 | 35.4 | 44.7 |
| MARITAL STATUS | | | | |
| - married | 87.7 | 88.6 | 87.5 | 85.8 |
| - widow/divorce/ separate | 8.7 | 8.1 | 10.0 | 8.2 |
| - single | 3.6 | 3.3 | 2.5 | 6.0 |
| FAMILY SIZE (#) | | | | |
| - 1-3 | 20.3 | 22.1 | 15.7 | 18.3 |
| - 4-6 | 51.1 | 52.6 | 49.6 | 51.0 |
| - > 6 | 28.6 | 25.3 | 34.7 | 30.8 |
| AGE (years) | | | | |
| - 15-30 | 23.8 | 29.1 | 19.1 | 21.3 |
| - 31-40 | 25.9 | 25.5 | 28.4 | 21.8 |
| - 41-50 | 28.3 | 28.2 | 28.3 | 29.2 |
| - > 50 | 22.0 | 17.2 | 24.2 | 27.8 |

| | | | | |
|---|---|---|---|---|
| EDUCATION (years) | | | | |
| - none | 13.5 | 17.7 | 11.0 | 9.3 |
| - < 4 | 16.0 | 15.8 | 15.5 | 17.2 |
| - ⩾ 4 | 70.5 | 66.5 | 73.5 | 73.6 |
| ANNUAL FAMILY INCOME (Baht/Baht 20/U.S.$) | | | | |
| - < 10,000 | 13.7 | 14.9 | 15.6 | 7.7 |
| - 10,000-29,999 | 47.8 | 48.8 | 46.6 | 47.8 |
| - 30,000-59,999 | 23.9 | 22.8 | 23.9 | 26.5 |
| - 60,000-89,999 | 7.4 | 7.9 | 6.5 | 7.9 |
| - ⩾ 90,000 | 7.2 | 5.6 | 7.4 | 10.1 |
| OCCUPATION | | | | |
| - rice farmers | 20.6 | 7.0 | 30.2 | 32.4 |
| - tree crops farmers (rubber, fruit trees) | 10.4 | 11.2 | 10.9 | 7.5 |
| - field crops farmers (e.g. suggrcane, tropioca) | 37.2 | 58.4 | 24.5 | 14.0 |
| - agri. labourers | 17.5 | 17.4 | 17.5 | 17.4 |
| - trade | 7.7 | 5.0 | 6.9 | 15.3 |
| - others | 6.7 | 0.9 | 10.0 | 13.4 |
| PLACE OF BIRTH | | | | |
| - local | 36.5 | 14.2 | 47.9 | 62.1 |
| - non-local | 63.5 | 85.8 | 52.1 | 37.9 |
| YEARS OF RESIDENCE (N=1183) | | | | |
| - < 1 | 6.4 | 9.0 | 3.5 | 1.5 |
| - 2-5 | 30.7 | 39.5 | 17.0 | 23.7 |
| - 6-9 | 13.9 | 15.5 | 12.7 | 8.9 |
| - ⩾ 10 | 49.0 | 36.0 | 66.8 | 65.9 |

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2 DEPTH INTERVIEW

In the survey, questions were asked about people's illness behavior when contracting malaria last time during the survey year. Attention was focused on people's stages of seeking care and alternative sources of care for malaria.

The research team recognized that the validity of survey data on illness behavior might be questionable due to recollection errors on the part of the respondents. Therefore, depth interview

of malaria patients at local malaria clinics was carried out in order to supplement the survey data.

Guidelines for depth interview was prepared on the basis of the illness behavior model developed by Igun (1979). Two research workers interviewed sample patients visiting the malaria clinics in Bor Poi district of Kanchanaburi province (about 200 kilometres west of Bangkok) and Graeng district of Rayong province (250 Kilometres east of Bangkok). The interview was tape-recorded without the knowledge of the subject patients, and kept under strict confidential. Altogether 124 case vignettes were collected. After the interview, follow-up of a limited sample of patients at their home were made at least twice, each at an interval of 5-6 days. Detaited description of the research process was provided in Annex 1.

## 3 OBSERVATION OF DDT HOUSE SPRAYING

In the field survey questions were asked about people's acceptance of DDT insecticide house spray at the latest round of DDT spraying (there are usually two rounds of DDT spray in a year). It was decided that in order to obtain more adequate and reliable information about people's cooperation, an observation of the spraying operation should be made.

Participant observation method was used. Two research staff were disguised as spraymen and joined the DDT spraying team of Graeng malaria sector in Rayong Province in its spraying operation for a week in August 1980. The two research workers were given intensive training on what to observe in the spraying operation. They were instructed to observe behavior of both the villagers and the spraymen. Further, they were instructed to strictly keep their disguised status throughout the operation to avoid any suspisions among the spraying team members. For more detailed presentation of the research process, see Annex 2.

# CHAPTER III

# KNOWLEDGE OF MALARIA

The chapter is composed of 2 sections. Section 1 presents findings on knowledge about aspects of malaria which include: 1) the mosquito vector; 2) malaria transmission; 3) control and preventive measures; 4) treatment; and 5) functions of local malaria unit. Differences in the extent of knowledge of the respondents among the three malarious areas and possible intervening effects of demographic and socio-economic variables are also discussed. Summary discussion is attempted in section 2.

## 1 ASPECTS OF MALARIA KNOWLEDGE

Data on the respondents' knowledge of malaria are presented in details with a view to locate the areas where knowledge is inadequate. In addition, the hypothesis that respondents in control, consolidation, and partial-integration areas possess differential levels of knowledge is put into test. Lastly attempts are made to explore whether sex, education, age, and annual family income of the respondents could account for the possible malarious areas difference in knowledge levels. Sex, age, education, and income were selected as control variables simply because in preliminary analysis of the survey data, they appeared to associate with several aspects of malaria knowledge.

### 1.1 The Mosquito Vector

Measurement of knowledge about anopheline mosquitoes is based on four questionnaire items: 1) recognition of anopheles by biting position: 2) breeding sites; 3) feeding times; 4) disease caused by anopheles. Except for the item on feeding times, responses were scored as none (0), low (1), and high (2) knowledge levels. "None" refers to 'don't know' or completely incorrect responses. "Low" includes partially correct answers, and "high" to completely correct answers.

As can be seen from Table 3.1 the aspect which the respondents have the least knowledge is breeding places of anopheline mosquitoes. The majority (72.5%) either had no ideas or identified totally irrelevant places as organically polluted water bodies and other permanant water bodies like ponds as breeding sites. Another 27.5 per cent belonging to the "low" category mentioned mixture of

Table 3.1 Knowledge about Anopheles by Malarious Areas

| Knowledge aspects/ level | Control | Consolidation | Partial-integration |
|---|---|---|---|
| Biting position | | | |
| none | 26.5 | 25.1 | 29.7 |
| low | 39.3 | 40.9 | 36.2 |
| high | 34.2 | 34.0 | 34.1 |
| N = 1874; V = .030; Chi-square = 13.33, P = .50 | | | |
| Breeding places | | | |
| none | 65.5 | 75.9 | 80.9 |
| low | 31.8 | 23.1 | 17.7 |
| high | 2.7 | 1.0 | 1.4 |
| N = 1878; V = .102; Chi-square = 38.99, P = <.001 | | | |
| Disease caused by anopheles | | | |
| none | 14.2 | 18.7 | 21.5 |
| low | 26.7 | 27.7 | 30.5 |
| high | 59.0 | 53.6 | 48.0 |
| N = 1878; V = .065; Chi-square = 15.98, P = <.004 | | | |
| Feeding time | | | |
| incorrect | 45.1 | 42.9 | 47.9 |
| correct | 54.9 | 57.1 | 52.3 |
| N = 1878; V = .035; Chi-square = 2.32, P = .31 | | | |

unlikely breeding places (e.g. canal, domestic water containers as earthen jar) and likely breeding places such as pools of water in discarded utensils as broken coconut shell and broken small jars. Only 1.8 per cent of the total respondents correctly identified slowly-moving streams and other temporary water bodies exposed to sunlight as pools of water in discarded utensils and buffalo's foot-print.*

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* The principal vectors in Thailand are A.balabacensis and A. minimus.

Feeding time of anopheline mosquitoes is another area where no less them half of the respondents have obviously poor knowledge. A. minimus and A. balabacensis, the two major malaria vectors in Thailand, hunt from late evening to dawn; however, these respondents misunderstood that they hunt merely during day time or both day and night time.

The poor knowledge about breeding places and feeding times suggests that the respondents probably were not able to distinguish anopheline from nuance mosquitoes. This is quite consistant with the finding that only about 34 percent of the respondents could correctly recognize the angle-biting position of anopheline mosquitoes, while the rest simply had no idea or provided mixture of correct and incorrect responses.* Although approximately 55 percent of the respondents related anopheline mosquitoes exclusively to malaria, the rest either simply could not tell what disease caused by anopheles (17%) or attributed other mosquito-borne diseases like dengue haemorrhagic fever and filariasis, in addition to malaria, to anopheline mosquitoes (28%).

Malarious areas differences in knowledge of anopheline vector as measured by the four items are not consistently significant. Out of the four items, only knowledge about breeding places and disease caused by anopheles show significant malarious areas differences. Though statistically significant, these relationships are not strong. The pattern is generally that control area respondents had more knowledge than those in consolidation and partial-integration areas in respective order.

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* In the survey, the interviewers showed four pictures depicting horizontal (2) and angle (2) biting positions of mosquitoes, and asked the subjects to identify which ones are anopheles. Only those who selected the two angle biting position pictures and not the others are considered belonging to the "high" knowledge group.

Controlling for sex, age, education, and family income separately, the effects of malarious areas on knowledge of vector breeding places are generally retained, but modified somewhat by age, and income variables.* With respect to age groups, the effect of living in different malarious areas on knowledge is not true for the age group 30-40 years. Within this age group the differences between consolidation and partial-integration areas almost disappear, though small differences still prevail between control and the other two malarious areas. Regarding the results of controlling for family income, the effect of malarious areas can be discerned in groups of annual income less than 60,000 Bahts.** However, for the respondents with annual income 60,000 Bahts and over, living in different malarious areas has no significent effect on knowledge about breeding places.

Controlling separately for sex and age consistently reduces the malarious areas differences in knowledge of disease caused by anopheles to non-significance, although the expected pattern of knowledge difference in the order of control>consolidation>partial-integration is retained. For education, however, the significant relationship between malarious areas and knowledge is retained, except for the none education group. Regarding income-specific malarious area knowledge difference, it is significant only in income group 10,000-29,999 Bahts.

It is fair to say that malarious areas have quite independent effects on knowledge about anopheline mosquitoes breeding places. However the differences in knowledge about disease caused by anopheles appear to be conditioned by sex and age, and also, though to a smaller extent, by income.

1.2 Causation and Spread of Malaria

Etiology and spread of malaria are the only two aspects of malaria transmission being considered. Levels of knowledge about etiology and spread are shown in Table 3.2.

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* The control was by three-ways cross-tabulation. The controlled variables were categoried as follow:sex (male, female); education (none education group, < 4 years, ⩾ 4 years); age (15-30 years, 31-40 years, 41-50 years, > 50 years); annual family income (< 10,000 Bahts, 10,000-29,999 Bahts, 30,000-59,999 Bahts, > 60,000 Bahts).

** At the time of survey, 20 Bahts = 1 US.$.

Regarding malaria etiology, it is striking that as high as 70 percent of the respondents had rather vague notions of malaria causation. Malaria was attributed not only to mosquito bite but also to air, water and personal contact. As shown in Table 3.3 drinking water contaminated with mosquito eggs/larvae, climatic changes, and personal contact as causes of malaria were mentioned by 60, 41, and 48 percent of the respondents respectively. From Table 3.2 only 16.5 percent attributed malaria exclusively to mosquitoes bite, though the proportion specifically identifying anopheline mosquitoes was slightly smaller.

Turning now to knowledge about spread of malaria,It should be noted first of all that the proportion of respondents not aware that malaria can spread was quite high (31%). The fact that about 40 percent recognized mosquitoes as responsible for spread of malaria seems contradictory to the finding that only 16.5 percent attributing mosquito bite as specific cause of malaria. This may be explained partially by the possibility that the terms "cause" and "spread" might be understood differently by the respondents. However data are not available to substantiate this. It is also possible that the difference may result from the questionnaire ifself. For malaria causation, set of items were asked to determine whether the respondents who mentioned mosquito bite also thought about other possible causes. With respect to spread of malaria, such further probing attempt was not made.

Regarding malarious areas differences in knowledge levels, it appears that for both causation and spread of malaria there are no marked differences between control and consolidation areas. Yet it is quite conclusive that the partial-integration respondents are less informed.

The conclusion that the partial-integration respondents were less informed about malaria causation than those in control and consolidation areas was true when education was controlled. However the relationship was modified when sex, age, and income were separately taken into account. For sex, the relationship was true only for female. When controlling for age, the significant malarious areas differences still prevailed in older age groups. As for income, the area differences were found only in the lowest income group (<10,000 Bahts).

Similar to knowledge about malaria causation, the significant malarious area difference in knowledge levels of spread of malaria is ture for female, but not for male. Controlling for education, the area differences were retained only in the education group of

$\geqslant$ 4 years. The relationship between malarious areas and knowledge of spread was weakened when age was controlled; statistical significance was retained only in the youngest age group (15-30 years). Controlling income had similar effect on the area differences, significant effect was retained only in the 10,000-29,999 Bahts income group.

Table 3.2 Knowledge about Cause and Spread of Malaria By Malarious Areas

| Knowledge/Level | Malarious Areas | | |
|---|---|---|---|
| | Control | Consolidation | Partial-integration |
| malaria causation[1/] | | | |
| none | 11.2 | 14.3 | 18.0 |
| low | 72.9 | 67.5 | 67.3 |
| moderate | 3.7 | 5.7 | 5.4 |
| high | 12.2 | 12.4 | 9.3 |
| N = 1878; V = .069 Chi-square = 16.62, P<.02 | | | |
| spread of malaria[2/] | | | |
| none | 28.2 | 30.5 | 39.3 |
| low | 26.0 | 22.5 | 21.3 |
| moderate | 5.1 | 6.1 | 3.8 |
| high | 40.8 | 40.9 | 35.5 |
| N = 1875; V = .066; Chi-square = 17.98, P<.005 | | | |

1/ none = "dont't know" or reporting causes absolutely not associate with mosquito bite; low = mosquito bite and other causes; moderate = mosquito bite but failed to specify anopheles; high = anopheline mosquito bite.

2/ none = don't know/malaria does not spread; low = spread by means other than mosquitoes; moderate = spread by mosquitoes and other means; high = exclusively mosquitoes.

Table 3.3 Percentage of Respondents Reporting Causes of Malaria other than Mosquitoes 1/

| Causes | % (number) |
|---|---|
| Water (mainly drinking water with..... mosquito eggs or larvae and other contaminated water) | 60.0 (1,011) |
| Climate (mainly abrupt climatic..... change and damp forestic air) | 41.5 (700) |
| Personal contact (mainly physical..... contact and sharing personal belongings and utensils) | 47.7 (804) |

1/ N is 1687 excluding "don't know" responses.

## 1.3 Knowledge about Control and Preventive Measures

Malaria control and preventive measures under consideration are residual insecticide house spray, case detection, and chemoprophylaxis.

1.3.1 DDT residual insecticide house spray Two related items were asked about the respondents' knowledge about DDT house spray. The first deals with the ability to associate DDT house spray with malaria control through effect on mosquitoes. The second concerns the effect of residual insecticide spray on the mosquitoes. The respondents' levels of knowledge about these two aspects of residual insecticide are shown in Table 3.4.

That only a small proportion of the respondents were able to associate DDT house spray with malaria control should be noted. As high as 73 percent of the respondents reported that DDT house spray helped prevent troubling mosquito bites but failed to associate this with malaria control. Such limited knowledge was consistent with the findings that as high as 56.4 percent thought insecticide had repellent effect on mosquitoes, and another 10.4 percent assumed that DDT killed mosquitoes by odor effect. Even

among those reporting mosquito-killing effect, the majority thought that the effective duration of DDT was rather short (Table 3.5), contrary to the scientific view that DDT house spray is effective for 4-6 months. If effective duration of 4-6 weeks is considered as approximate correct knowledge, only about 12 percent were well-informed.

The extremely limited knowledge of DDT house spray as malaria control measure applied to the respondents in all three malarious areas. Although the malarious areas differences were found to be significant in both of the items, the relationships were obviously not strong. They were reduced to nonsignificance when sex education, and income were separately controlled.

1.3.2 Detection of Malaria As shown in Table 3.6 the majority were aware of blood-smear taking and examination for malaria detection. The proportion of well-informed respondents in control areas was greater than those in consolidation and partial-integration areas respectively. However when sex was accounted for, the pattern of malarious area differences was true only for female. For each of the three education groups, the significant relationships between malarious areas and knowledge of malaria detection were retained. Yet among the none education respondents, it was those in the consolidation area, rather than the control area, who had the best knowledge. Controlling for age, the significant malarious areas differences were retained in all age groups except in the group age > 50. Differences in family income could not account for varying knowledge levels of respondents in the three malarious areas, except in income group of 30,000-59,999 Bahts.

1.3.3 Chemoprophylaxis A question was asked if the respondents knew anti-malarial drug that could prevent malaria, and, if yes, whether they could identify atleast one correct drug name. As shown in Table 3.7 most respondents recognized the availability of anti-malarial drug but could not specify drug names. Differences in the extent of knowledge about chemoprophylaxis among malarious areas are strongly significant. The fact that a much larger proportion of respondents in control area could identify atleast one correct name of anti-malarial drug testifies to the high epidemiological condition in the control area. Among the anti-malarial drug names mentioned were Quinine, Chloroquine, Fancida, Alrabil, Alalen, Romocin. Fancida was the most popular, being identified by almost 62 percent of the respondents who were aware of chemoprophylaxis.

Table 3.4 Knowledge about Effect of DDT Insecticide House Spray by Malarious Areas

| Knowledge Items/ Levels | Malarious Areas | | |
|---|---|---|---|
| | Control | Consolidation | Partial-Integration |
| Ability to relate DDT house spray to malaria control: | | | |
| able | 29.6 | 27.1 | 22.4 |
| unable | 70.4 | 72.9 | 77.6 |
| N = 1853; V = .06; Chi-square = 6.46, P<.05 | | | |
| Effect of DDT spray on mosquitoes | | | |
| don't know | 23.2 | 21.6 | 24.0 |
| repellent effect | 58.5 | 56.0 | 52.8 |
| kill mosquitoes by odor effect | 8.4 | 12.3 | 11.0 |
| kill mosquitoes by touch of insecticide | 9.9 | 10.1 | 12.1 |
| N = 1855; V = .07; Chi-square = 19.28, P<.05 | | | |

Table 3.5 Reported Effective Duration of DDT House Spray in Killing Mosquitoes, by Malarious Areas.

| Duration | Control | Consolidation | Partial-integration | N (%) |
|---|---|---|---|---|
| one week or less | 54.0 | 56.0 | 59.7 | 192(56.3) |
| 2-4 weeks | 23.4 | 24.8 | 29.2 | 86(25.2) |
| more than 4 weeks | 22.6 | 18.6 | 11.1 | 63(18.5) |

Table 3.6 Awarences of Blood-smear Taking and Examination for Detection of Malaria, by Malarious Areas.

| Level | Control | Consolidation | Partial-integration |
|---|---|---|---|
| yes | 95.3 | 90.9 | 86.4 |
| no | 4.7 | 9.1 | 13.6 |

N = 1877; V = .123; Chi-square = 28.51, P <.001

The overall effects of separately controlling for sex, age, education, and income did not alter the pattern of significant malarious areas differences in knowledge. However it should be noted that for the none education group and the lowest income group (< 10,000 Bahts) the effects of malarious areas were no longer significant.

1.4 Treatment: malaria symptoms and chemotherapy

1.4.1 Symptoms Table 3.8 shows proportions of respondents by malarious areas belonging to knowledge level categories. On the whole the majority of the respondents were well-informed about symptoms of malaria. As high as 74 percent of the respondents knew that malaria manifested in fever attack of cold, hot, and sweating, and other symptoms as nausea, vomiting, joint pain, anemia, etc. The high knowledge of symptoms presumably reflects long experience with the disease and self-treatments of malaria by the respondents and their families. Because malaria is more prevalent in control areas, it is not surprising that the residents are bettered informed about malaria symptoms than those in consolidation and partial-integration areas.

After controlling sex, the strength of relationship between malarious areas and knowledge levels was reduced somewhat in male group, though still significant. For female, the malarious areas differences particularly between the control and the other two malarious areas were more marked

Education is likely to interact with malarious areas in influencing knowledge on malaria symptoms. For the none education

group, there were no significant areas differences. For the < 4 years education group, they were somewhat reduced, nearly passing the .05 critial level. The relationship between malarious areas and knowledge level was clearly retained for the ⩾ 4 years education group.

Table 3.7 Knowledge about Chemoprophylaxis by Malarious Areas.

| Level 1/ | Control | Consolidation | Partial-integration |
|---|---|---|---|
| none | 18.9 | 24.5 | 35.3 |
| low | 63.9 | 69.3 | 60.5 |
| high | 17.2 | 6.2 | 4.1 |

N = 1842; V = .157; Chi-square = 90.85, p < .001

1/ "None" refers to don't know; "low" to aware of chemoprophylaxis but cannot identify anti-malarial drug names; "high" to aware about chemoprophylaxis and able to identify atleast one correct anti-malarial drug name.

The effect of controlling for age was to reduce the malarious areas differences in the proportions of respondents possessing varying knowledge of malaria symptoms. Significant malarious areas difference was retained only in age group 40-50 years. In all age groups, however, the control areas respondents were still the best well-informed.

The effects of controlling income on the malarious areas differences were similar to the situation when age was controlled. The significant relationship between malarious areas and knowledge about symptoms disappeared in all income groups except in group 30,000-59,999 Bahts.

1.4.2 Chemotherapy A question was asked if the respondents knew about drugs that can cure malaria, and if yes, what these drugs were. Those who were aware of the availability of malarial drugs and could correctly identify atleast one drug name

were classified as high knowledge category.

Table 3.8 Knowledge about Malaria Symptoms by Malarious Areas.

| Level 1/ | Control | Consolidation | Partial-integration |
|---|---|---|---|
| none | 1.4 | 4.9 | 4.9 |
| low | 22.1 | 22.2 | 25.8 |
| high | 76.5 | 7.9 | 69.3 |

N = 1872; V = .07, Chi square = 20.08, $p < .001$

1/ "None" refers to don't know responses; "low" to identification of secondary symptoms such as headache, joint pain, nausea, and troubled spleen, but failure to identify typical fever attack; "high" to identification of typical fever attack (cold, hot, sweating--temperature rising with shivers, temperature high (hot) with severe headache) and other complaints as nausea, vomiting, joint pain, anemia, etc.

The results shown in Table 3.9 indicate that almost all of the respondents have some knowledge of malaria chemotherapy. However only a small proportion was able to identify atleast one malarial drug name. Note the conformity of this with knowledge about malaria symptoms reported earlier. Again there were significant malarious areas differences in knowledge possessed by the respondents. A much higher percentage of the control area respondents compared with the consolidation and partial-integration areas respondents knew and could correctly specify malarial drug names. As is the case of knowledge about malaria symptoms, the high knowledge about chemotherapy among control area population reflects higher prevalence of malaria and the practice of self-treatment. The malarial drugs mentioned include: Quinine, Chloroquine, Fansida, Altrabil. Alalen, Romacin, Rasocin, Mosquito

Brand, and Ya-shud Malaria* (packet of malaria drugs). The most popularly known is Quinine, followed by Ya-wbat Npipoqpy Cplwqtpy plt ebs ihupiig ;ohtaust Nhwvaqeh =oplt. The effect of controlling separately for sex, education and family income did not alter the significant relationship between malarious areas and knowledge levels of chemotherapy. The relationship, however, was modified somewhat by age. The malarious areas differences were true for all age groups except the eldest age group (> 50 years) in which the areas differences were no longer significant.

1.5 Functions of Local Malaria Unit.

At the operational level malaria control is under the responsibility of a local malaria unit called the malaria sector. The malaria sector in addition to implementing malaria control field operations also runs a malaria clinic providing diagnostic service, presumptive and radical treatment on ambulatory basis.

