PREVENTIVE BEHAVIOR OF MALARIA AMONG PEOPLE LIVING ALONG THE THAI – CAMBODIA BORDER, KHLONGHAD DISTRICT SRAKAEO PROVINCE, THAILAND

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ABSTRACT

The purpose of this cross-sectional study was to determine the preventive behavior of malaria among people living along the Thai-Cambodia border Klonghad district Srakaeo province Thailand and to determine the knowledge, perception and behavior on malaria prevention by socio-demographic characteristics as well as the relationship of knowledge, perception and malaria preventive behavior. Self administered questionnaire was used in collecting data from 380 respondents aged 18 years and above living in 4 sub-district of Klonghad district areas from 2nd to 15 of February 2006.

Based on the results of the study, the knowledge on malaria prevention was categorized into 3 levels. More than half of the people had good overall knowledge. However, the knowledge about control, preventive and curative measure was poor, particularly the knowledge of insecticides. There were significant differences in the knowledge by, occupation, family income and income with savings. In addition, all the levels of the knowledge had significant positive correlation with malaria preventive behavior. For the perception levels, more than half of the respondents positively perceived towards susceptibility, severity and benefit-barrier of malaria and all the levels were significantly correlated with malaria preventive behavior.

Concerning the preventive behavior, which was defined treatment seeking and preventive behavior the majority of the respondent, went to the public hospital/private clinic when sick. But the preventive practice was poor, 90 percent had poor practice. Though subjects regularly used bed net, but they rarely check for holes before sleeping and percent of the respondents neither used DDT insecticide spray indoors nor prophylactic drug.

There was significant positive correlation among the knowledge, perception and preventive behavior on malaria. Therefore, the government should promote the Primary Health Care approach to improve knowledge, preventive behavior among people living along the Thai-Cambodia border as well as the achievement of malaria programme.

KEYWORDS : MALARIA, PREVENTIVE BEHAVIOR

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LIST OF ABBREVIATIONS

WHO : World Health Organization

DDT : Diethyl-Dihydro-Trichloromethane

HBM : Health Belief Model

CHAPTER 1
INTRODUCTION

1.1 Rationale and justification of the study

Through decades, Malaria has been recognized as most widespread parasitic disease in the world and remains of highest public health importance. Malaria is transmitted to man by vectors, a mosquito-Anopheles. It is one of the most serious diseases of developing countries. Though curable and preventable, it still kills several thousands of people. In Southeast Asia, people are hampered with four important mosquito-borne diseases such as malaria, dengue, filariasis and Japanese encephalitis. Among them, it is generally known that malaria by far is the most damaging when it comes to its magnitude. Statistics shows that over half of the world's population in approximately one hundred countries exposed to malaria (1).

Most of the deaths from malaria occur among children under five years old and pregnant women (2). Malaria is caused by the four species of human malaria parasites belonging to the genus Plasmodium: Plasmodium vivax, Plasmodium falciparum, Plasmodium ovale and Plasmodium malariae, Early symptoms are fever, shivering, body aches, and headache. It may cause anemia, jaundice, heart failure, kidney failure, coma, and in some cases death like the falciparum malaria or cerebral malaria. The plasmodium parasites are highly specific, with man as only vertebrate host. When control measures could not be sustained, malaria re-emerged as a major health challenge the problem is acute, partially in countries with a tropical or subtropical climate. It is estimated that 1.2 billion people out of the 1.4 billion population of the Southeast Asia Region live in malarious area. Among Western Pacific Regions 112 million people at risk of malaria in 1996(3). There were about 3.5 million laboratory-confirmed cases of malaria in 1996. However, the estimated incidence was nearly 26 million. The development of drug resistance incidence is

rising in many countries. In addition, insecticide-resistance by the mosquitoes is another problem hampering malaria control (4).

Globally, the malaria situation is serious and getting worse. The countries of the world affected by malaria today can be classified with respect to malaria control priorities into two major categories: those that were not included in the efforts of the global malaria eradication programme to end the transmission of infection (category I), and those that were and in which large scale programme of house spraying with insecticides have been in operation since the 1950s or 1960s (category II).

By the revision of WHO in 1996, the geographical area affected by malaria has shrunk considerably over the past 50 years, but control is becoming more difficult and gains are being eroded. The spread of the disease is linked with activities like road building, mining, logging and new agricultural and irrigation projects, particularly in frontier areas like the Amazon. Elsewhere, disintegration of health services, armed conflicts and mass movements of refugees worsen the malaria situation (5).

Malaria is a public health problem today in more than 90 countries, inhabited by a total of some 2400million people