To obtain information on the respondents' knowledge of the operations of local malaria unit, questions were asked whether the respondents were aware of the presence of the local malaria unit; what is the best place to go for diagnosis of malaria; and what are the functions/activities of local malaria workers. Responses to the second question were categorized into two groups: malaria sector office/ government hospital where there are microscopic facilities and other places such as health center and private clinics where diagnostic facilities are not available. For activities of local malaria workers, measurement was on the basis of number of activities mentioned by the respondents.

As shown in Table 3.10 there are significant malarious areas differences in awareness of the presence of local malaria unit, and in the knowledge about activities of malaria workers. Consistently smaller proportions of respondents in partial-integration area were well-informed. Regarding awareness of the presence of local malaria unit, it appeared that respondents in consolidation area were better informed than those in control area. Regarding number of reported activities of malaria workers, the pattern

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* According to Wiwat et al (1982) a Ya-shud Malaria is a packet of drugs composed of anti-malarial drugs as chloroquine, mepacrine, primaquine, amodiaquine and other groups of drugs such as analgesics-antipyretics, steroids, vitamins, tranquilizers and antimicrobial agents.

of area differences clearly reflect different phases of malaria control activities. This is reflected in the proportions of respondents reportedly recognizing each of the five major activities as shown in Table 3.11. Local malaria workers are commonly known for blood-smear collection, house visits, and drug distribution. They are less known for treatment service. Regarding DDT insecticide house spraying, it is quite surprising that only about 47 percent of the control area respondents acknowledged this activity. This may reflect the fact of limited coverage of spraying operation in the control areas.

Table 3.9 Knowledge about Chemotherapy by Malarious Areas.

| Level 1/ | Control | Consolidation | Partial-integration |
|---|---|---|---|
| none | 0.9 | 3.1 | 3.0 |
| low | 79.5 | 88.5 | 90.4 |
| high | 19.6 | 8.4 | 6.6 |

N = 1873; V = .132; Chi square = 65.92, $p < .001$

1/ "None" refers to don't know responses, "low" to awareness of chemotherapy but cannot identify anti-malarial drug names; "high" to awareness of chemotherapy and able to identify atleast one correct drug name.

Malarious areas appear to have independent effect on knowledge about the presence of local malaria unit. Controlling separately for sex, age, education, and annual family income, the significant differences among malarious areas were consistantly retained. Regarding the significant area differences in knowledge about avtivities of local malaria workers, they were retained when sex and age were separately controlled. However the area effects were modified a little bit by education and family income variables. Significant area differences were found in all education groups except the < 4-years group. The relationship between malarious areas and knowledge about activities of workers was retained in all income groups except the most well-to-do group (> 60,000 Bahts).

Table 3.10 Knowledge about the Presence of Local Malaria Unit and Operation of Malaria Workers.

| Knowledge items | Control | Consolidation | Partial-integration |
|---|---|---|---|
| Aware of presence of local malaria unit | | | |
| No | 20.8 | 9.6 | 33.0 |
| Yes | 79.2 | 90.4 | 67.0 |
| N = 1878; V = .218; Chi square = 89.70, p < .001 | | | |
| Best place for malaria diagnosis | | | |
| local malaria unit/ government hospital | 85.0 | 87.0 | 84.5 |
| other health facilities without microscopes | 15.0 | 12.7 | 15.5 |
| N = 1878; V = .035; Chi square = 2.32, P = .31 | | | |
| Reported activities (#) of local health workers | | | |
| don't know | 3.9 | 6.1 | 13.7 |
| 1-2 activities | 50.2 | 47.6 | 60.1 |
| 3-5 activities | 45.9 | 46.3 | 26.2 |
| N = 1876; V = .138; Chi square = 71.47, P <.001 | | | |

## 2 SUMMARY DISCUSSION

### 2.1 Areas of Inadequate Knowledge

Table 3.12 derived from data presented in the preceding section, is intended to indicate the areas in which knowledge of malaria is obviously inadequate. This is represented by comparing among knowledge items the proportions of respondents with none or/and low levels of knowledge.

Table 3.11 Percentage of Respondents Reporting Acitivities Performed by Local Malaria Workers, by Malarious Areas.

| Activities | Control | Consolidation | Partial-integration |
|---|---|---|---|
| Blood-smear collection and examination | 77.8 | 66.0 | 56.6 |
| DDT house spraying | 46.8 | 15.5 | 22.1 |
| House visits | 36.1 | 70.4 | 44.8 |
| Drug distribution | 72.5 | 60.9 | 47.5 |
| Treatment | 14.9 | 15.8 | 8.2 |

In general, it could be concluded that knowledge of epidemiology and transmission of malaria is extremely limited. This is reflected in the large proportions of respondents in none and low categories in most knowledge items under the malaria vector and cause and spread of malaria. The limited knowledge about the vector and its behavior reveals the fact that the majority respondents are not able to distinguish anopheles from other mosquitoes, particularly the nuance mosquitoes. That the people are not aware of breeding places of the vector is supposedly a major human constraints in control program using source-reduction measures. Feeding time of anopheles may be epidemiologically important for malaria control; however, it remains to be proved whether ignorance of feeding time have any singificant implications for human personal protective behavior to avoid vector contact. Limited knowledge about biting position and disease caused by anopheline mosquitoes may indicate that people normally could not distinguish different mosquitoes species. Yet it is questionable whether they have any direct implications for individuals' protective and preventive behavior.

Cause and spread of malaria are another two relating areas where the majority of the respondents are obviously poor in knowledge. Only about 16 percent of the respondents could relate malaria exclusively to mosquito bite; the proportion specifically identifying anopheline mosquito bite is even smaller, however. The rest of the respondents either have no idea or possess rather vague notion of etiology, relating malaria to multiple causes including mosquito bite, climatic changes, drinking water with

mosquito eggs/larvae, and personal contact (contagion). Personal communications with senior medical doctors with extensive and long experience in rural health indicate that the notion of drinking water contaminated with mosquito eggs/larvae as cause of malaria has long been held by the rural Thai villagers. It is quite astonishing that after more than two decades of malaria control programme, about 60 percent of the sample respondents still cling to this idea. However, whether this notion is related to the Thai traditional conception of disease etiology is not possible to determine. Climatic changes due to seasons (abrupt) and places (mainly forestic damp weather) as perceived causes of malaria warrant two relating explanations. The fact that in Thailand the peak of malaria transmission usually occurs soon after the onset of the rainy season might form the experiential basis for such natural etiologic conception of disease (Segal et al. 1974 ; Nurge 1958). Secondly climatic change as one of the causes of illnesses, particulary fever, is clearly spelled out in the Thai traditional medicine (Mulholland 1979). One of the local names for malaria in Thailand is khai pa (forest fever). One of the Thai traditional medicine text said "when anyone changes his place of residence, he might get an illness called khai pa" (Mulholland 1979). This means that a person's body may not adjust quickly enough, so that when it clashes with unseasonable or place-specific weather, illness results.

Knowledge of how malaria spread is very much in similar poor rating with malaria etiology. Approximately 52-54 percent of the respondents either did not have the idea at all or mentioned completely irrelevant means of spread (i.e. personal contact).

It is very obvious that the majority of villagers in endemic areas are not aware of DDT residual insecticide house spray as a malaria control measure. The effect of the insecticide on mosquitoes was completely misunderstood by the respondents. Apparently such poor knowledge is a manifestation of inadequate awareness of the epidemiology and transmission of malaria, particularly the inability to distinguish anopheline from nuance mosquitoes.

While the majority of respondents have limited knowledge about malaria epidemiology, transmission and control, they are quite well versed in treatment aspects. They are well-informed about symptoms of malaria, and aware of the availability of antimalarial drugs for both therapeutic and prophylactic purposes, reflecting their long experience with the disease and self-help in drug treatment which will be discussed later. Although the majority are aware of the availability of antimalarial drugs, only

Table 3.12 Percentage of Respondents with None and Low Level of Knowledge of Malarial/

| Knowledge aspects/ items | Control Area (N = 793) level of knowledge 1/ | | | Control and Consolidation (N = 1510) level of knowledge 1/ | | |
|---|---|---|---|---|---|---|
| | none (1) | low (2) | (1+2) | none (1) | low (2) | (1+2) |
| Malaria Vector: | | | | | | |
| biting position | 26.5 | 39.3 | 65.8 | 25.8 | 40.1 | 65.9 |
| breeding places | 65.5 | 31.8 | 9.3 | 70.5 | 27.7 | 98.3 |
| disease caused by anopheles | 14.2 | 26.7 | 40.9 | 16.3 | 27.2 | 43.5 |
| feeding time | 45.1 | N.A. | 45.1 | 44.1 | N.A. | 44.1 |
| Cause and Spread of Malaria: | | | | | | |
| cause | 11.2 | 72.9 | 84.1 | 12.7 | 70.3 | 83.0 |
| spread | 28.2 | 26.0 | 54.2 | 28.5 | 23.7 | 52.2 |
| Control and Preventive Measures: | | | | | | |
| DDT house spray as control measure | 70.4 | N.A. | 70.4 | 71.6 | N.A. | 71.6 |
| effect of DDT spray on mosquitoes | 23.2 | 58.5 | 81.7 | 22.4 | 57.3 | 79.3 |
| blood-smear taking and examination for diagnosis | 4.7 | N.A. | 4.7 | 6.7 | N.A. | 6.7 |
| chemoprophylaxis | 18.9 | 63.9 | 82.8 | 21.6 | 66.5 | 88.1 |
| Treatment: | | | | | | |
| symptoms | 1.4 | 21.1 | 22.5 | 3.0 | 22.2 | 25.2 |
| chemotherapy | 0.9 | 79.5 | 80.4 | 1.9 | 83.8 | 85.7 |
| Operations of Local Malaria Unit: | | | | | | |
| presence of local malaria unit | 20.8 | N.A. | 20.8 | 15.5 | N.A. | 15.5 |
| best place to go for diagnosis | 15.0 | N.A. | 15.0 | 13.9 | N.A. | 13.9 |
| activities of local malaria workers | 3.9 | 50.2 | 54.1 | 5.0 | 48.9 | 53.9 |

1/ Because the Table is intended to show aspects of knowledge which are markedly inadequate, the sample partal-integration area respondents were excluded. The exclusion by no means invalidate our conclusions, however.

few of them are knowledgeable enough to correctly tell atleast one drug name (trade or generic).

That the respondents are relatively well-informed about the presence and operations of the local malaria units may indicate the extensive coverage of malaria field control activities in the past and the present. However this does not mean that all the control activities are understood by the beneficiaries.

2.2 Differences among Malarious Areas

In most of the knowledge items under consideration, the proportions of respondents possessing varying levels of knowledge differ among the three malarious areas--control area, consolidation area, and partial-integration area. The patterns of area differences are summarized in Table 3.13. Consistently the partial-integration area respondents have the least knowledge compared to those in control and consolidation areas. Therefore the discussion here will focus mainly on the differences between control and consolidation areas.

Considering only those knowledge items with significant area differences, control area respondents are apparently better informed about malaria vector, control and preventive measures, symptoms, and chemotherapy. The findings supposedly reflect higher prevalence and transmission of malaria in the control area.

In the aspects of causation and spread of malaria, however, differences in the extent of knowledge between control and consolidation areas could not be discerned. Similarly in the case of knowledge about control activities of local malaria units, the control area respondents did not know better that their counterparts in consolidation area. The latter even knew better about the presence of local malaria unit. Consolidation areas are frequently the areas located near the control area and in which the attack phase of control program had not long been phased out to merely active survellance activities. Moreover, they are in better physical access to the malaria clinic (attached to the office of local malaria unit). These explain why consolidation area respondents are equally or bettered informed about operations of local malaria units than those in control areas. Regarding malaria transmission, knowledge is generally low and inadequate. Residence in highly endemic areas essentially did not enhance knowledge about malaria etiology and transmission.

Despite the statistically significance of malarious area

Table 3.13 Patterns of Malarious Area Differences in Knowledge of Malaria

| Knowledge Items | Patterns1/ | | | |
|---|---|---|---|---|
| | A | B | C | D |
| Knowledge about anopheles: | | | | |
| biting position** | | | x | |
| breeding places* | x | | | |
| disease caused by anopheles* | x | | | |
| feeding times** | | x | | |
| Cause and spread of malaria: | | | | |
| cause of malaria* | | | x | |
| spread of malaria* | | | x | |
| Control and preventive measures: | | | | |
| relating DDT house spray to malaria control* | x | | | |
| effect of DDT house spray on mosquitoes** | | | | x |
| blood-smear taking and exam* | x | | | |
| chemoprophylaxis* | x | | | |
| Symptoms and chemotherapy: | | | | |
| symptoms* | x | | | |
| chemotherapy* | x | | | |
| Local malaria unit operations: | | | | |
| presence of local malaria unit* | | x | | |
| best place for malaria diagnosis** | | x | | |
| reported activities of local malaria workers* | | | x | |

1/ Patterns of differences in knowledge are derived from the preceding section. There are four patterns represented by:

A = control area> consolidation area> partial-integration area;

B = consolidation area> control area> partial-integration area;

C = control area = consolidation area> partial-integration area;

D = control area = consolidation area = partial-integration area.

* The malarious area difference is statistically significant.

** The malarious area difference is not statistically significant.

differences in many knowledge items, the magnitude of differences represented by proportions of respondents in knowledge scales are not, for most items, substantial. Large differences are found only in knowledge about breeding places, chemoprophelaxis, and chemotherapy.

2.3 Ther Role of Demegraphic and Socio-econmic Factors

Table 3.14 shows strenght of associations between sex, education, age, and family annual income with each of the knowledge items. These socio-economic variables significantly associate with most of the knowledge items.

Sex. In all knowledge items, except those in breeding places and effect of DDT house spray on mosquitoes, male was significantly better informed than female. In should be noted that for the two items in which male-female differences were not found significant, the majority of respondents had extremely limited knowledge.

Despite the relationship, sex was found not interfering with the effect of malarious areas on knowledge in items dealing with blood-smear collection, breeding places, chemoprophelaxis, chemotherapy, and knowledge about operations of local malaria unit. The relationship between malarious areas and knowledge was interfered in the items on disease caused by anopheles, cause and spread of malaria, and the relation of DDT house spray to malaria control. For the first three items which may be said to have something to do with malaria transmission, the differential knowledge levels were true only for the female. For the item on the relation of DDT to malaria control, the area difference disappeared when sex was accounted for. Note that this was also an area where most respondents had no knowledge.

Education Education is associated positively and significantly to every aspect of knowledge of malaria execept the items pertaining to knowledge about breeding places of anopheles, feeding time, effect of DDT on the vector, and activities of malaria workers. Note that with exception for the last item, most respondents have obviously poor knowledge in those aspects.

The effect of education was found to be interfering with the relationship between malarious areas and knowledge of malaria. Only the area differences in knowledge about breeding place, cause of malaria, chemotherapy, and presence of local malaria unit were void of education intervening effects. For the rest, however, the effects of malarious areas were conditioned by education levels of

Table 3.14 Bivariate Relationship Between Demographic and Socio-Economic Factors and Knowledge of Malaria, as Shown by the Size of Chi-square (N = 1878)

| Knowledge items | Demographic and Socio-economic Factors | | | |
|---|---|---|---|---|
| | Sex | Education | Age | Income |
| Vector: | | | | |
| biting position | 55.75* | 46.15* | 23.26 | 12.05 |
| breeding places | 2.31 | 6.77 | 1.96 | 7.25 |
| disease caused by anopheles | 27.57* | 11.25*** | 10.43 | 2.70 |
| feeding time | 7.48** | 2.35 | 4.01 | 1.94 |
| Cause and Spread: | | | | |
| cause | 49.16* | 22.25* | 19.18*** | 4.20 |
| spread | 56.17* | 49.77* | 32.02* | 34.73* |
| Control & Preventive Measures: | | | | |
| DDT house spray as control measure | 11.00* | 10.56** | 4.79 | 3.66 |
| effect of DDT spray on mosquitoes | 8.11 | 12.91 | 19.56 | 9.81 |
| blood-smear taking | 4.30*** | 11.43** | 8.39*** | 6.13 |
| chemoprophylaxis | 26.59* | 12.61** | 20.64** | 7.86 |
| Treatment: | | | | |
| symptoms | 10.34** | 6.69 | 4.38 | 14.26*** |
| chemotherapy | 13.32* | 8.36 | 9.62 | 0.9 |
| Operations of Local Mal. Unit: | | | | |
| presence of local mal. unit | 14.42* | 9.54** | 9.42** | 2.49 |
| best place for diagnosis | 8.02*** | 15.79** | 1.76 | 4.30 |
| activities of malaria workers | 25.96* | 11.66 | 9.04 | 5.92 |

* significant at .001 level; ** significant at .01 level;

*** significant at .05 level.

the respondents. In most instances, the effects of malarious areas on knowledge did not apply to the less educated respondents particularly the no-education group. The area differences in knowledge of malaria were significant mostly for the more educated (4 years and more). The findings here are quite reasonable. The uneducated people generally have the least knowledge of malaria regardless of where they live.

Age On the basis of .05 critical level, age was found relating to six knowledge items of biting position, cause and spread of malaria, blood-smear collection, chemoprophylaxis, and presence of local malaria unit. The relationship between age and levels of knowledge appeared like an inverted U-shaped curve with the two age groups of 31-40 and 41-50 years sharing the highest knowledge level. The oldest group (over 50 years) was the poorest of all. However, the magnitude of age groups' differences in term of proportions with varying levels of knowledge were not so large.

Among the knowledge items of which malarious area differences were found significant, only the differences in chemoprophelaxis, presence of local malaria unit, and activities of malaria workers were not effected by the control of age. The others were more or less effected. The malarious area differences in items dealing with disease caused by anopheles, spread of malaria, DDT in relation to malaria control, and malaria symptoms, disappeared or nearly disappeared when age was controlled. For the rest of items, the significant area differences were retained only in one or two age groups. Yet systematic variation of age groups could not be discerned.

Family income Family annual income was not found to be associated significantly with any knowledge items except the item on spread of malaria. The higher the income level, the better the respondents were informed about how malaria spread. Controlling for income, however, generally effected the relationship between malarious areas and knowledge levels. For most knowledge items, the significant area differences in knowledge were retained in only some income groups. Nevertheless systematic patterns of groups with and without significant area differences in knowledge could not be discerned.

The discussion on the roles played by malarious areas and socio-demographic variables influencing knowledge of malaria reveals two major patterns. First, the effects of malarious areas are relatively independent from the influences of socio-economic variables. This is applicable only to knowledge about breeding

places, chemoprophylaxis, chemotherapy, presence of local malaria unit and activities of local malaria workers. Note that for the first three knowledge items, the area differences are strongly significant with the predicted pattern of control area respondents performing better than those in consolidation and partial-integration areas in respective order. It is very likely that the differences in knowledge of breeding places of vectors, chemoprophylaxis, and chemotherapy reflects the differential prevalence of malaria in three areas. By contrast, the consolidation area respondents are bettered informed about the presence of local malaria unit which also operate a malaria clinic. This again reflects the situational condition that the malaria units are mostly located in subdistrict or district towns which are epidemiologically classified either as consolidation or partial-integration area.

Sex, education, and age are significantly related to most knowledge items under the investigation, including those with significant malarious area differences. The relationships between malarious areas and knowledge items appear to be conditioned by sex, education, and age. These variables are clearly conditioning the effects of malarious areas in knowledge about causes and spread of malaria, DDT house spraying for malaria control, and malaria symptoms. In these aspects of knowledge, differences in degree of knowledge acquired through residences in areas with varying malaria prevalence and associated control activities are true only for the female and those with some formal education. It is likely that because of their behaviors (i.e. short-range and temporay movement), males are more susceptible to malaria, and hence tend to be more knowledgeable about the disease than women. As a matter of fact, previous studies indicated that malaria incidence rate was higher for the male (Segal et al 1974; Kanjanapan et al 1981). As for the uneducated group, it is quite reasonable that residence in endemic area did not enhance their knowledge at all. As for age, its conditioning effects on the associations between malarious areas and the knowledge items under consideration, do not show definite pattern.

# Chapter IV

# PERCEPTION OF MALARIA

Perceptions of malaria were specified on the basis of the Health Belief Model. Accordingly this chapter deals with perceived susceptibility to malaria, perceived seriousness of malaria, perceived efficacy of control measures, and perceived negative effects of control measures. In addition, another perception scale dealing with eradicability and controllability of malaria is included. It would seem a reasonable hypothesis that groups which perceive malaria as not controlable would be less inclined to accept or participate in control measures (Jenkins and Zyzanski 1968). Data for these five perception variables were gathered through use of 14 multiple choice questions. Each item contains three choices which are coded as none (0), low (1), and high (2). Perceptions of malaria are analyzed in relation to malarious areas, demographic and socioeconomic factors.

## 1 PERCEIVED SUSCEPTIBILITY

Perceived susceptibility to malaria was assessed through four item composite index (Have you ever (how often) talked about malaria?; To what extent do you feel concerned about getting malaria?; How big is your chance of getting a malaria?; If you have fever and headache, do you think you may be getting a malaria?). The index is based on inter-correlation coefficients of the four items, ranging from .2007 to .5456. The relationship of perceived susceptibility index to malarious areas is shown in Table 4.1. The relationship is very strong. While about 46 percent of the respondents in control area have high level of perceived susceptibility, only 25 and 11 percent of respondents in consolidation and partial-integration areas respectively are in this category. Other studies on preventive services utilization employing the Health Belief Model found association between perceived vulnerability and demographic and socioeconomic variables (Kirscht et al 1966; O'Shea and Gray 1968). It is found in the present study that sex, age, and income are negatively related to level of perceived susceptibility. Though the associations are statistically significant, they are not very strong compared to the malarious area differences (see Table 4.2).

The strongly significant malarious area difference in perceived susceptibility to malaria probably implies sensitivity to

the disease which positively varies with disease prevalences in the localities where people reside (WHO 1979). The area difference in perceived susceptibility is clearly free from confounding effects of demographic and socioeconomic variables as shown in Table 4.3. On the contrary, the associations between perceived vulnerability and demographic-socioeconomic variables appear to be conditioned by the areas' malaria prevalence. Among the control area respondents, the effects of demographic-socioeconomic factors on perceived susceptibility disappear. The effects of age and income are significant only in consolidation area, whereas significant sex difference is retained only in partial-integration area.

Table 4.1 Perceived Susceptibility by Malarious Areas

| Perceived susceptibility | Control | Consolidation | Partial |
|---|---|---|---|
| Low | 22.1 | 41.5 | 59.0 |
| Moderate | 32.1 | 33.5 | 29.9 |
| High | 45.8 | 25.0 | 11.1 |

N = 1849; V = .238; Chi square = 209.46, p = .0000

Table 4.2 Associations between Perceived Susceptibility and Demographic and Socioeconomic Factors

| Demographic/Socio-economic Factors | Perceived Susceptibility | | |
|---|---|---|---|
| | Low | Moderate | High |
| SEX | | | |
| male | 33.3 | 35.1 | 31.6 |
| female | 40.5 | 29.1 | 30.6 |
| (N = 1849; V = .081; Chi square = 12.09, P<.01) | | | |
| EDUCATION | | | |
| none | 38.3 | 25.6 | 35.6 |
| less than 4 yrs | 39.2 | 31.1 | 29.7 |
| 4 yrs and over | 35.6 | 33.8 | 30.6 |
| (N = 1847; V = .045; Chi square = 7.69, P =.10) | | | |

| | | | |
|---|---|---|---|
| AGE | | | |
| 15-30 yrs | 33.0 | 32.6 | 34.4 |
| 31-40 yrs | 32.3 | 35.4 | 32.3 |
| 41-50 yrs | 36.6 | 30.7 | 32.8 |
| over 50 yrs | 46.0 | 30.1 | 23.9 |
| (N = 1849; V =.082; Chi square = 25.14, P<.001) | | | |
| INCOME | | | |
| less than 10,000 Bhts | 29.4 | 28.2 | 42.5 |
| 10,000-29,999 Bhts | 35.2 | 34.1 | 30.7 |
| 30,000-59,999 Bhts | 40.7 | 30.4 | 28.8 |
| 60,000 Bhts and over | 42.0 | 33.5 | 24.5 |
| (N = 1837; V =.084; Chi square = 26.09, P<.001) | | | |

Table 4.3 Associations Between Perceived Susceptibility and Malarious Areas Controlling for Demographic and Socioeconomic Factors

| Demographic and socioeconomic factors | Cramer's V | Chi square (P) |
|---|---|---|
| SEX | | |
| male | 0.224 | 98.96 (.0000) |
| female | 0.250 | 108.72 (.0000) |
| EDUCATION | | |
| none | 0.191 | 18.24 (.0011) |
| less than 4 yrs | 0.236 | 32.96 (.0000) |
| 4 yrs and more | 0.251 | 163.85 (.0000) |
| AGE | | |
| 15-30 yrs | 0.267 | 62.81 (.0000) |
| 31-40 yrs | 0.227 | 49.72 (.0000) |
| 41-50 yrs | 0.266 | 74.41 (.0000) |
| over 50 yrs | 0.203 | 33.08 (.0000) |
| INCOME | | |
| less than 10,000 Bhts | 0.241 | 29.18 (.0000) |
| 10,000-29,999 Bhts | 0.224 | 88.11 (.0000) |
| 30,000-59,999 Bhts | 0.271 | 64.35 (.0000) |
| 60,000 Bhts and over | 0.241 | 31.15 (.0000) |

2 PERCEIVED SERIOUSNESS

Four questionnaire items were intended to measure perception of seriousness of malaria. They are : how is the chance of malaria causing death?; do you think malaria is a severe disease? ; being sick from malaria, to what extent it reduce working ability of the sick?; do you think self-medication can effect the cure of malaria? Quite contrary to the expected results, inter-items correlations are extremely low. In a previous study (Hongvivatana and Boonmongkok 1980) using similar question items, intercorrelation between the first two items was found to be quite high (r = .24). In light of low items correlation, composite scaling of perceived serverity is not attempted.

Although most studies using the Health Belief Model defined perceived severity in term of difficulties the individual believes a given health condition will create for him, measurement of the concept, particularly the questions used, varied from study to study (Rosenstock 1974). With the exception of the direct question on severity (item 2) which may be too broad covering unknowingly varying aspects of disease severity in the responses, the other three items clearly reflect aspects of difficulties a malaria may have on the individual's life. Yet the intercorrelation coefficients among the three items are generally low ($r<.05$). The measurement difficulties of perceived seriousness encountered in the present study is consistent with one observation made in previous studies that data on perceived seriousness are not as clear-cut as those on perceived susceptibility (Rosenstock, Derryberry, Carriger 1959). The measurement problem is supposedly more acute in the case of malaria due to the complex and varied clinical symptoms depending on the kinds of parasites one is getting.

Granted that perceived severity index is not possible, responses to individual items are shown in Table 4.4. Inconclusive results due probably to questionable validity of data appear in the responses to individual items. If only the last three items are considered, it may be concluded that the majority of respondents thought of malaria as highly severe. However this is incongruent with results from item 1 in which 72.5 percent indicated absolutely no chance or small chance of malaria causing death. Turning now to differences among the three malarious areas. Responses to the question on chance of malaria leading to death and a more direct querying on disease severity indicate that significantly larger proportions of respondents in control area report higher level of perceived seriousness. Yet the relationship is

reversed when perceived severity is indicated by effect of malaria on working ability and the perceived self-limited nature of malaria (effectiveness of self-medication for cure of malaria). There is a possibility that the relatively lower proportions of control area respondents reporting high disability effect of malaria and ineffectiveness of self-medication may reflect malaria endemicity and depressed socioeconomic status of the areas which shape the people's physical tolerance to the disease and the practical way to cope with it (Gramiccia 1981). However this remains to be empirically tested, particularly the aspects pertaining to individual's and household's work adjustment and illness responses to malaria. On the other hand, the query on chance of death and the direct question of perceived severity might elicit emotional arousal created by the thought of the disease rather than the actual repercussions on life, which lead to high perceived seriousness among the respondents in control area where malaria is more prevalent.

Note that though statistically significant, the relationships between individual severity perception items and malarious areas are not so strong, especially when compared with that of perceived susceptibility. With the exception of income, other demographic and socioeconomic variables are not significantly associated with severity perception items (see Table 4.5). Income is found to have significant negative effect on perception of seriousness as measured by chance of death from malaria and effect on work ability. Despite these apparently weak relationships with severity perception items, the demographic and socioeconomic characteristics of respondents tend to have conditioning effects on the associations between perception items and malarious areas (Table 4.6).

## 3 PERCEIVED CONTROLLABILITY AND ERADICABILITY

Although data were obtained on both perceived controllability and eradicability of malaria, essentially the focus is on the former. The results in Table 4.7 indicate that the respondents are practical enough to think that control of malaria is possible, but eradication is questionable. Whereas 92.3 percent think it could be reduced, only 41 percent think it could be eradicated. Consistently in both perceived controllability and eradicability more of the consolidation respondents are on the positive side. That smaller proportions of respondents in control area thought malaria could be controlled and eradicated may be attributable to the endemicity of the disease in the areas.

Table 4.4 Perceived Severity of Malaria by Malarious Areas

| Perceived severity items | Control | Consolidation | Partial-integration |
|---|---|---|---|
| How is the chance of malaria causing death? | | | |
| absolutely no chance | 1.0 | 1.5 | 2.5 |
| small chance | 66.8 | 71.0 | 80.0 |
| big chance | 32.2 | 27.5 | 17.5 |
| (N = 1864; V = .089; Chi square = 29.31; P = .0000) | | | |
| Do you think malaria is a severe disease? | | | |
| no, not severe | 2.5 | 4.3 | 7.2 |
| undecided/uncertain | 0.8 | 0.4 | 1.7 |
| yes, severe | 96.7 | 95.2 | 91.1 |
| (N = 1867; V = .070; Chi square = 18.57, P = .001) | | | |
| Being sick from malaria, to what extent it reduce working ability of the sick? | | | |
| small extent | 5.3 | 8.1 | 6.9 |
| large extent | 38.8 | 34.2 | 29.2 |
| can not work at all | 55.9 | 57.6 | 63.9 |
| (N = 1860; V = .061; Chi square = 13.89, P = .008) | | | |
| Do you think self-medication can effect the cure of malaria? | | | |
| yes | 20.2 | 13.1 | 8.6 |
| undecided/uncertain | 7.9 | 5.2 | 6.3 |
| no | 71.9 | 81.7 | 85.1 |
| (N = 1862; V = .100; Chi square = 37.30, P = .0000) | | | |

Table 4.5 Relationships between Perceived Severity Items and Demographic and Socioeconomic Factors.

| Perception Items | Chi square (P) | | | |
|---|---|---|---|---|
| | Sex | Education | Age | Income |
| How is the chance of malaria causing death? | 3.37(.185) | 5.26(.261) | 3.55(.730) | 27.50(.0001) |
| Do you think malaria is a severe disease? | 2.82(.244) | 5.78(.216) | 7.28(.296) | 11.37(.077) |
| Being sick from malaria, to what extent it reduce working ability of the sick? | 2.92(.232) | 8.83(.065) | 12.71(.048) | 19.40(.003) |
| Do you think self-medication can effect the cure of malaria? | 19.00(.0001) | 4.97(.290) | 6.69(.350) | 5.32(.503) |

Perception of controlability is found to be significantly related to education. The more education ones have, the more ones perceive malaria could be controlled. Significantly age is positively correlated with perceived eradicability. However, income has significantly negative effect on perceived eradicability. When

Table 4.6 Associations (Chi square, P) between Perceived Severity Items and Malarious Areas, Controlling for Demographic and Socioeconomic Factors.

| Demographic / socio-economic | Perceived severity items | | | |
|---|---|---|---|---|
| | DEATH | SEVERE | WORK | SELF-MED |
| SEX | | | | |
| male | 7.74(>.10) | 7.90(>.05) | 14.59(<.01) | 17.37(<.01) |
| female | 25.75(<.001) | 15.78(<.01) | 4.19(>.35) | 19.91(<.001) |
| EDUCATION | | | | |
| none | 3.11(>.50) | 2.63(>.25) | 3.81(>.40) | 4.32(>.35) |
| <4 yrs. | 7.88(>.05) | 5.27(>.25) | 6.70(>.15) | 9.36(>.05) |
| ≥4 yrs. | 26.11(<.001) | 15.19(<.01) | 10.36(<.05) | 29.86(<.001) |
| AGE | | | | |
| 15-30 | 16.33(<.01) | 18.03(<.01) | 10.70(<.05) | 18.22(<.01) |
| 31-40 | 7.33(>.10) | 2.44(>.60) | 8.79(>.05) | 11.21(<.05) |
| 41-50 | 12.98(<.05) | 7.35(>.10) | 2.33(>.65) | 15.76(<.01) |
| >50 | 5.30(>.25) | 11.91(<.05) | 5.23(>.25) | 10.32(<.05) |
| INCOME | | | | |
| <10,000 | 4.04(>.35) | .08(>.95) | 10.78(<.05) | 4.06(>.35) |
| 10,000-29,999 | 14.32(<.01) | 8.36(>.05) | 17.49(<.01) | 30.18(<.001) |
| 30,000-59,999 | 6.82(>.10) | 7.97(>.05) | 1.41(>.80) | 17.66(<.01) |
| ≥60,000 | 11.72(<.05) | 3.66(>.45) | 5.07(>.25) | 4.67(>.30) |

control for malarious areas, the effect of education on perceived controllability is significant only for control area (Cramer's V = .08, Chi square = 11.13, P<.05). The same is true for the effect of income on perceived eradicability (Cramer's V = .146, Chi square = 32.99, P<.001). The positive association between perceived eradicability and age is not true for control area.

## 4 PERCEIVED BENEFITS AND BARRIERS

Perception of benefits and barriers of malaria control measures hereby covers only anti-malarial drug for prophylactic pur-

pose, blood-smear examination, and DDT insecticide house spray. Perceived benefits are assessed in term of effectiveness of control measures. Perceived barriers were conceptually equated with possible side-effects or negative effects of control measures. Except for insecticide house spray, direct multiple choice questions were used to obtain respondents' views on effectiveness and negative effects of control measures (i.e. Do you think anti-malarial drug can prevent malaria?). Perceived barriers of DDT insecticide house spray were assessed rather indirectly by the question "Do you like residual insecticide spray of your house?". Verbally this may appear incomparable with other question items. However, since reasons for dislike of insecticide house spray were expressed consistently in term of perceived negative effects of insecticides, it could be treated as equivalent to responses to direct query about negative effects.

Table 4.7 Perceived Controllability and Eradicability of Malaria by Malarious Areas

| Controllability/ Eradicability | Control | Consolidation | Partial-integration |
|---|---|---|---|
| CONTROL: Do you think human is able to reduce malaria transmission? | | | |
| no | 5.6 | 4.1 | 5.3 |
| undecided/uncertain | 3.8 | 1.7 | 2.2 |
| yes | 90.5 | 94.2 | 92.5 |
| (N = 1849; V = .05; Chi square = 9.25, P = .055) | | | |
| ERADICATION: Do you think human can eradicate malaria? | | | |
| no | 54.3 | 48.2 | 59.4 |
| undecided/uncertain | 6.3 | 5.4 | 5.9 |
| yes | 39.4 | 46.5 | 34.7 |
| (N = 1846; V = .065; Chi square = 15.62, P = .0036) | | | |

The respondents' perception of benefits and barriers of the three malaria control measures are shown in Table 4.8. Perceivingly almost all of the respondents regardless of malarious areas are unconditioningly favorable to blood-smear examination as diagnostic procedure for malaria. However, for prophylactic malarial drug and DDT insecticide house spray, perseived side of negative-effects are there to potentially counter the perceived effectiveness of control measures. Whereas 90 percent of the respondents agreed that anti-malarial drug can prevent ones from malaria, only 41 percent believed the drugs induced no health side-effects. About 88 percent agreed that DDT insecticide house spray helped reduce malaria transmission, 25 percent of them disliked the spray because of varied perceived negative effects (to be discussed in next chapter). The information that most respondents agreed about the effectiveness of DDT house spray should be interpreted with care. Given that the majority had extremely limited knowledge about insecticide house spray and malaria control as discussed in the preceding chapter, it was likely that the respondents were reactive to our direct questioning whether they thought DDT house spray helped reduce malaria transmission.

Although in all the perception items for benefits and barriers of selected malaria control measures the malarious area differences are statistically significant, the magnitudes are not large except for the item on perceived side-effects of anti-malarial drugs. Larger proportion of respondents in control area (59%) agreed about side-effects of anti-malarial drugs. However, the relationship is conditioned by sex, education, age, and income of the respondents. It is true only for male ($V = .118$; Chi square $= 10.14$, $P<.01$), group with some education(4 years) ($V = .226$; Chi square $= 10.20$, $P<.01$), 15-30 ($V = .14$; Chi square $= 6.23$, $P < .05$ and 41-50 years age groups ($V = .162$; Chi square $= 9.34$, $P<.01$), and 10,000-39,999 Bahts income group ($V = .186$; Chi square $= 21.08$, $P<.001$).

Table 4.8 Perceived Benefit and Barrier of Selected Malaria Control Measures by Malarious Areas

| control measures/ perception | Control | Consolidation | Partial-integration |
|---|---|---|---|
| ANTI-MALARIAL DRUG: | | | |
| Do you think anti-malarial drug can prevent malaria? | | | |
| - no | 6.2 | 5.5 | 5.6 |
| - uncertain | 4.0 | 2.1 | 7.3 |
| - yes | 89.8 | 92.4 | 87.1 |
| (N = 1401; V = .066; Chi square = 12.19, P = .016) | | | |
| Do you think taking anti-malarial drug has side-effects as nausea, vomiting, etc.? | | | |
| - no | 35.9 | 45.7 | 45.2 |
| - uncertain | 5.0 | 6.5 | 7.6 |
| - yes | 59.1 | 47.8 | 47.2 |
| (N = 1275; V = .082; Chi square = 17.06, P = .002) | | | |
| BLOOD-SMEAR TAKING: | | | |
| Do you think blood-smear examination is reliable for detecting malaria? | | | |
| - no | 1.1 | 1.9 | 0.9 |
| - uncertain | 2.2 | 4.7 | 2.7 |
| - yes | 96.1 | 93.4 | 96.4 |
| (N = 1801; V = .051; Chi square = 9.39, P = .051) | | | |
| Do you think blood-smear taking has any negative effects on your health? | | | |
| - no | 97.8 | 96.5 | 92.4 |
| - uncerain | 1.1 | 2.2 | 5.4 |
| - yes | 1.0 | 1.3 | 2.2 |
| (N = 1875; V = .078; Chi square = 22.95, P =.0001) | | | |

| | | | |
|---|---|---|---|
| INSECTICIDE HOUSE SPRAY: | | | |
| Do you think DDT insecticide house spray help reduce transmission of malaria? | | | |
| - no | 10.0 | 7.3 | 13.3 |
| - uncertain | 3.2 | 3.3 | 5.4 |
| - yes | 86.8 | 89.3 | 82.1 |

(N = 1813; V = .056; Chi square = 11.42, P = .022)

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Note: small number of cases in some perception items are due to don't know responses which were treated as missing cases.

# CHAPTER V

# ILLNESS AND PREVENTIVE BEHAVIOR

The chapter presents descriptive and analytic results of illness and preventive behavior of malaria. Throughout the analysis, survey data are used. Specifically for analysis of illness behavior and acceptance of DDT insecticide house spraying, however, attempts are made to supplement the survey data with qualitative data based on depth interview and participant observation. Multivariate statistical analysis is made to relate aspects of preventive behavior to knowledge, perception, and socio-economic variables based on the Health Belief Model.

## 1 ILLNESS BEHAVIOR

Illness behavior, in contrast to (preventive) health behavior is defined as "any activity undertaken by a person who considers himself ill for the purpose of getting well" (Karl and Cobb, 1966). In Thailand, particularly in the rural area, the medical system is pluralistic, encompassing alternative sources of care among which the individuals could choose and shift from one to another in the course of seeking the most effective care to effect the cure. The general parttern of care seeking behavior of the Thais is characterized by self-treatment as the first treatment resort. Only if it does not effect the cure, other alternative treatment resorts are considered and selected. These treatment resorts may range from the more socially and geographically accessible (e.g. injection doctors, private clinics*) to the less accessible (e.g. government health center, hospital).

It is hypothesized that in the case of illness of malaria, the individuals would also have to choose among alternative treatment resorts including self-treatment or medication.* In the specific context of malaria treatment the Malaria Control Programme runs malaria clinics at zone and sector levels providing free presumptive and radical treatment on ambulatory basis. Supposedly the malaria clinic is another treatment source adding to the existing multiple treatment resorts.

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* For definitions, see Table 5.1 footnotes.

Based on the questionnaire survey 238 respondents reported themselves being sick from malaria during the first 8-9 months of 1980. Yet only 112 of them reported taking blood-smear tests with 81 confirmed malaria cases. Table 5.1 clearly indicates differences in the choices of initial treatment resorts among samples with and without blood-smear tests. The much higher proportion of self-treatment in the latter sample reflects the likelihood of the respondents' misunderstanding common fever and cold as malaria. In view of no significant difference in the choices of initial treatment resorts between the gross and the net (positive) sub-groups of the sample with blood-smear tests (see Table 5.1), the former is used for subsequent analysis.

Table 5.1 Initial Treatment Resorts of Self-reported Malaria Patients Classified by Blood-smear Examination Statuses (% in parentheses).

| Treatment resorts | Without blood-smear exam. | With blood-smear exam. | |
|---|---|---|---|
| | | Gross | Positive |
| | (N=238) | (N=112) | (N=81) |
| - Self-treatment | 101 (42.4) | 37 (33.0) | 26 (32.1) |
| - Gov't health center | 15 ( 6.3) | 8 ( 7.1) | 6 ( 7.4) |
| - Gov't hospital | 33 (13.9) | 21 (18.8) | 16 (19.8) |
| - malaria clinic | 33 (13.9) | 30 (26.8) | 22 (27.2) |
| - private clinic/hosptial | 46 (19.3) | 12 (10.7) | 8 ( 9.9) |
| - Others | 10 ( 4.2) | 4 ( 3.6) | 3 ( 3.7) |

Respondents reporting sick from malaria during the specified period were asked about actions undertaken to cure the illness last time they were sick (i.e. what did you do the last time your were sick from malaria?) If initial treatment was not successful, further questions about the next treatment resorts were asked. The questioning of treatment resorts progressively chosen was stopped after the third treatment resort, regardless of recovery. Results from the pre-test of questionnaire indicated that only few still did not recover after the third treatment resort.

As shown in Table 5.1, self-treatment appeared to be the most preferred choice of initial treatment resort (33%), with malaria clinic (26.8%) and government hospital (18.8%) as the second and

Table 5.2 Initial Treatment Resorts of Self-reported Malaria Patients (with blood-smear examination) by Malarious Areas (% in parentheses).

| Treatment resorts | Control (N=86) | Consolidation/partial-integration (N=26) |
|---|---|---|
| - Self-treatment | 26 (30.2) | 11 (42.3) |
| - Gov't health center | 5 ( 5.8) | 3 (11.5) |
| - Gov't hospital | 18 (20.9) | 3 (11.5) |
| - Malaria clinic | 26 (30.2) | 4 (15.4) |
| - Private clinic/hospital | 7 ( 8.1) | 5 (19.2) |
| - Others | 4 ( 4.7) | - |

Table 5.3 Transition to Second Alternative Treatment Resorts After Failure of Initial Treatment Resorts to Effect the Cure

| 1st treatment resorts \ 2nd treatment resorts | self-treatment | malaria clinic | gov't hospital/ health others | private clinics/ hospitals and | TOTAL |
|---|---|---|---|---|---|
| self-treatment | 10.8 | 48.6 | 27.0 | 13.5 | 37(61.7) |
| malaria clinic | 20.0 | 70.0 | - | 10.0 | 10(16.7) |
| gov't hospital/ health center | - | 50.0 | - | 50.0 | 2( 3.3) |
| private clinic/hospital and others | 9.1 | 27.3 | 9.1 | 54.5 | 11(18.3) |
| TOTAL | 7(11.7) | 29(48.3) | 11(18.3) | 13(21.6) | 60(100.0) |

the third runner-ups. Note that the sub-district health center was the least frequently used initial treatment resort. Table 5.2 indicated discernable differences in the choices of initial sources of care between patients in control area and consolidation/

partial-integration area. It is not clear what accounted for the differences. The more prevalence of self-treatment among consolidation/partial-integration area patients was also reported in one earlier study (Hongvivatana and Boonmonkol 1980). Probably the finding reflects greater extent of confusing malaria symptoms with those of common cold and fever among the patients in non-endemic area. Greater utilization of health centers and private clinics hospitals among consolidation/partial-integration areas might be explained by better physical access to these two services in the areas. However it is not clear why exceedingly higher proportions of control area patients resorted to malaria clinics and government hospitals. The higher utilization of malaria clinics may be partly explained by better knowledge about malaria symptoms and resultingly correct initial symptoms assessment. Awareness about the presence and functions of malaria clinic did not appear able to explain the differences (see Table 2.10). Differential geographical accessibility might be another explanatory factor; yet, there were no specific data to prove its potential effect.

Table 5.4 Transition to Third Alternative Treatment Resorts After Failure Second Treatment Resorts to Effect the Cure.

| 3rd treatment resorts / 2nd treatment resorts | self-treatment | malaria clinic | gov't hospital/ health center | private clinic/ hospital and others | TOTAL |
|---|---|---|---|---|---|
| self-treatment | 60.0 | - | 20.0 | 20.0 | 5(16.7) |
| malaria clinic | - | 55.6 | 22.2 | 22.2 | 9(30.0) |
| gov't hospital/ health center | 16.7 | 50.0 | 16.6 | 16.6 | 6(20.0) |
| private clinic/ hospital and others | - | 20.0 | 30.0 | 50.0 | 10(33.3) |
| TOTAL | 4(13.3) | 10(33.3) | 7(23.3) | 9(30.0) | 30(100.0) |

After the initial treatment 52 patients (46.4%) were recovered, the majority of which were those treated by government hospitals/health centers and malaria clinics.* Most of the remaining patients who were yet recovered resorted to new treatment sources. From Table 5.3 it is clear that the malaria clinic was exceedingly the most preferred choice of treatment resort. It lost two but gained 22 new cases. However, when the second treatment resort failed to effect the cure, the predominance of malaria clinic as the most preferred third treatment resort was markedly reduced (see Table 5.4). It should be noted that although significant malarious areas differences were found in the choices of first treatment resorts, the transitions to second and third resorts did not exhibit such differences.

To more fully understand the decision-making process involved in the transition from one treatment resort to another, particularly aspects relating to the choice of malaria clinic, depth interviews with sample patients were carried out at two malaria clinics in Bor Ploi District of Kanchanaburi Province and Graeng District of Rayong Province respectively. Altogether 124 patients, 60 in Bor Ploi and 64 in Graeng, were intervied. The main difference between the two district is that while the whole Bor Ploi district is classified in control phase, Graeng is rather heterogenous containing localities in control, consolidation, and partial-integration phases. Resultingly Graeng is more marked by temporary movement of people from non-endemic area (consolidation and partial-integration areas) to endemic areas in the district and bordering provinces of Trat and Chanthaburi for employment purposes (i.e. gem mining and plantation). This is clearly reflected in the structure of patients visiting the clinics as shown in Table 5.5. In addition, Graeng is more urbanized than Bor Ploi. The district town is located on Sukumvit highway, the eastern highway leading to Chanthaburi and Trat provinces bordering Kampujea.

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* Although the health centers did not directly provide malaria diagnostic service, some of them did collect blood-smears from suspected patients and subsequently sent the blood-slides to the malaria clinic for examination. Since all private clinics presumably did not directly or indirectly provide laboratory diagnosis of malaria, the five cases recovered from treatment at private clinic/hospital and other facilities may include invalid cases of (self-reported) blood-smear examinations.

Despite the differences, patterns of illness behavior based on case vignettes in the two localities were quite similar. Hence no separate analysis was attempted. Since analysis of cases at Bor Ploi was made and report prepared quite sometime ago, the report was included as annex for more detailed presentation. Out of the total 124 cases, 48 were confirmed positive by blood-slides. Because there were no systematic differences in patterns of illness behavior between the positive and negative cases, analysis was not made separately.

Table 5.5 Malaria Control Statuses of Places of Residence of Patients at Graeng Malaria Clinic (N = 64)

| Control statuses of place of residence | Number (%) | Percent positive blood-slide |
|---|---|---|
| Control area | 22(34.4) | 63.6 |
| Consolidation area | 15(23.4) | 80.0 |
| Partial-integration area | 27(41.2) | 48.1 |

As shown in Table 5.6, the self-suspected malaria patients resorted to other treatment sources before eventually reaching the malaria clinics. It indicates that illness behavior of malaria is part of the general help-seeking behvior of rural Thais which is characterized by individuals' decisions involving usages and changes of alternative multiple treatment resorts (Cunningham 1970; Riley and Santat 1974). The choices of treatment resorts of malaria patients are sequential, only after the initial treatment failed to effect the cure, did the transit to another alternative resort was made.

The two-fold stage "from self-medication to malaria clinic" is obviously the most prevailing pattern of help-seeking behavior. About 47 percent of the sample patients are classified in this category. Approximately 57 percent of these patients assessed the sysmptoms as malaria by themselves, principally because of their recent or recurring experience of malaria. The rest initially assessed the symptoms as common cold or fever, but eventually with assistance from their significant others the symptoms were reassessed as malaria. For these patients who recognized the symptoms as common cold and fever, it is understandable that self-medication with analgesic drugs was the common treatment course chosen.

Table 5.6 Paths of Patients to Malaria Clinics, Bor Ploi and Graeng Districts

| Paths | Bor Ploi number(%) | Graeng number(%) | Total number(%) |
|---|---|---|---|
| One stage: | | | |
| Symptom experience → MC | 8(13.3) | 11(17.2) | 19(15.3) |
| Two stages: | | | |
| - SM → MC | 27(45.0) | 31(48.4) | 58(46.8) |
| - PC → MC | 5( 8.3) | - - | 5( 4.0) |
| Three stages: | | | |
| - SM → PC → MC | 10(16.7) | 10(15.6) | 20(16.1) |
| - SM → TI → MC | 2( 3.3) | 3( 4.7) | 5( 4.0) |
| - SM → HC → MC | 6(10.0) | - - | 6( 4.8) |
| - SM → TD → MC | - - | 3( 4.7) | 3( 2.4) |
| Four stages: | | | |
| - SM → PC → MD → MC | 2( 3.3) | - - | 2( 1.6) |
| - SM → HC → PC → MC | - - | 4( 6.2) | 4( 2.2) |
| - SM → PC → DC → MC | - - | 2( 3.1) | 2( 1.6) |

Note SM = self-medication; MC = malaria clinic; PC = private clinic; TI = traveling injection doctor; HC = government health center; TD = traditional doctor; MD = military doctor; DC = government district hospital. Self-medication means the use of medicines without consulting any informal or formal medical attendants. Medicines particularly in the form of Ya-shud are available in village grocery shops and drug stores in sub-district markets. Private clinic is a broad category encompassing clinics owned and operated by lay pharmacists, injection doctors, former army medical orderlies, government health center workers, hospital health workers (e.g. nurses), and physicians. Private clinics operated by medical doctors are available only in Graeng. Traveling injectionist is local injection doctor who neither own a drugstore/clinic or work full-time as an injectionist. Traditional doctors refer to herbalists who prescribe herbal medicine for malaria treatment. Use of herbal medicines for treatment of malaria is found only in Graeng. For more detailed explanation of treatment sources, see Annex 1.

Yet it should be noted that only about a half of those who assessed their illnesses as malaria took anti-malarial drugs deliberately to effect the cure. Another half took analgesic medicines simply to temporarily relieve the symptoms before going to the malaria clinic. Some of them knew by themselves or was told by significant others that ones should not take any medicine sometime before going for blood-smear examination at the malaria clinic. Yet they could not tolerate the fever and headache.

For the deliberate self-medication cases including few from the non-deliberate group, the decision process involving shift to malaria clinic is principally that self-treatment failed to effect the cure and the illness got progressively worsening. Significant others played obviously decisive role in referring the patients, especially those who did not initially recognized malaria, to the malaria clinics. Many of those with recent and recurring malaria visited the clinics several times before the current malaria attack. Apparently this facilitated transit to the malaria clinics.

Another two-fold stage pattern, that is "from private clinics to malaria clinic", was followed by five patients in Bor Ploi district. All did not assess their initial symptoms as malaria, although some of them claimed having experience of malaria before. Familiarity with the injection doctors who operate the clinics and locational closeness of the clinics to the patients' home were the main reasons for the choice of injectionist clinics as first treatment resort. Normally these injectionist clinics are the places where the patients and their families go for medical care. In addition, special health conditions of few patients, e.g. cardiacneurosis, asthma, discouraged them from self-treatment course. Similar to the treatment pattern of "self-medication to malaria clinic", experience with the disease and the malaria clinic and advices of significant others contributed to reassessment of the symptoms and transition to the malaria clinics. Note that for two of the five cases it was the injectionists who made the reassessment of symptoms and referred the patients to the malaria clinic.

The one stage treatment pattern, that is visiting the malaria clinic right after symptom experience, raises a question of why self-treatment was not chosen first. Similar to the majority cases under the two stages pattern (SM⟶MC),most patients (15 out of the total 19) immediately recognized the symptoms as malaria and have experienced recent or recurring waves of malaria attacks (laboratory proved or perceived). Yet the reasons accounting for

the currently observed visit to the malaria clinic without resorting first to self-medication are too varied to yield definite conclusions. Due to repeated attacks of malaria, some patients after trying several treatment sources found malaria clinic the most reliable and cheapest source of care. For these patients the malaria clinic has been the most frequent treatment resource whenever they experienced malaria symptoms. They also knew that to maximize the chance of malaria parasites being detected they shoud not take any medicine. Many of them also possess high perceived severity of malaria. However, there were cases of repeatedly malaria attack whose present visit, after probing into past treatment behavior, did not reflect frequent use of malaria clinic. In the past illness episodes, these patients turned to multiple treatment resorts including self-treatment and malaria clinic of course. Sometimes they were successful, some other times not. The illness came and went away. This time the patients came to the malaria clinic hoping that the clinic might help them getting away definitely from malaria. In addition there are some other few cases whose motivations underlining the present visits to malaria clinic were more or less preventive. For instance, after staying over-night in forested area where malaria is known to be endemic, the patients developed headache and pain in the body, they immediately suspected getting a malaria and proceeded to the malaria clinic for diagnosis.

Note that for the 15 patients with experience of malaria, significant others played no role in symptom assessment and referring the patients to malaria clinics. Yet for the remaining 4 cases without experience of malaria, it is notable that knowledgeable significant others came right on time to assess the initial symptoms as malaria, and adviced the patient to go to malaria clinics, stressing that meanwhile no medicines should be taken by the patients.

The three-stages treatment pattern (34 cases) comprises 4 variants which differ only in the choices of second treatment sources. The majority (about 80%) of the patients assessed their symptoms as common cold and fever. The rest recognized malaria and deliberately took self-treatment course. The most notable feature of the three-stages pattern is that the inner circle of significant others closest to the patients (i.e. husband/wife, father/mother, other close relatives) were ignorant of malaria, and hence were unable to assess or correctly reassess the symptoms. Yet they did have role in referring the patients to second treatment sources, though with different reasons. For 20 cases, private clinics were chosen because they were the most familiar and frequent

places and/or possessed social and physical proximity to the patients and their immediate significant others. The choice of traveling injectionists (5 cases) appeared to be determined by the fact that the patients and their families lived in highly remote and mountaneous areas where injection doctors were the only treatment alternative besides self-medication. For all the cases, it was not the patients but their parents who made the choices of injection doctors. The choice of health center (6 cases) was determined by the patients' and their parents' familiarity with the health center workers and ease of physical access to the places. The reasons for selecting traditional doctors (3 cases) are two-fold. In two cases, after failure of self-treatment, the symptoms were reassessed by parents as "wind disease" which is a traditionally indigeneous illness category. [ For detailed discussion of wind illness and implications for choices of treatment resorts, see Muecke (1973)] Hence traditional doctors were chosen. Anaother remaining case reassessed the illness as malaria and went to the traditional doctor who used to successfully cure malaria for him. As was mentioned earlier, the traditional doctor used herbal medicines to cure malaria.

After the second treatment resort did not effect the cure, the reassessment of symptoms was made as malaria, and the malaria clinic was suggested by somes of the same inner-circle significant others or new ones who were more knowledgeable about the disease and had experience with malaria clinics. It is notable that in some instances operators of private clinics did refer the suspected malaria patients to malaria clinics. Yet apparently it was the injectionists and, to a less extent, health center workers' clinics, rather than the medical doctors' private clinics who more frequently referred the patients. In all the six cases of which health centers were the second treatment resort, patients were referred to the malaria clinics. However it is doubtful whether this would happen if the same patients visited them at their private clinics. Knowledge about the extent and circumstances of patients being referred by private and government health facilites to the malaria clinics would have important implications for management of malaria treatment program. Unfortunately the data available in the present study are too limited to reach definite conclusions.

The four-stages treatment pattern comprising 3 variants represents the longest delay in the path to malaria clinics. Similar to the three-stages pattern, almost all of the patients (8 cases) assessed the initial symptoms as common cold and fever mainly because of lack of experience with malaria. Immediate significant

others of the patients were unable to correctly assess the symptoms. Due to familiarity and physical assessibility reasons, private clinics and health centers were equally chosen after failure of initial self-treatment with analgesic drugs. Granted that treatment by the private clinics failed to effect the cure, two patients with assistance from concerned significant others became more and more suspicious of malaria. They were in fact aware of the malaria clinic. However due to their negative attitude toward the clinic, the idea of visiting the clinic suggested by significant others did not materialize. Instead doctor at nearby military camp was selected. Only after the failure of the third treatment resort, and with the accompany of significant others, did they finally visit the malaria clinic. For the other two patients the unsuccessful treatments at private clinics resulted in the third choice of district hospital. In one case, the choice was made on the basis of the parents' perceived better quality of care at the district hospital. For another, the presence of one relative as worker in the particular district hospital apparently influenced the choice. Two of the four patients resorting to health centers as the second treatment choice were diagnosed as malaria and told to go to the malaria clinic. Because they lived quite far away from the clinic, and that the families were being very busy in the fields, no bodies were free to accompany them to the clinic. At the same time, the symptoms were getting more severe. Resultingly the private clinics nearby were chosen. The other two patients, not yet recovered and being informed nothing about their illness, turned to private clinics with similar reasons. It should be noted that three patients were referred to the malaria clinic by private clinic doctors.

On the surface the finding that about 80 percent of the patients at malaria clinics resorted to self-medication as the first choice of treatment appears to contradict the same figure based on the survey (about 33%). The discrepencies may be explained by the fact that a large percentage of the patients did not deliberately turned to self-medication for treatment of malaria. These patients took analgesic medicines to cure the illness which they initially assessed as fever or common cold. For cases with initial symptom assessment as malaria, many of them took anti-pain drugs deliberately to relieve the symptoms but not to cure malaria. Excluding these patients and including those who turned to anti-malarial drugs when analgesic drugs did not effect the cure and the illness was reassessed as malaria, the real malaria self-medication cases were approximately 45 or 36 percent of the total interview cases. In the survey the question item pertaining to illness behavior was preconditioned by self-identi-

fied sickness from malaria (what did you do about it last time you were sick from malaria?). It is likely that the corresponding responses excluded instances where symptoms were not initially assessed as malaria and when anti-pain drugs were taken simply for the purpose of temporary relieve before visiting the malaria clinics.

From the case vignettes, the reasons for deliberate self-medication of malaria may be two-fold. For cases with intermittently repeated attacks of malaria and the symptoms were not severe, the disease was considered self-limited, percieved severity was low, and self-prescribed anti-malarial drugs were the most preferable first choice of treatment resort. Deliberate self-medication also arises out of bare necessity due to distance, transportation and time cost of going to a more professional treatment facility such as the malaria clinic which is usually located in sub-district or district town. Among the case vignettes, there were many instances of which, despite correct symptoms accessment, situational factors, particularly those relating to work and household responsibilities, effectively caused delay of transit to the malaria clinic. The behavior of malaria self-medication is thus very much influenced by objective conditions, and can not explained solely by cognitive domain. Thus it is not so inconsistent to find that when being asked whether self-medication can effect the cure of malaria, 80 percent of the respondents in the survey provided negative responses. Practically in many cases, however, self-medication was tried first. Only if it did not effect the cure and the illness got progressively more severe, a more professional treatment choice was selected.

The fact that self-treatment is usually the first step in medical care for most people particularly the self-diagnosed malaria patients has important implications for the planning of malaria treatment. A study reported that a malarial Ya-shud widely available in the endemic area comprised inadequate number of effective antimalarial tablets and some other unnecessary drugs that may be harmful to health (Wiwat et al. 1982). The same study also alleged that even if some Ya-shuds contained right proportions of anti-malarial drugs, the consumers often bought only 2-3 packets which in term of dosage were not enough to bring an effective cure.

It appeared that private clinic was a frequent treatment resort for rural patients. This was so mainly because of its physical and social proximities to the local people. The negative side of these clinics, particularly those operated by non.M.D.

health workers and injection doctors, is apparently the practice of giving unnecessary injections and intravenous fluid which are expensive and reforcing people's expectation of quick results from treatment. However, some injectionists did refer suspected malaria cases to the malaria clinic. Since the place of injectionist clinics in the local medical system could not be denied, the possibility of make better use of these clinics should be explored. For example, actions are needed to educate the injectionists about malaria symptoms and pursuade them to refer more suspected cases of malaria to the malaria clinic.

The four treatment patterns suggest that medical resorts used in the course of seeking care are mostly sequencial,beginning with that of the most assessible--that is self-treatment or injectionist clinics--and shifting to a more qualified resorts after failure of initial treatment. The selection of medical resorts is determined by a variety of factors as distance, transportation, knowledge and familiarity with afternative medical resources, perception of symptoms and other situational factors specific to individual patients and their families. With respect to the transition of patients from other resorts to the malaria clinic, it appears that the pathway to the clinic would be short or long depends principally on correct symptom accessment and evaluation of alternative sources of care which involes information about the malaria clinic as an effective healer of malaria. For those with correct malaria symptoms assessment in the first place, a more assessible source of treatment was often their first choice. After it failed to cure, and the symptoms got more severe, they rapidly transited to the malaria clinic. As discussed earlier, the three-fold and four-fold treatment patterns are relatively dominated by those who were slow in making correct self-diagnosis of malaria. In the process of symptom assessment and evaluation of alternative treatment resorts which eventually led to the decision to visit the malaria clinics, parents, relatives, neighbours--the socalled "significant others" of the patients--played apparently important role. Generally illness including malaria that occurs to an individual is managed within his/her family and social networks. Within the family it is the father rather than the mother, and male rather than famale, who plays more important role in managing a malaria patient case. Such finding is consistent with what was presented earlier that generally male is more knowledgeable about malaria than famale. The importance of quick and accurate perception of malaria symptoms and the role of concerned significant others in accelerating the decisions to visit the malaria clinic have implications for health education efforts.

## 2 PREVENTIVE BEHAVIOR

Preventive behavior relating to malaria is conceptually distinguished between personally initiated behavior and acceptance of control measures. Descriptive results of both aspects of preventive behavior shall be presented first, and followed by regression analysis relating behavior to knowledge, perception, and socio-economic factors. Since transmission of malaria is significant only in the control area, analysis of data is confined to the sub-sample in control villages. Preventive behavior of the consolidation and partial-integration respondents is analyzed only in relation to temporary movement of some respondents into control area.

### 2.1 Descriptive Analysis

#### 2.1.1 Personally initiated Behavior

The extent of sleeping in mosquito nets and sleeping outdoor are two major aspects of personal behavior rendering exposure to mosquitoes. Granted that the people in rural area hardly distinguished between nuance and anopheline mosquitoes, it is difficult to regard mosquito nets usage as deliberate malaria protective behavior. Yet objectively as far as malaria control is concerned, usage of mosquito nets, regardless of deliberate or non-deliberate motivations, is an important personal protective measure. Also included in the personal protective behavior is the use of prophylactic anti-malarial drugs. Ideally measurement of these three behavioral aspects should be done by observation. Measurement based on interviewing would never be exact. In the present survey, questions were asked if the respondents normally sleep in mosquito nets, sleep outdoor, and taking prophylactic anti-malarial drugs. The results are presented in Table 5.7

Among the villagers in malaria endemic (control) area, the habit of sleeping outdoor was not found to be widespread. Out of the 165 villagers ever slept outdoor, about 40 percent used mosquito nets or repellants for protection from mosquitoes. On the whole the majority of the villagers slept in mosquito nets; only about 4 percent were the absolute non-users. However, about 42 percent of the respondents did not use mosquito nets on a regular basis. Among the absolute non-users (33), 15 of them reported having no mosquito nets; the rest cited stiffy and uncomfortableness as reasons for non-use.

It was found that taking anti-malaria drugs was not a common practice among the villagers in the control area where malaria was endemic. Only about 14 percent claimed having taken anti-malaria drugs frequently, and another 28 percent, sporadically.

Table 5.7 Frequencies of Mosquito Net Usage Sleeping Outdoor, and Taking Prophylactic Anti-malaria Drugs

| Aspects of Behavior | Number | Percentage |
|---|---|---|
| Usage of Mosquito Nets | | |
| non-users | 33 | 4.2 |
| irregular users | 331 | 41.8 |
| regular users | 428 | 54.0 |
| Sleeping Outdoor | | |
| never | 624 | 79.1 |
| sometimes | 86 | 10.9 |
| frequently | 79 | 10.0 |
| Prophylactic Anti-malarial drugs | | |
| never | 457 | 57.6 |
| sometimes | 221 | 27.9 |
| frequently | 115 | 14.5 |

Table 5.8 Frequencies of Mosquito Nets Usage and Taking Prophylactic Anti-malarial Drugs Among Temporary Migrants in Control Area (N=131)

| Aspects of Behavior | Number | Percentage |
|---|---|---|
| Usage of Mosquito Nets | | |
| non-users | 39 | 29.8 |
| irregular users | 11 | 8.4 |
| regular users | 81 | 61.8 |
| Prophylactic Anti-malarial drugs | | |
| no | 114 | 87.0 |
| yes | 17 | 13.0 |

For the villagers who are permanent residence in endemic control area, it appeared that the behavior of sleeping without mosquito net protection was not problematic. On the contrary,

however, among the consolidation and partial-integration villagers who temporarily migrated to control area, as high as 30 percent did not sleep in mosquito nets during the entire stay in the endemic area (Table 5.8). Moreover, as high as 87 percent did not take prophylactic malarial drugs. Given that chemoprophylaxis on the part of the individuals might require many precipitating factors (i.e. drug availability, high perceived threat of malaria) which are not easily met, the small proportion of the migrants taking this measure should not be a surprising finding. However it is not clear why many of them slept without mosquito nets. The survey data unfortunately were unable to supply us with relevant information to explore this question. Since most of these migrants stayed temporarily (7 to 30 days) in control area mainly for employment purpose, possible answers may lie in the very nature of short stay and their employment activities in the control area.

### 2.1.2 Acceptance of malaria control measures

The control measures under consideration are active case detection and DDT insecticide house spray.

Insecticide house spray. The application of residual insecticides to structures of human habitation has been the most basic malaria control measure in Thailand. Usually two rounds of house spraying operations per year are carried out in highly endemic control areas. The first round started sometime during January to May, the second round, sometime from July to September. In low transmission control areas, however, only one round of spraying operation was scheduled. Spraying operations in most of the country employed DDT suspensions, with one exception in the South where DDT emulsions were introduced to bolster people's cooperation.

Our field survey was conducted in August and September 1980 when the first round spraying operations were already completed. However, in some sample control villages, the second round was also completed (about 36% of the respondents reported the second round). To avoid recollection errors, measurement of people's acceptance of residual insecticide house spray was confined to the last time the respondents being approached for house spray in 1980. Questions were asked whether the respondents agreed with the request for house spray, and if yes, what parts of the house surface were sprayed. The responses were cross-checked by the interviewer's observation of whitish mess of insecticide on the alleged parts of house surface. The information was further classified according to the definition of complete

house spray by the Malaria Division of the Ministry of Public Health.

Table 5.9 Acceptance of DDT Insecticide House Spray Based on Interview and House Spraying Codes, 1980

| Acceptance | Interview [1] | House Spraying Codes | |
|---|---|---|---|
| | number (%) | 1st round | 2nd round |
| Complete spray [2] | 233 (57.9) | 125 (43.1) | 88 (54.0) |
| Incomplete spray [3] | 115 (29.9) | 113 (39.0) | 57 (35.0) |
| - A | 45 (39.1) | 27 (23.9) | 10 (17.5) |
| - B | 45 (39.1) | 11 ( 9.7) | 3 ( 5.3) |
| - C | 25 (21.8) | 21 (18.6) | 10 (17.5) |
| - not specified | N.A. | 54 (47.8) | 34 (59.7) |
| Refusal | 15 ( 3.9) | 15 ( 5.2) | 8 ( 4.9) |
| Closed house/not at home | 32 ( 8.3) | 16 ( 5.5) | 4 ( 2.5) |
| Unreadable codes | N.A. | 18 ( 7.2) | 6 ( 3.6) |
| N | 385 | 290 | 163 |

[1] Refer to the last time being approached for DDT house spray. Approximately 36 percent of the total 385 respondents were second round house spray. The rest were first round spray.

[2] Complete spray means 100 percent of house surface sprayed. This usually includes bed room, ceiling/inner roof, interior wall, exterior wall, and underneaths of the house on stilts.

[3] Degree of incomplete spray: A = 75% of internal house surface sprayed, including bed room; B = 50% of internal house surface sprayed; C = 25% of internal house surface sprayed.

As a rule, a DDT spraying squad of 4-5 spraymen and a squad chief are required to write a code indicating results of DDT spray

on the house column or outside wall of every house contacted. Therefore, measurement of people's acceptance of DDT house spray here would also make use of this information.

Based on the interview data, about 50 percent of the sample in control areas reported being approached for DDT house spraying in 1980. Malaria house spraying codes for first round of the same year were found only in 14 percent of the total sample houses. This indicates low house coverage of spraying operations in control area villages where transmission and control activities were defined as problematic (see Chapter I).

As shown in Table 5.9 the acceptance rates based on the interview data in general did not differ much from those based on house spraying codes, particularly if results of both the two spraying rounds were combined. It is fair to conclude that the problems of DDT house spraying operations lie not only in absolute refusals but also in the markedly high rates of incomplete house spray, indicating people's limited cooperations. The findings here were consistent with results of whole spraying operations in the Malaria Region 5. Based on results of the first round spray in 1981, it was reported that the rate of incomplete spray was 26.8 percent, and that of refusals (inclusive of closed houses) was 10.5 percent (Malaria Division 1981). Our data based on the interviews, however, tended to underestimate the seriousness of incomplete spray problem. The regional figures indicated that about 59 percent of the incomplete spray cases were of Grade C--that is only 25% of the internal house surface were sprayed (in many cases this covers only the underneaths of the houses on stilts).

Reasons for refusals or allowing only partial spray as given by the respondents are shown in Table 5.10. Dirtiness, rusted roof, and negative health effect appeared to be the most important perceived negative side-effects of insecticide spray which discoraged people's cooperations. As was mentioned earlier, the DDT insecticide for spraying operations in Thailand has been mainly of 75% wettable powder. Often the white marks of suspensions left on the interior walls of the houses were for obvious reasons not pleasant for the villagers. Quite a number of houses were with galvanized iron roof. It was contended that the insecticide rusted or ruined the galvanized roof. The villagers' concerns about this negative effect was manifested in the obviously low percentage of households allowing spray on the ceiling or inner roof (23% compared to about 70-80 percent for other parts of the houses). Regarding the perceived negative health effects, it was of special concern for children, pregnant women, and women during

the postpartum month. Such concern might link to a traditional belief among certain sections of the Thai rural villagers that smelling a bad odor may upset the state of humoral equilibrium which causes illness (Muecke 1979).

A detailed examination of the 15 refusal cases revealed that the majority of them were female and relatively the most well-educated (4 years of education and over). The reasons for refusal were dominated by those of dirtiness caused by mess of insecticide and perceived negative health effects. It was striking that 4 of the 15 cases frankly admitted that they did not allow house spray because they perceived absolutely no benefits of the house spray. These were generally consistent with findings from the observation of DDT house spraying operation in a rural village. It was found in the observation study that the refusers and the partial accepters were more prosperous than the average villagers. Their houses were made wholely from wood with galvanized iron roof, clean and fine interior. Many of the shop-owners were among the refusers and the partial accepters. Regarding the complete accepters, they were dominated by poor families whose houses were small and crudely built (for more discussion, see Annex 2).

Table 5.10 Reported Reasons for Refusal and Incomplete House Spray

| Reasons | % Households reported (N=111) | % Households indicating the most important reason (N=109) |
|---|---|---|
| Dirtiness | 38.7 | 30.3 |
| Death of domestic animals | 7.2 | 2.8 |
| Rusted roof | 32.4 | 25.6 |
| Bad odor/negative health effect | 25.2 | 16.5 |
| Increased bed bugs | 0.9 | 0.9 |
| Unwillingness to move furniture and other utensils | 11.7 | 3.7 |
| Perceived no benefits of DDT spray | 5.4 | 3.7 |
| Other reasons | 17.1 | 16.5 |

The observation study also found that the management of the spraying operation was markedly poor, particularly in respect to

the relationship between the spraymen and the villagers whose houses were to be sprayed (for more detailed discussion of the spraying operation, see Annex 2). The spraymen neither involved nor informed village headmen and villagers in advance about the spraying operation. The spraymen in approaching the villagers for house spray were authoritative and uneducative. Health education was hardly practiced by the spraying squad. The single case observational study results were consistently confirmed by the survey. As high as 88 percent of the respondents said they were not contacted in advance about the house spray either from the spraying team or the village headmen. About half of the respondents reported that the spraymen did not tell about the purposes or benefits of the house spraying. In the case study, it was observed that though the poor villagers did not resist house spraying, their reactions to the request of the spraymen were rather half-heartedly. In the survey, about 10 percent of those who allowed complete or partial house spray admitted that they did so unwillingly mainly because of compulsion to comply to government authorities.

Blood-smear examination. In the survey the control area respondents were asked whether in the survey year malaria workers came to ask for blood-smear, and, if yes, whether they cooperated. Only about 27 percent reported being approached as such. The majority (90%) said they were informed by the malaria workers that the purpose of blood-smear collection was to detect malaria. As high as 88.4 percent complied with the request for blood-smears. The most important reason for refusal was that the respondents did not see anything wrong with their health to justify the taking of their blood-smears for examinations. About 30 percent of the total respondents also reported being approached for blood-smears of their children. The acceptance rate for children climbed up to a higher level of 95 percent.

Since the acceptance of blood-smear examination for malaria surveillance activities appeared satisfactory, it shall not be included for further multivariate analysis.

## 2.2 Regression Analysis

Personally initiated preventive behaviors and acceptance of insecticide house spray are hypothesized to be related to knowledge, perception, and socio-economic variables. Mutiple regression analysis employing the linear probability model is used to test the independent effects of each independent variable. Definitions and measurements of variables used in the regression model

are provide in Table 5.11. It should be noted that knowledge of malaria is represented by variables specific to major aspects of malaria knowledge, rather than a single composite (total) knowledge index. This is relevant to the need mentioned earlier for identification of areas where knowledge are inadequate. Regression results (not shown here) also indicated that in general the conposite knowledge index was apparently less effective than specific knowledge variables in explaining the variance in behaviors. Possible multicollinearity problem was examined by the method of Farrar and Glauber (1967). It was found that only knowledge variables were effected by multicollinearity problem. Essentially for each regression, only one knowledge variable was entered.

The regression results should be interpreted with care. They only roughly indicate significance of the net effect each independent variable has on aspects of behavior under consideration. This is due mainly to problems in estimating the regression equations. Firstly, because the dependent variables under study are of limited value between 0 and 1, the Ordinary Least Square method violates the assumption of constant disturbance variances (hemeskedasticity) (Goldberger 1964). The values of 0, 0.5 and 1 for the dependent variables in the present study are not the conventional dummies (0,1) to which the linear probability model is usually applied [although there was study applying the linear probability model to limited dependent variable of 0, 0.5, and 1 (see Cain 1966)]. Secondly the knowledge and perception variables are not really interval scales. Thus the predicted value of dependent variables could not be unambigously interpreted.

### 2.2.1 Personally initiated behavior

Regression results for mosquito net usage, sleeping outdoor, and chemoprophylaxis are shown in Table 5.12, 5.13, 5.14, and 5.15 respectively. Table 5.13 applies only to mosquito net usage of the consolidation and partial-integration area respondents who temporarily moved to endemic control area.

Regarding usage of mosquito nets and sleeping outdoor in control area, although the estimated regression equations are statistically significant, the explanatory power of the specified knowledge, perception, and socio-economic variables is extremely low (Table 5.12 and 5.14). This probably indicates that usage of mosquito nets and sleeping outdoor habit are not deliberate malaria protective behaviors. Despite the low explained variance, some variables do have significantly net effects on the two behaviors.

Table 5.11 Variable Definitions and Measurement

| Variables | Definitions | Measurement |
|---|---|---|
| MENT | Usage of mosquito nets | 0 = nonuser; 0.5 = irregular users; 1 = regular users |
| OUTDO | Extent of sleeping outdoor | 0 = never; 0.5 = sometimes; 1 = frequently |
| CHEMOP | Extent of taking chemoprophylaxis | 0 = never; 0.5 = sometimes; 1 = often |
| SPRAY | Acceptance of insecticide house spray last time being approached in 1980 (excluding refusals and not at home) | 0 = incomplete degree B and C (equal of less than 50% house surface sprayed); 0.5 = incomplete degree A (75% surface sprayed); 1 = complete spray |
| KANOPHE* | Knowledge about anopheles | scores ranging from 0 to 4 |
| KTRANS* | Knowledge about cause and spread of malaria | scores ranging from 0 to 2 |
| KPREM* | Knowledge about preventive measures of malaria | scores ranging from 0 to 4 |
| KCHEPRO | Knowledge about chemoprophylaxis | dummy, 1 = yes |
| KDDT | knowledge about DDT house spraying as control measure | scores ranging from 0 to 2 |
| SUSCEPT | Perceived susceptability to malaria | index ranging from 0 to 8 |
| SIDE-EF | Perceived side-effects of anti-malarial drug | dummy, 1 = yes |
| EDDT | Perceived negative effect of insecticide house spray | dummy, 1 = yes |
| SEX | Sex | dummy, 1 = male |
| AGE | Age | years (#) |
| ED1 | Education | dummy, 1 = education less than 4 years, 0 otherwise |
| ED2 | Education | dummy, 1 = education 4 years and over; 0 otherwise |

| | | |
|---|---|---|
| INCOME | Annual family income | Bahts |
| CONSO | Consolidation/partial-integration | dummy, 1 = consolidation; 0 otherwise |

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* KANOPHE, KTRANS, and KPREMS are total knowledge scores, based on summation of relevant item scores (see Chapter 3), of anopheles, cause and spread of malaria, preventive measures, respectively.

For the people residing in control area, only knowledge about cause and spread of malaria (KTRANS) has significantly independent positive effect on mosquito net usage. Perceived susceptiblity plays no important role in inducing usage. As for the net effects of socio-economic factors, only those of family income and sex are significant. The effect of income is positive as should be expected. Men use mosquito nets less frequently than women.

For the consolidation and partial-integration area respondents who ever temporarily migrated to endemic control area in the survey year, the factors determining the extent of mosquito nets usage during the stay were rather different from the control area residents (Table 5.13). Knowledge variables and family income play no significant role in influencing usage. The negative effects of sex are retained but not consistently significant. Other things being held constant, the migrants from consolidation area tend to use mosquito nets during their stay in endemic area to a greater extent than those from partial-integration area. It could be said that perceived susceptibility to malaria is the most decisive factor determining the extent of mosquito nets usage. This implies that the usage of mosquito nets among the temporary migrants is more or less personal preventive behavior.

The significant independent variables in the sleeping outdoor regression equation are quite similar to those of mosquito net usage (the control area residents). The higher the family income, the less likely the respondents would sleep outdoor. Male tends to sleep outdoor more often than female. Knowledge about malaria preventive measures is found to have significantly negative independent effect on sleeping outdoor. Though the effect of KTRANS is quite large, it did not manage to pass the .05 critical level.

Regression results for chemoprophylaxis as shown in Table

5.15 need further explanation. Models 1-5 are simply to explore the knowledge variables having the best predictive power. Since the number of missing cases in the perceived side-effect of anti-malarial drugs (SIDE-EF) is quite large, it was included in alternative Model 5 to save cases for the other 4 models. Only knowledge about preventive measures (KPREM) and specifically chemoprophylaxis (KCHEPRO) are found to have significantly independent positive effects on taking prophylactic anti-malarial drugs. However the predictive power of KCHEPRO is twice as large as that of KPREM as can be seen by the size of R-squares in Model 3 and Model 4. It could be said that KCHEPRO is the single most important predictor of chemoprophylaxis. It alone accounted for 16 percent of the variance in chemoprophylactic behavior. However the explained variance contributed by KCHEPRO was reduced to about 6 percent in Model 5 when cases of observation were decreased by 219. The missing cases are mainly those either on the high or the low in both knowledge and practice of chemoprophylaxis.

Table 5.12 Standardized Regression Coefficients for Usage of Mosquito Nets (F-Value in parentheses)

| Variables | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| KANOPHE | -0.0356(0.970) | - | - |
| KTRA[illegible] | - | 0.0729(3.934)* | - |
| KPREM | - | - | 0.0611(2.672) |
| SUSCEPT | 0.0141(0.155) | 0.0016(0.002) | 0.0055(0.022) |
| INCOME | 0.1150(10.353)** | 0.1130(10.045)** | 0.1138(9.732)** |
| SEX | -0.1253(11.469)** | 0.1414(14.762)** | 0.1219(10.559)** |
| AGE | 0.0198(0.272) | 0.0223(0.345) | 0.0071(0.034) |
| ED1 | 0.0325(0.0624) | 0.0219(0.233) | 0.0247(0.281) |
| ED2 | 0.0942(0.0506) | 0.0823(2.922) | 0.0810(2.656) |
| Constant | 0.5263 | 0.4046 | 0.3855 |
| $R^2$ adjusted | 0.024 | 0.029 | 0.024 |
| F-value | 3.751** | 4.264** | 3.652** |
| N | 770 | 770 | 770 |

* significant at .05 level; ** significant at .01 level.

Table 5.13 Standardized Regression Coefficients of Mosquito Nets Usage of Consolidation and Partial-Integration Respondents Temporarily Moved to Endemic Control Area (F-value in parentheses)

| Variables | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| KANOPHE | -0.1235(1.802) | - | - |
| KTRANS | - | 0.1213(1.859) | - |
| KPREM | - | - | 0.1112(1.486) |
| SUSCEPT | 0.2193(6.101)** | 0.2043(5.239)** | 0.1792(3.711) |
| INCOME | -0.1207(1.713) | -0.0913(0.994) | -0.0565(0.366) |
| SEX | -0.1415(2.379) | -0.1760(3.819) | -0.1956(4.575)* |
| AGE | 0.0622(0.443) | 0.0464(0.251) | 0.0239(0.065) |
| ED1 | -0.0115(0.004) | 0.0081(0.002) | 0.0234(0.017) |
| ED2 | 0.0882(0.233) | 0.0870(0.226) | 0.1055(0.324) |
| CONSO | 0.1132(1.501) | 0.1522(2.770) | 0.1318(2.065) |
| Constant | 1.2732 | 1.0167 | 0.9418 |
| $R^2$ adjusted | 0.0586 | 0.0590 | 0.0525 |
| F-value | 1.995 | 2.003 | 1.872 |
| N | 129 | 129 | 127 |

* significant at .05 level; ** significant at .01 level.

The independent positive effect of perceived susceptibility and negative effect of perceived side-effect of anti-malarial drugs are found statistically significant. Of the socio-economic variables, only education is independently related to chemoprophylaxis. However, merely those with 4 or more years of education significantly practiced chemoprophylaxis to a greater extent than other less education groups.

2.2.2 Acceptance of DDT insecticide house spray

It should be noted first of all that, due to small number of cases, the absolute refusal cases (including closed houses/not at home cases) are not included in the analysis. The insecticide house spray acceptance as measured here could be interpreted as the probability of complete house spray acceptance (in terms of

area of house surface sprayed). Regression results based on interview data (SPRAY) is presented in Table 5.16.

Table 5.14 Standardized Regression Coefficients for Sleeping Outdoor (F-value in parentheses)

| Variables | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| | Beta (F) | Beta (F) | Beta (F) |
| KANOPHE | -0.0497(1.880) | - | - |
| KTRANS | - | -0.0703(3.628) | - |
| KPREMS | - | - | 0.0755(4.062)* |
| SUSCEPT | 0.0565(2.493) | 0.0615(2.881) | 0.0661(3.214) |
| INCOME | -0.0716(3.991)* | -0.0702(3.846) | -0.0678(3.434) |
| SEX | 0.1155(9.692)** | 0.1202(10.579)* | 0.0895(5.667)* |
| AGE | 0.0372(0.955) | 0.0364(0.912) | 0.0531(1.857) |
| ED1 | 0.0387(0.723) | 0.0383(0.708) | 0.0490(1.085) |
| ED2 | 0.0254(0.280) | -0.0202(0.175) | -0.0171(0.118) |
| Constant | 0.2295 | 0.2346 | 0.2542 |
| $R^2$ adjusted | 0.0184 | 0.0210 | 0.0198 |
| F-value | 3.054** | 3.362** | 3.125** |
| N | 770 | 770 | 738 |

* significant at .05 level; ** significant at .01 level.

The specified model is able to explain 7.31 percent of the total variance in DDT house spray acceptance. Yet knowledge about DDT house spray does not significantly enhance the likelihood of complete acceptance. Neither do the other knowledge variables (the regression results are not shown here). Perceived vulnerability to malaria increases the probability of complete acceptance; though the effect is not strong enough to pass the 0.5 critical level. As expected, perceived negative effects of DDT insecticide house spray significantly leads to incomplete acceptance. Relatively it is the most important predictor of acceptance as can be seen by the size of its standardized regression coefficient. Income is found to have significant negative effect on complete acceptance. This is consistent with the finding from the observation that the partial acceptors of

Table 5.15 Standardized Regression Coefficients for Chemoprophylaxis (F-value in parentheses)

| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| KANOPHE | 0.0407(1.291) | - | - | - | - |
| KTRANS | - | 0.0551(2.277) | - | - | - |
| KPREMS | - | - | 0.2212(37.54)** | - | - |
| KCHEPRO | - | - | - | 0.3782(124.681)** | 0.2086(25.178)** |
| SUSCEPT | 0.1159(10.703)** | 0.1124(9.831)** | 0.0954(7.215)** | 0.0820(6.070)* | 0.1182(8.255)** |
| SIDE-EF | - | - | - | - | -0.0835(4.067)* |
| INCOME | -0.0189(0.285) | -0.0185(0.272) | -0.0121(0.117) | -0.0089(0.073) | -0.0064(0.024) |
| SEX | 0.0419(1.303) | 0.0419(1.314) | 0.0432(1.422) | 0.0217(0.403) | 0.0088(0.044) |
| AGE | -0.0296(0.616) | -0.0281(0.556) | -0.432(1.323) | -0.0212(0.359) | -0.0121(0.076) |
| ED 1 | 0.0569(1.598) | 0.0610(1.830) | 0.520(1.336) | 0.455(1.135) | 0.0838(2.432) |
| ED 2 | 0.1764(13.759)** | 0.1703(12.672)** | 0.1418(8.730)** | 0.1236(7.465)** | 0.1791(10.038)** |
| Constant | 0.3999 | 0.3951 | 0.2051 | 0.1625 | 0.3118 |
| $R^2$adjusted | 0.0388 | 0.0407 | 0.0900 | 0.1782 | 0.0879 |
| F-value | 5.437** | 5.658** | 11.427** | 24.269** | 7.567** |
| N | 770 | 770 | 739 | 752 | 536 |

*significant at .05 level; **significant at .01 level.

DDT house spraying tend to be the relatively rich families, whereas the complete acceptors are dominated by the poor families. Other things being held constant, men are more inclined to completely accept DDT house spray. Age and education are not found to be significantly related to the probability of complete acceptance. Yet the negative coefficients of education variables should be noted. It is quite consistent with the finding mentioned earlier that the absolute refusals are dominated by the better-educated respondents.

Table 5.16 Standardized Regression Coefficients for Acceptance of Insecticide House Spraying (F-value in parentheses)

| Variables | Interview Data (SPRAY) |
|---|---|
| KDDT | 0.0576(1.128) |
| SUSCEPT | 0.1048(3.664) |
| EDDT | -0.2272(17.615)** |
| INCOME | -0.1568(8.440)** |
| SEX | 0.0256(0.209) |
| AGE | -0.0110(0.034) |
| ED1 | -0.1095(2.504) |
| ED2 | -0.0075(0.141) |
| Constant | 1.0672 |
| $R^2$ adjusted | 0.0731 |
| F-value | 4.214** |
| N | 327 |

* significant at .05 level; ** significant at .01 level.

### 2.2.3 Summary discussion

Regression results indicate that of the three major aspects of malaria knowledge, only those pertaining to transmission and preventive measures play some role in influencing preventive behavior of malaria. Despite statistical significance, the effects are not markedly strong. It should be noted, however, that knowledge about anopheline vector (KANOPHE) manifested much smaller

variations than the two aspects on transmission and preventive measures (see Chapter III). The majority of the respondents possessed extremely limited knowledge about the malaria mosquito vector. This partially explains why the variable played no role in accounting for variance in behavior. Quite in a similar maner, knowledge about DDT insecticide house spray (which is generally limited for most respondents) was not significantly related to acceptance of the house spray. Knowledge of chemoprophylaxis contributed greatly to the explained variance in the practice of chemoprophylaxis. However, the implied causal relationship should be carefully interpreted. It is possible that the causality might run the other way round--those who practiced chemoprophylaxis knew about chemoprophylaxis.

As predicted by the Health Belief Model, percieved susceptibility was found to be an important predictor of chemoprophylaxis and acceptance of DDT insecticide house spray. The higher the individuals perceived themselves vulnerable to malaria, the more frequent they took prophelactic anti-malarial drugs, and the more likely they allowed complete insecticide house spray. That the positive effect of perceived susceptibility on mosquito nets usage is significant among the temporary migrants from consolidation and partial-integration areas but not among the control area residents suggests that usage of mosquito nets among the latter may not be deliberate malaria personal preventive behavior. The hypothesis that perceptions of negative effects of preventive measures discourage people's participation was also confirmed by the regression results. Perceived side-effects of anti-malarial drugs significantly reduced the extent of chemoprophylactic practice. As for DDT insecticide house spray, it is fair to conclude that the perceived negative effect of insectiside house spray is the most important factor determining the likelihood of complete acceptance. What the rural villagers feel concerned is perhaps not the benefits but disbenefits of residual insectiside house spraying.

Consistently sex has significantly independent effect on almost every aspect of preventive behavior under consideration. It is the male rather than the female who tend to expose more to mosquito contact by less frequent use of mosquito nets and sleeping outdoor more often. Family income plays important role only in usage of mosquito nets and acceptance of DDT house spray. The findings are quite reasonable. The effect of education is significant only in the practice of chemoprophylaxis. Age is found not significantly related to any aspects of behavior.

# CHAPTER VI

# RECOMMENDATIONS

On the basis of empirical findings and research experience gained from the research project, recommendations are provided in this chapter. They are grouped into: 1) health education; 2) community participation; 3) research design and methodology; 4) further research.

## Health Education

1. The research results indicate that in general the majority of people are ignorant about malaria and malaria control measures.

   It is recommended that the malaria control programme strengthen its health education activities. Serious efforts should be made in critical review of existing health education programme, particularly its contents, approach, and methods.

2. In relation to the areas of inadequate malaria knowledge identified by the research findings and their associations with aspects of preventive behavior under consideration, it is recommended that the priority contents of health education should include:

   - cause of malaria (mosquito bites; behavioral differences between nuance and anopheline mosquitoes; in delivering education about cause of malaria, attempts should be made to modify or correct people's misunderstandings, e.g. drinking water containing mosquito eggs/larvae, climatic changes);

   - spread of malaria (important point is how malaria spread from one to another, this should be explained in terms of indoor mosquito biting, individuals' behavior exposing to mosquito contacts, and in relation to people's misunderstandings about cause of malaria);

   - malaria control effect of DDT insecticide house spray (this should atleast include the effect of insecticides on adult anopheles and it effective duration; health education in house spraying operation should be particularly sensitive to people's perceived negative effects of insecticide spray; if

not possible to change or modify the perceptions, atleast the spraymen should be considerate in conducting the spray and try to minimize the perceived negative effects as much as possible);

- breeding places and hunting time of anopheles (the research findings indicated that people's knowledge in these two respects was extremely limited, although it was not found to be related to aspects of preventive behavior under study. However, because people's knowledge about breeding places is very crucial for source reduction and antilarval measures (not being considered in the study), it should therefore be included in malaria education programme. Health education about breeding places should be related to man-made breeding sites, local transmission foci, human behavior contributing to mosquito contact.).

3. It was found that health education in DDT insecticide house spraying operation was extremely inadequate. In the malaria clinics, no active health education was given to the patients, except the passive display of posters. Based on informal discussion with the villagers as well as the malaria field guides during the survey field work, it was learned that in the house-to-house visits for surveillance by malaria workers, health education was hardly attempted.

It is therefore recommended that:

- the malaria control programme seriously assess the effectiveness of existing health education methods which rely mainly on display of posters, distribution of leaflets, slides and films shows, and other mass media coverage;

- the malaria control programme strengthen and promote health education employing dialogue method in its various field operational activities, particularly in the DDT house spraying operations and the malaria clinics;

- training and other necessary resources be provided for improving health education and communication skills of operational malaria workers.

4. Although villagers in control area were found be better aware of malaria than those in consolidation and partial-integration areas, the difference is not strong enough to justify policy change regarding target population (in term of malarious

areas) of health education programme in malaria control.

It is therefore recommended that:

- in view of malaria endemicity in control area, health education activities should be intensified in the control area, this would automatically cover the temporary migrants from consolidation and partial-integration areas;

- male, particularly of active working age (30 years and over), should be the strategic target population group for health education in malaria control principally because behaviorally they are more vulnerable to malaria and notable for being effective natural communicators ( as potentially knowledgeable significant others to malaria patients) of malaria knowledge.

## Community Participation

5. The present research found that most of the people and their family/social networks are quite well verse in the use of antimalarial drugs for treatment and, to a less extent, prophylactic purposes. Regarding malaria treatment, it is noteworthy that the local medical systems are characterized by presence of variegated private (lay) doctors/clinics/drugstores readily rendering curative care to suspected malaria patients, in addition to the government local malaria clinics and hospitals. Obviously in treatment of malaria the self-help component is already there.

It is highly recommended that community participation in malaria control should start with treatment activities. This should form the basis for subsequent extension of community involvement in other control activities at later stages.

6. In the community-based malaria treatment programme, serious efforts should be made to involve the local lay doctors/clinics/drugstores. They should be trained to make diagnosis by symptoms, provide presumptive treatment, and appropriate referral of patients to the government local malaria units and hospitals. The local malaria unit (the sector office) and/or the government health center should provide adequate and continuing support and supervision for the participating local lay doctors/clinics/drugstores. Where appropriate, they could

also be trained in preparing blood-slides for suspected patients and provide radical treatment for cases positively confirmed by the local malaria clinic.

The above recommendation implicitly suggests that community participation in malaria treatment need not confine to the community health worker approach only (i.e. the malaria volunteer, the village health volunteers and communicators). However, it does not exclude possible role of existing village malaria volunteers, and other community health volunteers in the programme.

7. In the light of wide distribution of drugs, including antimalarial drugs of course, in the rural area through the outlets of village grocery shops, village drug cooperatives, lay clinics/drug stores, etc., it might be worthwhile to consider the feasibility of malaria prophylaxis programme in hyperendemic area. At present chemoprophylaxis is not extensively practiced. However, granted that self-medication behavior is rather prevalent among the rural population, the prospect of successful malaria prophylaxis programme in hyperendenmic area is potentially good. The existing alternative drug distributors shoud be taken into account in designing effective methods for antimalarial drug distribution.

8. In the course of seeking care for malaria, the rural villagers normally have to pay for it, at least for the cost of medicines (the exception is the malaria clinic where treatment is provided free of charge). It is recommended that antimalarial drugs distributed through the community-based treatment and/or prophylaxis programmes should be paid by the patients. This should enhance the cost-effectiveness of the programmes.

## Research Design and Methodology

9. In the course of implementing the study, the research team became more and more convinced that the research problems were not adequately formulated. The key research question pertaining to differential levels of malaria knowledge possessed by people in control, consolidation, and partial-integration areas, was suggested to the principal investigator by the former Chief of Malaria Region 5. Supposedly there is nothing wrong with the research problems being identified by the control people. As a matter of fact it should be encouraged.

The problem lay, however, in that the above-mentioned research question was accepted by the principal investigator in a rather uncritical maner. Being a medical social scientist who was then not familiar with the malaria control programme and concerned authorities, the principal investigator failed to adequately search out the suggested problem with other relevant control programme people. Although refinements and modifications of the suggested research problem were made by the principal investigator himself (e.g., illness behavior, the Health Belief Model), they were mainly from relating theoretical social science perspectives. Despite the attempts, the key research question was retained in the overall design of the study. As a result of inadequate research problem formulation, the research questions or objectives were too broad, unintentionally barring the investigator from perceiving the need for more efficient and rigorous research design and methodology.

In the course of implementing the study, the research team eventually realized that the appropriateness of concentrating health education activities more in control than in consolidation and partial-integration areas, which formed the basis for the key research question, might not really be the issue. A more basic one however, was the poor state of health education activities even in the endemic control area. We thought it was still worthwhile to study what people knew about malaria. Yet if we knew the relevant concrete situations and the context of the problem well enough, we would have approached the problem differently. For example, since malria prevalence and transmission in consolidation and partial-integration areas were no longer a problem, they should have been excluded from the study population. Regarding knowledge of people in these two nonendemic areas who temporarily moved to the control area, this could be easily accounted for by appropriate sampling of study control villages and households.

In the light of our research experience, it is recommended that steps be taken to ensure adequacy in formulating the research problem. This could be accomplished generally by extensively exploring the problems with concerned disease control people. Extensive literature search definitely aids the process. More importantly the research plan should allow for pilot exploratory study to define the scope of the study and identify relevent variables before launching the main investigation.

10. In the present investigation, perceptions of malaria were specified according to the Health Belief Model, and survey questionnaires were developed accordingly. Similarly measurements of malaria knowledge were based on scientific criteria. No doubts, theories help generate specific hypotheses which, in turn, facilitate collection of quantitative data based on representative study sample. Yet the potential benefits of theories and hypothesis testing are realized only if applied to the problems some basic knowledge of which has already been established. But if applied to relatively unexplored area, it would be an inefficient method of researching the facts. Essentially it would end up in obtaining only those pieces of information identified by theories, leaving out others which may be equally or more relevant to the study phenomena. Moreover, the formal survey questionnaire method is often not flexible enough to allow for collection of the data not being specified before. In our research endeavour, we have experienced such limitations particularly in relation to aspects of people's perceptions of malaria.

Since the social and economic aspects of tropical diseases is a relatively unexplored area, it is strongly recommended that research in this area in most cases should start with intensive case studies. This would help the social scientist investigators familiarize the research problems in the real context, define the scope of investigation, identify relevant variables, and generate plausible hypotheses.

TDR/SER should encourage intensive case studies not only for exploratory objective. For many research problems pertaining to social and economic aspects of tropical diseases, the method is important in its own right and/or supplementary to quantitative data collected by other methods. In the present investigation, participant observation of DDT insecticide spraying operation and depth interview of malaria patients significantly supplemented the survey data and enhanced our understanding of the problems.

## Further Research

11. It is highly recommended that an action research on community participation in malaria treatment and/or prophylaxis programme be undertaken along the line suggested in recommendations 5 to 8. Apparently health education would be an impor-

tant component the main objective of which is to develop innovative health education methods particularly suited to local situations and effective in fostering community participation (i.e. participatory methods in health education). The selected study area should be highly malaria endemic to allow for further expansion of community involvement in other control activities in later stages. The control activities may also include social and economic interventions (i.e. economic activities to substitute charcoal burning in endemic forested area). This is particularly important for social and economic research of malaria to demonstrate relevence and effectiveness of social and economic measures in disease control.

12. Malaria control in the context of primary health care at the community level, obviously requires new approaches and methods of health education. To be effective, it needs adequate technical and other supports from the health education programme in the national malaria control programme. It is then necessary to assess the existing health education programme in malaria control with a view to strengthen and reorient the programme toward support of malaria control at community level. Such assessment should address not only the technical problems but also resources, organization, and management constraints.

13. Our observation study of DDT insecticide house spraying operation has raised a number of management problems which might contribute to the continuingly high rate of incomplete house spray or limited people's co-operations. The operational value of the study was unfortunately constrained by two limitations. Firstly, because it was a single case study, the generalizability of the findings was questioned, particularly by the malaria control people. Secondly, the study was made without due regard to the whole house spraying operation programme. This more or less restricted the range of all possible as well as strategic recommendations from the study to improve the spraying operations.

Since insecticide residual house spray shall continue to be the principal malaria control measure in Thailand, it is recommended that an extended study be undertaken to review the national insecticide residual house spraying programme and investigate the field house spraying operations using a more representative sample, with the views to provide recommendations and guidelines to strengthen and improve effectiveness of the operations.

ANNEX 1

# ILLNESS BEHAVIOR OF PATIENTS AT A MALARIA CLINIC IN BOR PLOI DISTRICT, KANCHANABURI PROVINCE

## INTRODUCTION

Illness behavior is a subject which has been widely researched by medical sociologists and anthropologists. Analytically the course of illness and its associated care-seeking behavior is viewed in term of distinguishable but related stages. For example, Suchman's schema, which is widely used, views the sequence of medical events representing major transition points involving new decisions about the course of medical care as divided into five stages--the symptom experience stage, assumption of the sick role stage, the medical care contact stage, the dependent-patient role stage, and the recovery or rehabilitation stage (1). Subsequently this schema was modified and the process of moving from stage to stage further elaborated (2, 3, 4, 5). The consideration of illness behavior as a process involving decision making on the course of medical care at several points appears highly applicable to care-seeking pattern in developing societies. The health care system in developing societies are markedly pluralistic in the sense that there exists competing medical systems (traditional and cosmopolitan medicine) and multiple alternative souces of care which the patients could choose. Apparently in this context care-seeking behavior is supposedly a process of on-going decisions on the choice of alternative and multiple resources and treatments. Various studies have indicated the fruitfulness of this approach in understanding the pattern of health care utilization in developing countries (6, 7).

Most studies of health-seeking behavior did not deal with specific disease or type of illness. The present investigation attempts to demonstrate the applicability of the approach in understanding illness behavior of a specific disease as malaria. It must be mentioned at the outset that it is not the purpose here to attempt modification of existing models of stages of health-seeking. We simply want to illustrate illness behavior of malaria patients in the context of care-seeking stages which may have important implications for effective planning of chemotherapy which is increasingly important for the present situation in which the control of malaria transmission is more difficult.

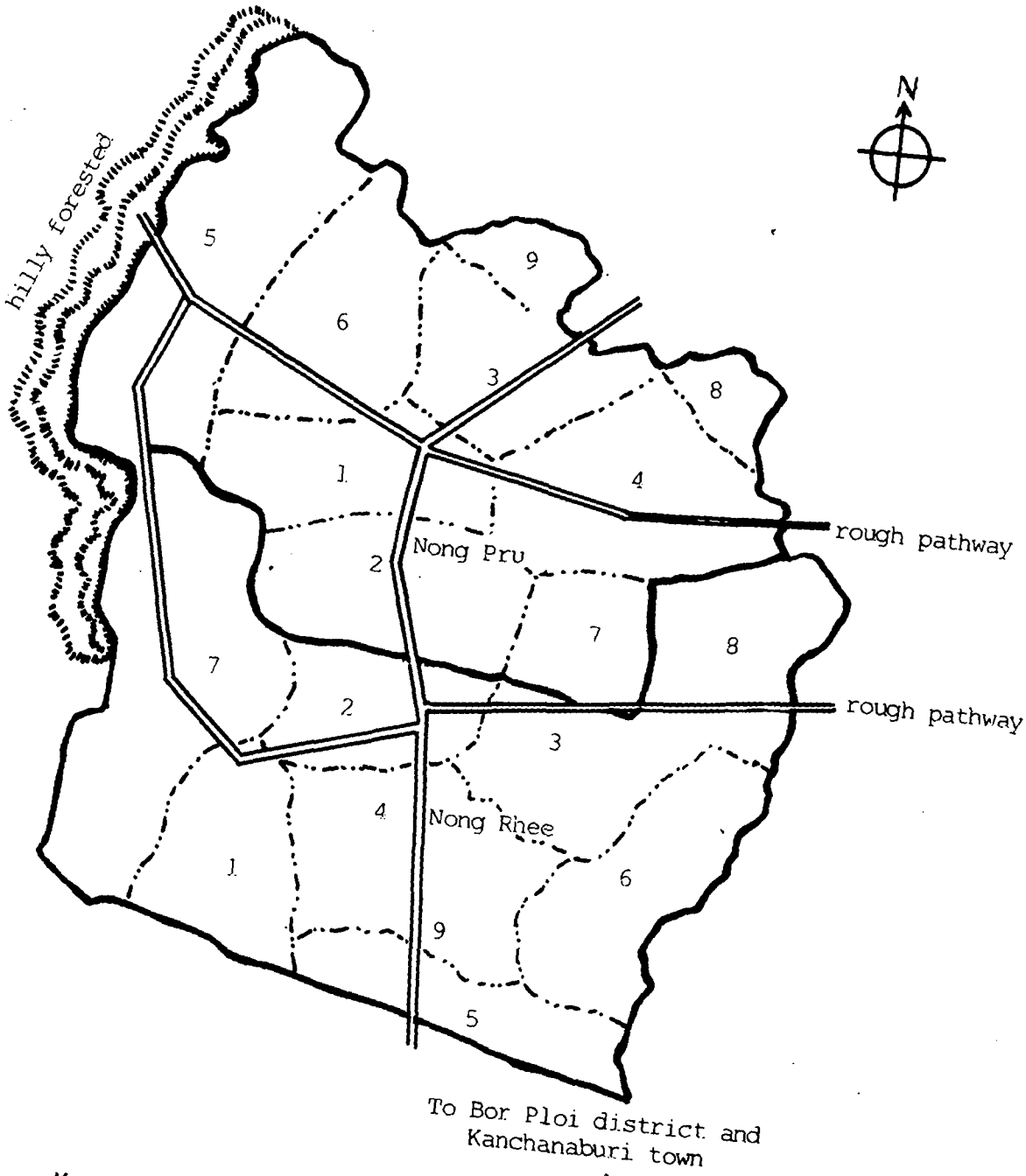
## MATERIALS AND METHODS

Patients visiting a malaria clinic in Bor Ploi district of Kanchanaburi province were interviewed during January 1981. Only adult cases age 15 and over were included. In order to avoid recollection errors on the part of the patients, repeated visits were excluded. In addition, for the sake of expediency in following up some of the patients, few cases originating from area outside Bor Ploi district, were also excluded. Altogether 60 patients were interviewed. After the interviews at the clinic, follow-ups of a sample of 18 patients at their home were made. Each selected patient was revisited two or three times at an interval of 6 days. In order to make the interview less formal and more flexible, it was tape recorded throughout without the knowledge of the subject patients. A short interview guideline was developed based on Igun's health-seeking model (5).

The malaria clinic is located in village no.2 of Nong Rhee subdistrict of Bor Ploi district, Kanchanaburi province. The clinic was set up in 1978, and its catchment area is mainly Bor Ploi district. The district is classified in control phase. However it is the two subdistricts of Nong Rhee and Nong Pru which are malarial "problem area". The area is a newly opened forested area mainly used for sugarcane plantations. Due to its plantation economy, demand for labor is high, and thus it could not be met entirely by local labor supply. Resultingly there has been considerable number of migrant workers mostly from Northeastern provinces moving in and out of the area twice a year during planting (June-July) and harvesting seasons (January-March). Malaria has been found to be endemic throughout the year in the area, especially in the mountaneous and forested part of village no. 7 of Nong Rhee and village no.5 of Nong Pru (see Map 1).

## RESULTS

As shown in Table 1, most of the patients interviewed are in the working-age group of 16-30 years, and a larger proportion of them are male. This is quite agreeable with results of another study in the same area that relatively working-age male were more susceptible to malaria infections due to their greater extent of out-door employment and leisure activities and hence the higher probability of vector contact (8). Just like the average rural Thais, the patients were not well educated, having merely 4 year compulsory education or even less. They were predominantly engaged in sugarcane production, Only few of them pursued cassava and




Map 1. Showing Nong Rhee and Nong Pru Subdistricts

tobacco cultivation. Somes were involved in tin mining. With respect to work status, almost half of the patients were sugarcane plantation workers. Some of these patients were temporary migrant workers from the Northeastern region. The rest of the patients was self-employed in family sugarcane or cassava fields; yet none of them were big sugarcane plantation owners.

Out of 60 patients interviewed, 30 were detected as malaria cases. Thirteen cases were infected with P. vivax; the rest was P. falciparum.

Table 1 Selected Social Demographic Characteristics of the Sample Patients (N=60)

| Characteristics | Number |
|---|---|
| Sex | |
| male | 35 |
| female | 25 |
| Age | |
| 15-20 | 22 |
| 21-30 | 18 |
| 31-40 | 9 |
| 41-50 | 10 |
| > 50 | 1 |
| Marital Status | |
| married | 33 |
| single | 24 |
| divorced or separate | 3 |
| Education | |
| No formal education | 10 |
| 4 years or less | 42 |
| > 4 years | 8 |
| Occupation | |
| agriculture (sugarcane) | 38 |
| agriculture (tobacco, cassava and other crops) | 12 |
| mining and others | 10 |
| Work Status | |
| wage laborer | 24 |
| self-employed or family workers | 36 |

As shown in Table 2, the patients at the malaria clinic came mainly from Nong Rhee and Nong Pru subdistricts, suggesting that geographical distance might be a factor influencing utilization of malaria clinic. In addition, Table 2 also reflects epidemiological condition of malaria in the area--that is malaria transmission was concentrated in the western part of Nong Rhee and Nong Pru [Ban Lam Yzu (village No.7) and Ban Kra Proi (southern part of village no.5)] which was mainly mountaineous and heavily forested (9).

Table 2 Locational Distribution of Patients

| Location (subdistrict and villages) | Total number of patients | Number of positive cases |
|---|---|---|
| Nong Rhee subdistrict | 30 | 15 |
| Village no. 7 | 14 | 7 |
| " no. 2 | 3 | 3 |
| " no. 8 | 2 | 2 |
| " no. 3 | 2 | - |
| " no. 1 | 3 | 3 |
| " no. 4 | 4 | - |
| " no. 9 | 2 | - |
| Nong Pru subdistrict | 21 | 3 |
| Village no. 5 | 10 | 3 |
| " no. 3 | 4 | - |
| " no. 2 | 3 | - |
| " no. 1 | 2 | - |
| " no. 8 | 2 | - |
| Bor Ploi subdistrict | 8 | - |
| Nong Gum subdistrict | 1 | - |
| Total | 60 | 20 |

## Patterns of Care-seeking

The unstructured interviews gave accounts of the patients' treatment patterns and the process of taking such treatments

before presenting themselves at the malaria clinic. Analysis of these illness behavioral patterns shall be made based on the accounts of sixty patients. But, first of all a brief description of existing alternative sources of care from which villagers in the study area could choose, is needed.

Sources of care

From the interview accounts, in addition to the malaria clinic, there exists three other major alternative resorts, from which the self-suspected malaria patient were free to choose--that is self-medication, injectionist clinic and health center. Not a single case in our sample reported usage of traditional healer.

Table 3 Initial Source of Care of Malaria Patients

| Source | Number of patients (%) |
|---|---|
| Self-medication | 47 (78.3 %) |
| Injection clinic | 5 ( 8.4 %) |
| Malaria clinic | 8 (13.3 %) |
| Total | 60 (100.0 %) |

Self-medication implies the use of medicines for treatment without consulting any formal or informal medical attendants. In the village patent medicines for common ailments like headache, cold, and malaria could be bought easily from small grocery shops. Medicines acquired in the village are usually in the form of a packet for specific ailments or symptoms, referred to as ya-shud (packet medicines). For example, a packet of medicines for malaria might be consisted of tablets of Chloroquine, Mepacrine, and other antimicrobial drugs. More variegated patent drugs, however, are availiable from drugstores in subdistrict market towns.

Injectionist clinics refer to lay pharmacists and injection doctors who own a drugstore and gain a reputaion of socalled local doctors among local populace through practice of prescribing mostly patent medicines, and giving injections. Some of them are

former army medical orderlies. Note that government health center officials, i.e., junior sanitarian, midwife, who own a drugstore or keep a small stock of medicines at their home, and provide medical care on a private basis, are also classified as injectionist clinics. This is justified by the fact that these health workers were trained very little in curative medicine, and in their private practice, they prescribed patent medicines and gave injections like a typical injectionist. In Nong Pru market place, both the junior senitarian and the midwife own a drugstore. Note that the injectionist here is distinguished from a "traveling injectionist" who, despite possessing skill in giving injections, does not operate a drugstore or work full-time as an injectionist (10).

Table 4 Treatment Patterns of Malaria Patients

| Patterns | Number |
|---|---|
| One Stage (symptom experience ⟶ malaria-clinic (MC) | 8 |
| Two Stages | 32 |
| self-medication (SM) ⟶ malaria clinic (MC) | 28 |
| injection clinic (DC) ⟶ malaria clinic (MC) | 5 |
| Three Stages | 19 |
| SM ⟶ DC ⟶ MC | 10 |
| SM ⟶ health center ⟶ MC | 5 |
| SM ⟶ traveling injectionist ⟶ MC | 2 |
| Four Stages | |
| SM ⟶ DC ⟶ army medical unit ⟶ MC | 2 |

A health center is usually staffed by a junior sanitarian and a midwife. It provides mostly preventive services and treatment of common ailments. In village no.2 of Nong Pru subdistrict, there is an army field station which also keep a medical unit (without M.D.,) Naturally nearby villagers made use of this medical unit. Here the army medical unit is treated as a unit equivalent to a health center.

Treatment patterns

The fact that out of the 60 patients there were only 7 whose visits at the malaria clinic were their initial resorts (see Table 3) obviously indicated that the rest of 53 patients must had traveled through series of treatments which, however, failed to recover their illness. For such an ailment as malaria the symptoms of which could not be easily distinguished from common cold or fever, it is natural to expect that the malaria clinic was not the first choice for most of the people.

Series of treatment which the patients had gone through until arriving at the malaria clinic were categorized into 4 major patterns (see Table 4). Discussion of each pattern and example cases is made below. Although a single blood test at the malaria clinic could not tell definitely that the patient was free from malaria, we found it useful to distinguish between patients with positive and negative blood tests in our discussion of treatment patterns.

One stage pattern : symptom experience ⟶ MC

Two out of eight patients in this pattern were found with P. vivax infection. The two patients perceived immedicately right after their symptom experience that they had malaria. This was so because both of them had malaria several times before and were quite acquainted with the malaria clinic. In fact there were reasons to believe that they were relapse cases. It appeared that correct assessment of symptom or self-diagnosis probably contributed to the choice of malaria clinic. However, closer examination of past experience in searching for treatment of malaria did not confirm this. It was more likely that for these two relapse patients the presently observed visits at the malaria should be viewed as an outgrowth of past health-seeking experience of each patient. One of the two cases was a young woman who had malaria so many times that her perceived severity of malaria was markedly low. She came to the malaria clinic several times. Yet she did not take the full dosage of medicine prescribed by the clinic, because malaria came and went within a few days. She resultingly kept the left-over medicine for the next time she developed the same old symptoms of malaria. When she was infected and no drugs were available at home she would then go to the malaria clinic. Another case which serves as our example also revealed that the use of malaria clinic at the time of interview was an outgrowth of at least two repeated malaria infections and the associated treatment behavior. The more increasing frequence of malaria attack, the more he felt scared of malaria, and, of course, after trying several sources of treatment, malaria clinic was eventually proved

to be the most reliable.

Among the 6 patients whose blood-slides were negative, all appeared to make assessment of their symptoms as malaria, and hence came forward directly to the malaria clinic. However, factors that accounted for such assessment were varied. Two cases had experienced an on-going sickness that was not clearly diagnosed by hospital, but the patients had the impression that it was malaria. Thus whenever they had such symptoms as fever and headache, they came forward to the malaria clinic, deliberately not taking any medicine in order to increase the likelihood of locating the malaria parasites. Other two patients did not have experience of malaria, and hence did not perceive their symptoms as malaria by themselves. However certain significant others or lay referees assessed the symptoms and recommended visit to the malaria clinic and meanwhile should not take any medicine. Given that the patients recently stayed overnight in certain forested areas which were not malarious free, they went along with the assessment and recommendation of the significant others. The final case was infected with malaria 5 months ago. He developed the symptoms of ache and pain in the body and head and suspected he might have malaria. More importantly he just came back from forested malarious area 10 days ago and planned to go again in the next few days, His symptoms were apparently mild. His motivation in visiting the malaria clinic was apparently prevention.

Example case 1

Male, 17 years of age, a native of a Northeastern province, just moved to join his parents in pursuing tin mining in mountaneous terrain of village no.7 of Nong Rhee 7 months ago. At the malaria clinic he was found infected with P. vivax. However this was not the first time he had troubles with malaria. Within the first week of his arrival he developed fever, headache, and frequent vomiting. One of the neigbours told his father that he was sick from malaria and suggested Fansidar for cure, and recommended a visit to the malaria clinic. Father bought some Fansidars for him, and after a few days, the symptoms disappeared. Three months later the same symptoms developed again. This time father asked him to contact the malaria clinic. He forbade his son to take further medicines; otherwise malaria parasite would not be detected at the clinic. He had endured fever for 4 days without taking any medicine before coming to the clinic. Three months later the same symptoms came again, but this time, more severe. He and his father assessed the symptoms as the same old malaria. An traveling injection doctor who happened to be in this area to dig

tin ore was asked to come to take a look. The injection doctor said he had malaria and gave him injections. Yet his conditions did not improve. Father bought some more Resochin, mixed it with saline and asked the same injection doctor to administer the intravenous fluid.

He still did not recover. Father decided to bring him to the malaria clinic. After taking medicines prescribed by the clinic, he gradually recovered.

Yet a week later, fever with chill and shivering came again. Immediately he recognized the malaria fever. He communicated his symptoms to his father. Father made the same assessment and told him to go to the malaria clinic. The young man tolerated his fever for 4 days without taking any medicine before coming to the malaria clinic.

Example case 2

Male, married, age 27 years, a sugarcane cultivator. The man experienced repeated illness episodes the symptoms of which he perceived as malaria. He went to hospital several times for treatment. Doctor did not tell what was wrong with him. He came to the malaria clinic several times for blood-smear examinations, but time after time the tests were negative. He kept worried about his health. This time he had fever for three days. He did not take any drugs. He perceived it as malaria, and again went to the malaria clinic for a diagnosis.

Example case 3

Male, age 48 married, a sugarcane and rice clutivator. The man had no experience of malaria at all. Five days after returning from a 2 days trip to a deep jungle on the northern border of Bor Ploi district, he felt sick with fever and ache in the body and head. His own assessment was just common cold fever. However his wife suspected that the symptoms might be malaria and suggested a visit to malaria clinic. The wife herself has never been sick from malaria; however, several years ago she saw her own brother being sick from malaria and treated by the malaria clinic. However, he did not believe his wife. He talked to one of his close neighbours about his sickness. The neighbour assessed the symptoms as malaria, and recommended that he should go to the malaria clinic, and meanwhile should not take any medicine. As he had more headache, he became more suspicious that he might get a malaria, and finally decided to visit the malaria clinic.

Two stage pattern

a) self-medication ——→ malaria clinic

This was the most prevailing treatment pattern. Twenty eight out of the total sixty patients started with self-treatment and ended up with the malaria clinic. However only 8 patients were found infected--5 with P. vivax and 3 with P. falciparum.

These 8 dianostically proved cases assessed their initial symptom experience differently. Due to lack of experience of malaria, 3 patients and their significant others diagnosed the symptoms as cold and fever. Resultingly they took analgesic drugs of varied brand names for self-treatment. It went on for 3-4 days but did not effect the cure. Instead, symptoms particularly fever and headache got worsening. Then a new diagnosis was suggested particularly by significant others who had experience of malaria and the malaria clinic. However, accepting the new diagnosis was not immediately followed by visits to the malaria clinic as recommended. One of the patients upon the perception of malaria attack, bought packet antimalarial drugs and continued with self-treatment course for another 5 days. After it failed to effect the cure, she was urged by her son to go for treatment at the malaria clinic. The fact that she was a busy housewife and at that time had to look after her son who had a car accident made her reluctant to be out to the malaria clinic. It appeared that correct perception of malaria attack did not necessarily bring the patient to the malaria clinic.

Because of the experience of repeated attacks of malaria, the other 5 malaria-infected persons immediately assessed the onset of initial signs and symptoms as malaria. Yet these patients resorted to self-treatment. At least for 3 patients, malaria was a common disease and hence their perceived threat of malaria was low. Unsurprisingly self-treatment was tried first by taking packet antimalarial drugs. The other two self-treatment cases, however appeared not to be deliberate actions. Analgesic drugs were taken merely to relieve fever before going to the malaria clinic. The decision to go to malaria clinic after failure of self-treatment was made frequently in accordance with recommendations by experienced significant others. Some patients used to come to the malaria clinic when they were sick of malaria. These patients, because of repeated attacks of malaria, came to the clinic at this present time with the expectation that they could be made fully recovered. Note that for most patients, the significant others played important role in encouraging the patients to go to the

malaria clinic.

As for the rest of 20 patients whose symptoms were not confirmed to be malaria infection, the analysis of factors accounting for their two stage treatment behavior yielded similar conclusions with those of the positive blood-slide cases.

Twelve patients failed to make assessment of their initial symptoms as malaria. Thus all of them resorted to taking analgesic drugs for self-treatment of self-diagnosed common cold and fever. Four patients, three of which were Northeastern migrant workers, never had malaria before, so it was not possible for them to assess the symptoms as malaria. The rest had contracted malaria before, but it was in too distant past to help them make the current diagnosis as such. Upon the failure of self-treatment in effecting the cure, a new diagnosis of malaria was made. Note the markedly important role of significant others in the reassessment of symptoms and recommending the patients to go for treatment at the malaria clinic. For the Northeastern migrant workers in sugarcane plantation, the significant others were apparently the plantation owners and their fellow workers.

Four patients made the initial assessment of their symptoms as malaria, and thus resorted to self-treatment with packet antimalarial drugs. Upon failure of self-treatment, they turned to the malaria clinic. Again the important role of significant others in this transition was apparent. Note that 2 of these 4 patients had undergone repeated episodes of malaria.

Under a very unique experience of wittnessing cases of severe attack of malaria, the rest 3 patients became highly afraid of malaria after the onset of headache and some fever. Thus they came to the malaria clinic for diagnosis apparently with precaution motive. Here analgesic drugs were taken instead of packet antimalarial drugs just for the purpose of relieving headache and fever.

Example case 1

This is a 36 year old Northeastern migrant sugarcane plantation workers, together with her husband and 4 children in village no.7 of Nong Rhee. The family was poor, owed at last 2,000 Bahts to the plantation owner. Not any one in the family was familiar with malaria. Two of the children had recurrent steady fever for 5 days. The parents did not notice it mainly because during the day both of them were away in the sugarcane field and the children were left behind at the migrant huts. The plantation owner's wife

told the mother about her children getting malaria and suggested visits to the malaria clinic. However she did not take the suggestion, and argued that the health officials at the clinic might not treat her children well because she did not know them personally. Subsequently one of the plantation workers again told he that the children were sick from malaria and encouraged her to bring them to the malaria clinic for treatment. She dicided eventually to bring the children to the malaria clinic, but disappointed because it was a holiday and the clinic was closed. She then consulted with a nearby drugstore which prescribed an injection and some pills costing her 50 bahts.

Yet the treatment did not effect the cure. Meanwhile the mother herself developed symptoms of mild fever, pain in the body and head. Initially she thought it was due to her eating improper food, and the pain, to physical hardwork in the field. She then took analgesic drugs. Other workers noticed her symptom and assessed that she contracted malaria from her children. They recommended that she and her children should go to the malaria clinic. Because the analgesic drugs she took did not effect the cure, she soon suspected being sick from malaria. Meanwhile her children did not seem to recover a bit. She decided to go to the malaria clinic but had to delay the trip for 2 days, until the time she could get paid, and rode with the plantation truck to the Nong Rhee market place which was about 8 kilometres from the plantation.

Example case 2

A young man, age 18, lives with his parents who cutivate sugarcane in village no.1 of Nong Rhee. He was found infected with P. vivax. He had malaria once six years ago. This time, initial symptoms started with ache and pain in the body and head during mid-day and mild recurrent steady fever. He communicated this symptom experience to his parents and brothers who assessed it as common cold, which he agreed. He took analgesic drugs which were available in the house. three days of self-treatment did not significantly effected the cure, Even worse the fever ran high with chill and shivering, making him and his parents reassessed the symptoms as malaria. One of his brothers who used to be ill with malaria and fully recovered at the malaria clinic told him to go to the malaria clinic.

Example case 3

This is a 18 year old man staying with his parents who cultivate tobacco field in village no.7 of Nong Rhee. He had malaria

attacks several times before. For mild malaria symptoms he usually bought packet antimalarial drugs for self-treatment. If not recovered, a drugstore in the market place of Nong Rhee was the next most accustomed place to go for treatment. He himself had never gone to the malaria clinic for treatment. However, his father and brother used to have malaria and fully recovered after treatment at the malaria clinic. This time initial symptoms came with fever and shivering, headache, and vomiting. Symptom assessment was immediately made by him that it was the same old malaria. He communicated his symptoms to his mother who boutht packet antimalarial drugs for his self-treatment. Yet his condition did not improve. As time went on, the fever with chill and shivering became more recurrent and lasting longer. He became very weak and had to assume sick role. Having wittnessed the worsening condition of his son this time, the father became worried and told him to go for diagnosis at the malaria clinic. The day before he came to the clinic he did not take any medicine for fear that malaria parasite would escape detection.

Example case 4

A single 18 year old man staying with his family who cultivates sugarcane in village no.8 of Nong Rhee. This man had experienced malaria infections quite repeatedly. He recognized well the signs and symptoms of malaria. His elder sister was an army village health workers who supplied him with bottles of Quinine and Chloroquine, Whenever malaria symptoms were developing, he would take some of the pills. The treatment effected the cure but not complete recovery. He soon would developed malaria again. This time when the symptom came he knew it was malaria, and took some Chloroquines. for all along, his father kept a look at his repeatedly illness episodes with a worrying eye. This time when Chloroquines did not help he brought his son to the malaria clinic to prove whether his son was sick from malaria or what?

Example case 5

This is a 43 year old Northeastern migrant worker who just moved here to work in a sugarcane plantation in village no.7 of Nong Rhee two weeks ago. Initial symptoms started with severe headache and fever in the evening. He had no experience with malaria and thought he cought a cold. Packet anti-cold drugs were bought from a store in Nong Rhee market place. He did not recover The next 2 days he was unable to work. The plantation owner's son asked about his sickness and said he might contract malaria. He believed so because there were lots of mosquitoes around the

plantation. Because there were at least 5 workers who fell ill at the time, the owner's son decided to take them altogether to doctors at Nong Rhee. He himself was taken to the malaria clinic.

Example case 6

A young man of 19 years of age, staying with his elder brother in Bor Ploi subdistrict. During the year he contracted malaria several times. Whenever symptoms of fever with shivering and headache occured to him, he knew it was malaria. Usually the care-seeking pattern began with self-treatment with packet antimalarial drugs. If not better, he went to the malaria clinic in Kanchanaburi provincial town which is about 30 kilometres from here. This time when the same symptoms came, he immediately took packet antimalarial drugs as usual. For 3 days the drugs did not affect the cure. His brother told him to stop taking any more drugs and next day took him to the malaria clinic at Nong Rhee. He had no idea about this malaria clinic before. However, his brother contracted malaria recently and was recovered by treatment at the malaria clinic.

b) injectionist clinics $\longrightarrow$ malaria clinic

Five patients followed this treatment pattern; yet only one was found infected with P. vivax. All the patients did not assess their initial symptoms as malaria, although some of them claimed having experienced malaria before. The choice of injectionist clinics as the first source of care seemed to be explained by two factors. For all the 5 patients a certain injectionist clinic appeared to be the place they and their families were most familiar with when medical needs arose. Specifically they were well acquainted with the socalled doctor who operated the clinic. Moreover, these clinics or drugstores were not far away from their residences. In another words, physical and social proximities to the villagers are important characteristics of these places. Furthermore, special health conditions of some patients, i.e. cardiacneurosis, asthma, often discouraged them from uncareful self-treatment course. The nature of symptoms and treatment reassessment which precipitated visits to the malaria clinic were rather varied. For 2 cases, experience of malaria and the malria clinic, especially that of repeated illness episodes, helped to form a new self-diagnosis and transition to the malaria clinic. For the rest, significant others had influence on the reassessment and selection of further treatment. If was noteworthy that for 2

cases, the injectionists themselves made the new diagnosis as malaria and referred the patients to the malaria clinic.

Example case 1

This is a 27 year old man, married with one child, a small sugarcane cultivator in village no.1 of Nong Rhee. He claimed he used to have malaria three years ago; yet not confirmed by laboratory test. Two day ago he had fever with shivering. He did not make a clear-cut self-diagnosis, just knowing it was fever, and had no idea of its possible causes. He went straightforward to consult an injectionist at his drugstore in nearby village. This was natural because his family and relatives usually went to this doctor for care. The doctor prescribed 3 sets of packet drugs but did not tell what was wrong with the patient. The patient, however, asked to buy some additional analgesic drugs of certain brand. Next day the fever still persisted. Note that a month ago he was troubled by the same symptom of fever. At that time he went to the same doctor who said he had malaria and prescribed 5 injections an administered a bottle of intravenous saline to him. The patient eventually recovered. So this time when the fever came again and medicines prescribed by the same doctor did not work, the patient was suspicious that he might get a malaria attack. Note that his wife and other relatives living nearby neither knew nor had experience of malaria. He communicated his symptom reassessment to his brother-in-law, and went to the malaria clinic. He was accompanied by his brother-in-law.

Example case 2

This is a 21 year old man, married. He owns a small automobile repair shop in Nong Rhee market (village no.2). A year ago he contracted a malaria fever. At first he did not notice it. So he consulted an injectionist who was in fact his good neigbour. The doctor said he cought a cold and gave him injections. He did not get better. The doctor reassessed that he might get a malaria and recommended going to the malaria clinic for a diagnosis. At the malaria clinic, he was found infected with malaria. This time the symptoms came with fever and thirstiness. The next morning he told his wife about the symptoms and said he would go to the next-door injectionist clinic. The doctor said he might be getting a malaria, and should go for blood-smear examination at the malaria clinic.

Three stage pattern

a) self-medication→injectionist clinic→malaria clinic

Ten patients were classified into this three stage health-seeking path. Out of these 10 patients who were present at the malaria clinic only 3 were confirmed as positive (P. vivax).

Two of the three positive cases were migrant sugarcane workers from neighbouring Supanburi province who had no experience of malaria at all. Unsurprisingly, the initial signs and symptoms were assessed as common cold and self-treatments with anti-cold drugs were taken. For one patient, failure of the initial resort led to new symptoms assessment as malaria; however, self-treatment was retained. Packet antimalarial drugs were taken instead. Still it did not effect the cure. For these two patients, the transition to the injectionist clinic was suggested and arranged by their significant others. The influence of the significant others was also evident in the shift to the malaria clinic. In fact for one case, it was the injectionist himself who recommended the transition to the malaria clinic.

One particular relapse case of malaria which is our example case below indicates the possible interacting effects of various factors on delay in the search for appropriate treatment. Ignorance of malaria on the part of the patient and his significant others, together with their unfamiliarity with the community could possibly resulted in long delay in treatment. This is the case of a young migrant worker and his father.

With respect to the seven unconfirmed patients, four were Northeastern migrant workers. In term of initial symptoms assessment, all of them did not think of malaria. The transition to injectionist clinics could be explained simply interm of physical and social proximities of the chosen clinics. The change to malaria clinic was made naturally after failures of treatments by injection doctors, and in accordance with the recommendations of significant others who, in the case of migrant workers, were mostly the plantation owners, and fellow workers. Note that at least for 2 patients who were local residents, it was the injectionist clinics who referred the patients to the malaria clinic.

Example case 1

This is a 16 year old female migrant worker from Supanburi province. Her father and his 5 sons and daughters including herself were employed to work seasonally in a sugarcane plantation in village no. 2 of Nong Rhee. She experienced the symptoms of fever

with shivering an ache/pain in the body and head. She communicated the symptoms to her father who diagnosed them as just fever, and bougth her some analgesic medicines. After taking the medicines she felt better. However, after hardwork in the plantation the same symptoms came again, which prompted her to take the left-over medicines. The symptoms had never completely gone. They had been off and on for a month. Some neighbours and fellow workers told her father that she might get a malaria. Yet her father did not believe so. He himself had worked here seasonably for almost 5 years, but never had malaria infection. Lately her headache became more severe. Her father knew someone at the army medical unit in the village and wanted to bring her there. Yet she was too weak to go. Nevertheless he went alone and bought back some medicines. Her condition did not improve still. The plantation owner told her father to take her to some good doctor. So he brought her to the health center approximately 4 kilometres away from her home. The worker did not tell what was wrong with her, but just administered an injection and prescribed some medicines. She had gradually recovered herself. So she went out to work again. After two or three days, the old symptoms of fever and headache came to her again. This time it continued for another 10 days.

Fellow workers told her and her father again that they thought she got a malaria attack. Her father half-heartedly believed so. Anyway he bought 2 packet of malaria drugs from the village grocery shop for her. Yet the new drugs did not fully effect the cure. Her father decided for her to go to the same health center again anticipating an effective cure as the last time she was treated there. Arriving at the health center, they found it closed. So they went into the Nong Rhee market place, not far away from the health center. Passing an injectionist clinic in the market, her father thought of having the doctor to examine her conditions. The lay doctor diagnosed that she might get a malaria and should go to the malaria clinic for diagnosis and treatment.

She was found infected with P. vivax.

Example case 2

A 21 year old Northeastern migrant worker in tobacco plantation in village no. 7 of Nong Rhee. This man claimed having malaria once six years ago. Yet it was not confirmed by laboratory test. This time he had recurrent fever with shivering and headache. He tought it was just fever. After taking analgesic drugs for 3 days without any signs of improvement, the plantation owner assessed his symptoms as malaria and offerred to take him to an

injectionist clinic at Nong Rhee market. The doctor said he was sick from malaria, and administered to him a dosage of medicine mixed with intraveneous saline. Some tablets were also prescribed for him. However, his condition did not improve much and still was not able to work. At this time the head of the malaria clinic, in a house-to-house visit mission, came across the patient. He then told the plantation owner about the malaria clinic and asked him to send the patient there for diagnosis and treatment. The plantation owner did not know about the clinic before. However he was kind enough to take the patient to the malaria clinic. Malaria parasite was not found in the patient's blood, however.

b) self-treatment ⟶ health center ⟶ malaria clinic

Five patients pursued this three stage behavioral pattern of care-seeking, Malaria infections were detected only in 3 patients--one with P. vivax and other two with P. faciparum. Their initial assessment of symptoms and its relationship to self-treatment as well as the kinds of medicines used were quite similar to other patients whose treatment process began with self-medication. These 5 pateints were distinguished from others in their choice of health center as second source of care. Mostly health center was chosen because the patients and/or their significant others were familiar with it. In additon, the location of the health center was also important for this group of patients. The most interesting dimension of the present treatment pattern was that for all the cases it was the health workers at the health center who referred the patients to the malaria clinic without giving them any prior treatments. The same thing might not happen if the same patients were to see them at their clinics, however.

Example case 1

This is a 42 year old married women, a worker in a sugarcane plantation in the south of village no.5 of Nong Pru subdistrict. She alleged that she had experienced malaria twice. The last attack happened a month ago. At that time she went to the health center in Nong Pru but was referred to the malaria clinic. However, malaria parasite was not detected. This time, she had troubles with recurrent fever and severe headache. It was assessed as the same old malaria again. Her son bought some packet antimalarial drugs for her self-treatment. However, her conditions were worsened. Next day she was accompanied by her husband to the Nong Pru health center which was about 6 kilometres from her place. She expected that the doctor at the health center would administer to

her an injection so that she could quickly recover and go back to work. She also argued that the malaria clinic only prescribed medicines but did not administer injections to patients. However the health center doctor did not give injection but told her to go to the malaria clinic. She was found infected with P. falciparum.

c) self-medication ⟶ traveling injection doctor ⟶ malaria clinic

Two patients followed this care-seeking pattern, but only one was found infected with P. falciparum. Both the two patients had no experience of malaria themselves. Initial symptoms were assessed as common cold and fever. So they started with the usual practice of self-treatment. The notable feature of the present pattern was the transition from self-treatment to traveling injection doctors. The choice of traveling injectionists appeared to be determined by the fact that the patients' families lieved in a highly remote and mountaneous area where transportation was difficult. In such area, the service of traveling injection doctors was the only kind of medical care available in addition to self-treatment. Note that it was not the decision of the patients themselves to call for the injection doctors. Their parents simply decided for them. At this point the symptoms were not assessed as malaria. After injections failed to effect the cure and the patients' conditions were getting worse, the parents became suspicious of malaria and decided to take the patients to the malaria clinic.

Example case 1

A 20 year old women, married but separated, now living with their parents who were tin mining workers in the mountaneous part (Khao Puongmao) of village no. 7 of Nong Pru subdistrict. A month ago she started tc have troubles with headache and fever, and was unable to work. Her parents and herself thought it was simply common cold. After a day of self-treatment which did not affect the symptoms, the parents sent somebody to call for doctor Vichien who was an injection doctor. Doctor Vichien was a former army medical orderly, he was up here 3 months ago to work as a miner. Without making his diagnosis known to the patient or her parents, the doctor administered injections to her. After two injections the patient's condition got worsening. She refused to have more injections. Afterward she continued with her self-treatment with Tamjai, a popular brand of analgesic drug. Her symptoms continued, however. Her father said it was a chronic fever but her mother thought it might be malaria. A few neighbours also made the asses-

sment as malaria. Finally her mother decided to take the patient to the malaria clinic. Yet they had to wait for another two days because only every Wednesday that there was bus leaving for Nong Rhee market, about 14 kilometres from their residence. The patient was found infected with P. falciparum.

Four Stage Pattern (self-treatment ⟶ injectionist clinic ⟶ army medical unit ⟶ malaria clinic)

In this treatment pattern there were only two patients. Both were found infected with P. falciparum. The four-stage here just represented the four major resorts used. Yet detailed examination of each of the patients' accounts shown that it was in fact a very complicated care-seeking process resulting in long delay before reaching the malaria clinic. Here self-treatment stage was rather short. However, because the patients and their significant others were not knowledgable about malaria, and, more importantly, the injectionist failed to assess the patients' symptoms as malaria, visits to the injectionist clinic were excessively repeated. Moreover, that the patients, although knew about the malaria clinic, possessed negative attitudes towards the malaria clinic and their own psychological inferiority also contributed to their reluctance to go to the malaria clinic. Eventually, however, with the help of significant others, the patients came to form a new symptom assessment as malaria, and managed to go to the malaria clinic. Because the full accounts of this illness behavior is clearly revealed in the example case below, further elaborations are not needed here.

Example case 1

This is a 36 year old man. He and his family own a small sugarcane plantation in village no. 1 of Nong Rhee subdistrict. Having lived in this village for more than 10 years, yet he himself never have experience of malaria. Initial sign came as headache which he thought was a common cold symptom. Therefore self-treatment with analgesic drugs was tried. After two days of headache, fever came along. He decided to see doctor Chan who owned a drugstore in nearby village. This drugstore was his usual source of medical attention. He expected that doctor Chan would give injections and administer to him dosage of glucose-saline which he believed would make him quickly recovered, so that he could go back to work. Doctor Chan prescribed an injection and some medicines. However it did not effect the cure, and he came back to doctor Chan again. Visits to doctor Chan's clinic were repeated 5-6 times without signs of improvement. Meanwhile his parents and

relatives came to visit him. Yet no one knew about malaria and hence did not suggest any symptom assessment. They just suggested that the patient should go to a hospital. He was afraid of leaving his wife alone in the house; so he refused to go to the hospital. Repeated failures of treatment at doctor Chan's clinic made him suspicious that he might get a malaria. To confirm this he talked to a neighbour who lived a bit farther away from his home and whose son had a malaria attack a year ago. That neighbour suggested going to the malaria clinic for a diagnosis and warned him not to take medicines for atleast 1 or 2 days before going for blood test there. He became more convinced about the possibility of a malaria attack and communicated this to his wife. However he was reluctant to go to the malaria clinic because he had heard that the malaria doctors were intermittently not on duty, and patients often had to wait for him for long time. He was afraid he was too sick too wait. In addition he doubted that people at the malaria clinic would treat him well because they could not get money for the services. So he decided to go to see doctor Chan again. This time he told the doctor about his self-diagnosis of malaria. The doctor then prescribed some packet antimalarial drugs to him. Again it did not effect his cure. With repeated failures of doctor Chan's treatments, the patient decided to go to the army medical unit in the village. His wife kept on asking him to go to the malaria clinic. But he refused. Again treatment by the army medical unit was ineffective. Recently he talked about his sickness to his wife's brother who happened to have quite similar symptoms. Finally they dicided to go to the malaria clinic together.

Beyond the Malaria Clinic

To complete the chain of health-seeking stages from the onset of malaria infection to recovery, 18 out of the total 60 patients were followed up. They were consisted of 6 cases of P. falciparum, 8 of P. vivax, and 4 of unconfirmed or negative blood-test patients.

Out of the 14 confirmed patients 8 rapidly recovered. For the rest, malaria symptoms had been lingering on; some even had complications of severe coughing as well as vomiting. For this group, further treatments are sought. Four patients went to injection clinics, two back to the malaria clinic, and one to self-treatment with analgesic drugs in addition to the prescribed radical treatment from the malaria clinic. Note that only 2 of out of the 4 patients at the injection clinics were given treatments at all. Afterward 4 of the 7 cases recovered, the rest sought further

treatment. One was admitted to a hospital in Bor Ploi district hospital, the other two went to the Nong Rhee malaria clinic and the malaria clinic in Kanchanaburi provincial town respectively.

As a rule every positive case was asked to revisit the malaria clinic a week afterward. Yet only 4 out of the total 14 positive cases did so. Apparently the reasons for making revisits on the part of these patients were not complicance per se. Three of them came evidently because of their lingering symptoms.

With respect to the negative cases, all except one gradually recovered after presumptive treatments at the malaria clinic.

Patients' compliance with recommended drug dosage

The prescribed dosage of antimalarial drugs for the positive cases at the malaria clinic was shown in Table 5. The dosage for radical treatment of P. vivax deviated from the standard dosage set by the Malaria Division. During the follow-ups, information on the dosage of antimalarial drugs actually taken by 13 positive cases were recorded (excluding one who was hospitalized). As for the eight P. vivax cases, there was only one woman patient who failed to take the correct dosage, just because her husband took some of these tablets for his own treatment of fever. Critical problem, however, lay in cases of P. falciparum. None of the patient was able to adhere to the recommended dosage (see Table 6).

At the malaria clinic, dosage of drug consumption was verbally explained in a routine maner to each patient. However, all kinds of drugs were put together in one bag, and no dosage instructions were written on it. As was evidently clear from Table 6, the failure among P. falciparum cases to observe the prescribed dosage was due simply to the fact that the patients were unfortunately not able to remember the verbal instructions. Apparently, the prescribed dosage for P. vivax was much easier for the patients to remember. Hence the recommended dosage could be closely observed.

## DISCUSSION

Depth interview with patients present at the malaria clinic illustrated pathways of alternative medical resorts the malaria patients have passed along before eventually arriving at the clinic. These medical resorts are varied, ranging from self-

treatment with patient drugs available mostly in packet form at village grocery shops. malaria clinic to hospital. This variegated medical system is the context which give rise to course of medical care involving usage of multiple alternative sources of treatment of suspected malaria patients. With respect to medical resources, it is noteworthy that not a single patient interviewed reported usage of herbal medicine or traditional healers in the course of their care-seeking process. Other studies also reports similar findings (11, 12).

Table 5 Prescribed Dosage of Antimalarial Drugs (number of tablets)

| Drugs | 1st day | 2nd day | 3rd day | 4th day | 5th day |
|---|---|---|---|---|---|
| P. falciparum | | | | | |
| Fansidar | 2 | - | - | - | - |
| Quinine | 6 | 2 | - | - | - |
| Primaquine | 1 | 1 | 1 | 1 | 1 |
| P. vivax* | | | | | |
| Chloroquine | 2 | 2 | 2 | 2 | 2 |
| Primaquine | 1 | 1 | 1 | 1 | 1 |

* standard dosage recommended by the Malaria Division is 6 tablets of Chloroquine and 1 of primaquine for the first day, 2 Chloroquine and 1 primaquine for the next 2 consecutive days, and 1 primaquine for the next 2 consecutive days.

That about 80 percent of the sample patients resorted to self-medication for initial treatment suggests two things. Firstly, initial symptoms of malaria infections were generally assessed as common cold and fever which in people's views are self-limiting and easily treated. Secondly, it reflects a general illness behavior of rural poor whose self-treatment is usually the first step in medical care. In the present study the majority of patients who made a correct self-diagnosis still started with self-treatment with packet antimalarial drugs. Only few of them

who happened to experience intermittent malaria attacks managed to go to the malaria clinic directly for treatment. It is fair to conclude that the most basic feature of illness behavior of rural poor villagers in almost every illness episode including malaria infection is self-help first.

Table 6 Prescribed and Actual Dosage of Antimalarial Drugs Taken by 5 Patients with P. falciparum. (tablets)

| Case | 1st day | | | 2nd day | | 3rd day | 4th day | 5th day |
|---|---|---|---|---|---|---|---|---|
| | F | Q | P | Q | P | P | P | P |
| PRESCRIBED | 2 | 6 | 1 | 2 | 1 | 1 | 1 | 1 |
| ACTUAL : | | | | | | | | |
| Case 1 | 2 | 4 | - | 2 | 1 | (1P, 2Q) | 1 | 1 |
| Case 2 | 2 | 2 | 1 | 6 | 2 | 1 | 1 | - |
| Case 3 | 2 | 4 | 1 | 4 | 2 | 2 | - | - |
| Case 4 | 2 | - | 1 | 2 | 1 | (1P, 2Q) | (1P, 2Q) | (1P, 2Q) |
| Case 5 | 2 | 2 | - | 4 | 2 | (2P, 4Q) | 1 | - |

Note : F = Fansidar
Q = Ouinine
P = Primaquine

The fact that self-treatment is usually the first step in medical care for most people including the self-diagnosed malaria patients has important implications for the planning of malaria treatment. A study reports that a malarial drug packet widely available in the endemic area comprises inadequate number of effective antimalarial tablets and some other unnecessary drugs that may be harmful to health (12). Moreover it was sold to consumers without consideration of appropriate dosage. Given the fact that it is not feasible to elimininate self-treatment, attention should be paid to the possibility of correcting the drug combinations in the packet. The same study also alleged that even if some brands of these antimalarial drug packets contained right proportion of antimalarial drugs, the consumers often bought only 2-3 packets of which the total dosage was not enough to bring an effective cure (12). Therefore one could think of the possibility

of educating these small village grocery shops and drugstore owners of appropriate dosage of malarial drug packets

It appeared that the injectionist clinic was a frequent resort for rural patients as illustrated in our example case reports. This was so mainly because of its physical and social proximities to the local people. The negative side of injectionist clinics was apparently the practice of giving unnecessary injections and intravenous fluid which was expensive and reforcing people's expectation of quick results from treatment. However, some injectionists did refer suspected malaria cases to the malaria clinic. Since the place of injectionist clinics in the local medical system could not be denied, the possibility of make better use of these clinics should be explored. For example, actions are needed to educate the injectionist about malaria symptoms and pursuade them to refer more suspected cases of malaria to the malaria clinic.

The four treatment patterns suggest that medical resorts used in the course of seeking care are mostly sequencial, beginning with that of the most accessible--that is self-treatment or injectionist clinics--and shifting to a more qualified resorts after failure of initial treatment. Multiple usage of more than one resorts at the same time was not found. It should be obvious from these treatment patterns that the selection of medical resorts is determined by a variety of factors as distance, transportation, knowledge and familiarity with alternative medical resources, perception of symptoms and other situational factors specific to individual patients. With respect to the transition of patients from other resorts to the malaria clinic, it appears that the pathway to the clinic would be short or long depending principally on correct symptom assessment and evaluation of alternative sources of care which involes information about the malaria clinic as an effective healer of malaria. For those with correct self-diagnosis of malaria in the first place, a more accessible source of treatment was often their first choice. After it failed to cure, and the symptoms got more severe they rapidly transit to the malaria clinic. As our case reports illustrate, the three--fold and four--fold treatment patterns are relatively dominated by those who were slow in making correct self-diagnosis of malaria. In the process of symptom assessment and evaluation of treatment which eventually led to the decision to visit the malaria clinics, parents, relatives, neighbours or the socalled "significant others" of the patients play an apparently important role. For the migrant plantation workers, their significant others include fellow workers and the plantation owners. Generally illness inclu-

ding malaria that occurs to an individual is managed within the family context. Within the family it appears that it is the father rather than the mother, and male rather than female, who plays more important role in managing a malaria patient case in the family. Such assertion seems consistent with findings from past studies that malaria morbidity rate is higher for men than women (8).

The importance of quick and accurate perception of malaria symptoms and the role of concerned significant others in accelerating the process of seeking care from the malaria clinic has implications for health education efforts.

That the P. falciparum cases failed to take the recommended dosage of antimalarial drugs should be a problem of concern for effective malaria treatment and prevention. Presumably, just verbal explanation of the dosage is not helpful enough. Putting all kinds of drugs in one small bag further confuses the patients later. Thus it is imperative that a new more effective arrangement is needed.

## CONCLUSION

Sixty patients at a malaria clinic in Nong Rhee subdistrict, Bor Ploi district, Kanchanaburi province, were interviewed about their treatment patterns before coming to the clinic. A sample of sixteen cases were followed up at their home to determine their illness behavior afterward. Results shown several illness behavioral patterns, but almost all began with self-treatment. After the failure of initial resort to effect the cure, new symptom assessment and/or treatment evaluation were made, resulting in the use of new alternative resorts i.e., injectionist clinics, health centers, and the malaria clinic itself. The dominant treatment pattern is two-fold stage--from self-treatment to malaria clinic. It was found that perception of malaria symptoms and the role of concerned significant others of individual patients in symptom assessment and treatment evaluation were decisive in the selection of alternative treatments, and more importantly in accelerating the movement of suspected malaria patients to the malaria clinic. On the basis of the results, implications for a more effective planning of treatment of malaria are discussed.

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ANNEX 2

# An observational study of DDT house spraying in a rural area of Thailand *


## Summary

The study investigated factors affecting public co-operation in DDT house spraying which is the most important malaria control measure in Thailand. A spraying round in a rural village in an eastern province was observed by two field workers disguised as members of the DDT spraying team. Emphasis was placed on the operational practices of spraying teams and their interactions with the villagers whose houses were to be sprayed with insecticides. Villagers' unco-operative attitude towards DDT house spraying was attributed to their perception of insecticides as a danger to the health of children, pregnant women and domestic animals, and unsightliness caused by whitish DDT deposits on the house walls. To some extent, lack of knowledge or disbelief in the benefit of DDT house spraying also precipitated non-co-operation. The effects of these inhibiting factors varied with villagers' socioeconomic status. More importantly, the study revealed defects in the management and supervision of the spraying operation as possible causes of low coverage of DDT house spray. Lack of health education efforts in the conduct of the spraying operation and the failures of spraymen to develop good relations with the community contributed further to the villagers' limited co-operation. The success of insecticide house spraying as a malaria control measure depends on the community as well as the malaria workers.


## Introduction

Historically Thailand was a successful case in the worldwide malaria eradication efforts based on the application of DDT insecticide house spraying. With financial and technical assistance from the United States and UNICEF, DDT house spraying in Thailand was first started as a set of pilot projects in the northern region during 1949–1951. Afterwards DDT spraying was extensively applied to all hyperendemic areas to control malaria transmission. In 1965 the National Malaria Program changed its objective from 'control' to 'eradication' and DDT house spraying to destroy *Anopheles* vectors was extended to cover all areas with malaria transmission (Stein 1970). Even today, despite the possibility of vector resistance to DDT and behavioural resistance in the form of an outdoor biting habit, the national malaria control programme relies mainly on DDT house spraying.

The unco-operative attitude of people towards DDT spraying of their houses in Thailand has been mentioned frequently officially (Pinichpongse & Bullner 1967). The problem of public co-operation here is not outright refusal, but only partial acceptance, resulting in a high rate of incomplete house spraying, that is, not all of the internal house surfaces are sprayed. In 1979 the rate of refusals was about 10% while that of incomplete spraying was around 40–50% of total sprayed houses. [An assessment study of insecticide spraying operations in Central Thailand indicated large errors in the reported number of incompletely sprayed houses. Based on the official house spraying standards, it was found that a large number of reported completely sprayed houses were in fact partially sprayed (Malaria Division 1975). Thus it is highly likely that the 40–50% rate of incomplete house spraying here might be underestimated.] In addition, in most of these incompletely sprayed cases only the underneaths of the houses on stilts were sprayed.


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Indeed if these houses are regarded as not significantly different from the unsprayed in terms of interrupting malaria transmission, adjusted refusals would rise to the comparatively high rate of about 55%.

Despite such an acknowledged continuing problem of public co-operation in DDT house spraying, systematic assessment of the problem, its nature, magnitude and possible causes, has never been attempted. Often the people are blamed for their refusals. The reasons for refusals reported widely by the malaria control planners are objections raised by the people, such as dislike of intrusion, unsightly contamination by insecticide, adverse effects of DDT on personal health and the fact that DDT no longer controls bedbugs or cockroaches owing to resistance in these insects (Malaria Division 1980).

These perceived side-effects of insecticide spray discouraging public acceptance were reported in various studies (Foster & Anderson 1978). However, there are different views on the causes of non-acceptance of DDT house spraying. Barnes & Jenkins (1972) in their study in Surinam found personal envies, fears of Surinamese spraying workers by Bush Negroes, intrafamily rivalry and the ignorance on the part of spraying workers of the strategic position of chiefs and headmen in the local social structure, as the cultural factors preventing villagers' co-operation with insecticide house spraying. Study by Rabello & Verma (1977) pointed specifically to the significance of a good relation between community and malaria workers for obtaining public co-operation in control activities.

The present study is an investigation of DDT house spraying in a rural community of Thailand, emphasizing the operational practices of DDT spraying teams in the field and their interactions with the villagers whose houses are to be sprayed with insecticides. By focusing on these interactions, factors affecting acceptance of DDT house spray on the parts of both the house owners and the malaria workers were revealed.

## Materials and methods

To obtain firsthand information concerning actual DDT spraying operation in the field, the method of participant observation was employed. Two research assistants were disguised as spraymen and sent to join DDT spraying teams in their operations in a rural village. The two observers were instructed to work like typical spraymen to avoid any suspicion about them among other spraying team members. There were two teams in the field operation of spraying, and the observers were attached to separate teams, making it possible to gather maximal information.

The two observers in their assigned positions as spraymen were instructed beforehand not to take an active role in the task of approaching villagers for house spraying. This was not atypical because the spraymen usually limited themselves to the spraying and left the responsibility of approaching villagers to the spraying team leaders.

### Setting

The study area where spraying operation was observed is a village in Thung Kwai Kin subdistrict, about 60 km north of the town of Klang in Rayong Province, about 250 km east of Bangkok.

Originally it was a heavily forested area, bounded by mountains stretching from north to south (Khao Chamao and Khao Wang), with streams running from the mountains down to a plateau. The area possesses great malarious potential, but until recently it was relatively underpopulated.

In the last few years the area has been opened up illegally by groups of commercial loggers, for felling timber in the forest. This was followed by waves of land acquisition by local landlords and other influential people, and close on their footsteps came waves of migrating poor and landless peasants, mainly from the northeast, to work for the landlords, or buying and renting land to settle. Eventually stable communities were established and the malariogenic potential of the area was fully realized. Epidemiological conditions in Thung Kwai Kin, particularly in the study village, are hyperendemic. A malaria clinic had to be set up in the area to deal with the high morbidity in the populace.

There are approximately 609 households located in the study village and the area population density is very low. The distribution of houses is extremely sparse. Houses are located on the occupant's own fields or lands. Most of the villagers are poor farmers cultivating cassava or maize in owned or rented plots of about 10 acres.

## Results

### Spraying team

A total of 13 persons were engaged in the spraying operation in the study village. The group was under the field supervision of the head of the Malaria Sector located at Klang District township. The manpower was further subdivided into two teams, each consisting of four spraymen, a bloodsmear collector and a team leader. All the spraymen, except the two 'participant observers', were recruited locally from the Klang District town area. Spraymen were hired temporarily just for the spray round and paid a daily wage of about 45 bahts (23 bahts ≙1 US$). Most of them had only the minimum of 4 years' formal education and they were unskilled wage labourers without year-round jobs. Some had worked as spraymen before.

Bloodsmear collectors are responsible for taking bloodsmears from villagers and dispensing anti-malarial drugs during the spraying round. Team leaders are responsible for supervising the spraying operation, approaching villagers for permission for spraying houses and recording results of DDT spraying. Both the bloodsmear collectors and team leaders are government permanent employees. They had received at most 10 years formal education.

### Training

Training for spraymen was arranged at a monastery in the village a day before the operation began. The whole training was very short, lasting 90 min only, and covered the purpose of insecticide house spraying, how to approach villagers, preparation of DDT suspensions, operating spraying equipment, and the method of obtaining the required DDT deposits on house walls. The spraymen were emphatically asked to behave properly in working with the villagers.

Because of the extremely short duration of training, it was not possible for spraymen to participate actively in the process. Throughout the training session they just sat listening patiently without asking any questions. It was doubtful whether they even paid attention to what was being said, or understood all aspects of the operation. Afterwards when asked about their understanding and attitude toward the training, some of them responded:

*'I didn't understand a thing. They said what they had to say. We are not interested in it.'*

*'So we listened, but did not understand, or wish to pay attention.'*

*'All we have to do is the spraying. We need not talk, it is the duty of the team leader to do the talking with the people.'*

### Operation

The work was carried out without first informing the village headman or any other community leaders about it; neither were the households contacted or informed before the spraying team arrived at the door. The two team leaders in approaching the villagers were apparently authoritarian, impolite and inconsiderate. The words they used repeatedly to the house owners may be rendered as follows: *'We want to spray DDT'; 'Move everybody out, we're going to spray DDT'; 'Get something to cover this jar, we're going to spray DDT'.* Needless to say, the spraymen approached the villagers in a similar manner whenever they were asked to do so by the team leaders.

On encountering refusals and reluctance among some villagers, the team leaders' reactions were often provocative and particularly unhelpful. They did not even so much as try to explain their intention and convince the people to accept house spraying. Faced with some reluctant villagers questioning the benefits of spraying their houses, the team leaders often retorted: *'Oh! you don't want the spray; we do not mind. The government hired us to spray. You don't want it, all right; we don't mind. It is you who are in the wrong.'* and then they turned away. Some non-acceptors and partial acceptors argued about the negative impacts of DDT, such as bad odour, harmfulness to children's health and increase of bedbugs and cockroaches, as reasons for not co-operating. Again responses by the team leaders, and sometimes the bloodsmear collectors too, were merely short denials of such allegations, with no convincing further explanations. Interestingly enough if the villagers continued to argue, the team leaders became irritated, not knowing how to explain further. This was partly reflected in conversations among team members after being rejected: *'Damn these people, they are hua-mo.* ('Hua-mo' is one who is very argumentative, a 'barrack room lawyer'.) *'Damn their education. Put them on our black-list. We'll wait and see if they have to come to us at the malaria clinic.'*

When the spraymen had to make the approach themselves (which was rare) and encountered

refusals, they usually accepted them without arguments. It is noteworthy that in most cases where only partial spraying was allowed by the villagers, the team was satisfied and usually complied with it. Even worse, these villagers dictated to the team where it was to spray, and the team usually did not argue for a more complete spray.

With respect to dosage and distribution of DDT deposits for each house sprayed, it is not possible to reach a definite conclusion, due to a lack of adequate information. However, there was evidence of wrong dosage and poor distribution of DDT deposits. Spraymen were inclined to use more DDT powder in each dilution prepared for each house during the first half of a day's operation. Since houses were widely scattered, diluted DDT had to be prepared separately for each house. The aim was to use up the DDT mixed at each house by spraying more than was necessary or throwing away the leftover DDT, or both. Because of overusage of DDT in the first half of the day there was a shortage and underdosage of DDT for houses reached in the second half of the day.

Obviously the basic motive of the early use of more DDT powder than necessary was to lighten the weight of DDT powder that had to be carried from house to house. This was so because in a day's operation the team had to bring along a certain quantity of DDT powder and use it up within the day.

As a matter of fact, the team leaders were aware of these practices. Yet they did not raise any objections, except cautioning the spraymen to be on watch for the head supervisor.

In addition to overdosage of DDT in certain circumstances, DDT was also misused through the practice of giving it to certain villagers in return for food or as an act of courtesy. It was estimated by the two observers that altogether one-third of the total DDT carried by the team was misused each day.

The recording of results of house spraying by the team leaders was quite accurate. As a rule, the team leaders were expected to differentiate the extent of incomplete spraying into three levels according to the percentage of the area of the total inner surfaces of a house covered by the spraying. However, one of the two spraying teams failed to do this.

After a day's work, the two teams went back to their temporary field station at the monastery where the training of spraymen was carried out. The Head of the Klang Malaria Sector, who was responsible for the general supervision of the operation, was well meaning but his supervision was lax. Problems encountered during a day's operation were not reported or raised for discussion. Thus improvements were made in the operations and they were carried out according to a standard routine.

**Misconduct among team members**

In the course of house-to-house DDT spraying, various team members behaved badly towards the villagers, causing annoyance and probably precipitating non-co-operation among the people. Stealing food, agriculture products and clothes was common. Even worse was intrusion into unoccupied houses, spraying DDT without first properly clearing away possessions and utensils left in the house, and afterwards stealing some of the house owner's possessions. Such intrusion was greatly resented by the villagers.

Furthermore, one of the two team leaders brought medicines with him to sell to the villagers whom he had to contact for house spraying. The medicines were anti-malarial and the motive was obviously private profit.

This misconduct among the team members evidently created annoyance and suspicion among the villagers. Although no clashes on this issue between spraymen and villagers, or total refusals on this account have, so far, been reported in the area, such misconduct surely affected the spraymen's credibility.

**Villagers' co-operation**

This will be discussed under three groups.

*Accepters.* The majority of households in the study area accepted DDT house spraying. The acceptors were predominantly poor families whose dwellings were small and crudely built. Although the poor villagers did not resist DDT spraying they reacted to the request half-heartedly. According to the observers, it was likely that they perceived the spraying team members as government officials with whose orders they must comply. Psychologically the poor were quite uncritically submissive to the authorities. Yet it was questionable that these acceptors understood or saw the benefits of DDT house spraying.

*Refusers.* Absolute refusals to DDT spraying were few in number. These people were markedly more prosperous than the average villagers, as could be seen from their large houses and the

size of their land holdings. Their houses were made wholly from wood, with galvanized iron roofs, well appointed interiors and fairly well arranged compounds. Some refusers were shop owners whose refusals were understandable on that account. One particularly interesting case of refusal was that of a retired schoolmaster. He knew quite well about malaria and the control of mosquitoes by DDT spraying but he believed that, regardless of having his house sprayed, he still could not avoid mosquito bites. In addition, he disliked the unsightliness of DDT deposits in his house. The spraying team did not know how to convince him, and eventually yielded to his opposition. Another refusal happened in this manner. As the spraymen were walking towards a large house, they saw a boy standing at the front gate deliberately waiting for them. The boy said *'Father doesn't allow DDT house spraying'*. The spraymen retorted, *'We're going to spray'*, and walked into the house compound. The boy started to cry and tried to stop the spraymen. Facing such tough resistance, the spraymen became undecided. Later the team leader came along and gave orders to spray. Some of the spraymen disagreed and finally decided not to spray. It is obvious that the boy's father must have known that the spraying team was coming. Despite his absence, his non-acceptance of DDT spraying was quite apparent.

*Semi-accepters.* This group of villagers were adamant in only allowing partial spraying of their houses. They were like the refusers in terms of socioeconomic status, being prosperous owner agriculturalists or shop owners. Danger of DDT to the health of children and pregnant women, death of domestic animals (particularly cats), and unsightliness of whitish DDT deposits were the principal reasons for not allowing complete spraying of their houses. Among the shop owners the objection to DDT deposits left over after spraying was apparently the most important reason for incomplete spraying. In most cases of incomplete spray the house owner would dictate where to spray and frequently the spraying team did not hesitate to comply.

## Discussion

In the present study findings about the reasons why people resist DDT spray conform quite well with other studies. Apparently DDT spraying is accompanied by some side-effects that are viewed adversely by the villagers. The intensity of these negative reactions varies with people's socioeconomic status including housing as well as occupation. The poor man in his crudely built house may care little about the unsightliness of DDT deposits and to him team leaders and spraymen were regarded as government authorities to whom they had no choice but obedience. However, for the rich the contrary is true and the benefits of DDT spray in protecting from *Anopheles* mosquitoes are considered unreliable.

Our study did not reveal any cultural basis for DDT spray refusal or partial co-operation. The dislike of intrusion and misconduct of the spraying teams does not have anything to do with cultural patterns.

The use of 'participant observer' spraymen, made it possible to obtain firsthand information about the management and conduct of DDT spraying which could not have been gathered in any other fashion. The study obviously indicates the need for a better administration and supervision of the DDT spraying operation.

It is apparent that the training of spraymen was inadequate. The 1½ h of training is too short to produce efficient spraymen who understand all the aspects of DDT spraying, including its objectives and, more importantly, who have the skill to obtain uniform and adequate distribution of the insecticide which is very important for the success of any malaria control programme (Russell *et al.* 1963). From our observations there was indirect evidence of inadequacy in dosage of insecticide applied for house spraying. With respect to the uniformity and adequacy in distribution of insecticide, a more rigorous study is needed, however.

Spraymen in a field research project in Nigeria received 2 weeks of training (Molineaux & Gramiccia 1980), whereas in Surinam (Barnes 1968) they received only 1 day. However, in Thailand, as found in this study, training was even shorter, lasting for 90 min only. The authors were informed that, at least in theory, training of spraymen is scheduled for 2 days, but due to government budget appropriation regulations, spraymen could not be paid for training. Therefore, in practice, training has to be done in the field so that spraymen can be paid. Hence training has to be cut short or the planned period of spraying operation would be affected.

During the operation, supervision of DDT

spraying, particularly that by the team leaders, was extremely inadequate. The need to have efficient, responsible and considerate team leaders and head supervisors is obvious from our observations.

With respect to the misconduct among spraymen, more careful recruitment should be tried. However the difficulties of recruiting efficient and good spraymen due to relatively low wages paid for the job are understandable (Tansatitaya 1974). Thus ultimately the government pay scale for spraymen needs to be raised. Meanwhile, responsible and efficient team leaders are still very necessary in coping with the problem of misconduct.

As observed, health education was almost totally omitted in the conduct of spraying operation. The team leaders and their men were not conscious at all about the need for education and persuading the villagers to accept DDT spraying. As a matter of fact they were not prepared for this important task at all. Specifically because of poor education background and inadequate training for the job, it was highly unlikely that the spraymen could be efficient health educators. Ideally every malaria worker, including the spraymen, should be a health educator. Yet the conduct of the spraying operation is very far from this ideal. Again, it is recommended that at least the spraying team leaders and the bloodsmear collectors be trained to be efficient health educators.

It is clear from this study that the problem of non-acceptance or partial acceptance of DDT house spraying could not be solely blamed on the villagers. Poor management and supervision of spraying operations, poor relations between spraymen and the community, and lack of a health education component in the operation are probable causes of poor coverage of house spraying. Our conclusion is in line with the statement made by WHO Regional Committee for the Eastern Mediterranean (1967) that the failures of malaria eradication programmes were never due solely to technical factors, such as vector resistance to DDT but to a combination of these factors with operational and administrative defects.

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ANNEX 3

PUBLICATIONS/PRESENTATIONS RELATED TO
THE RESEARCH PROJECT


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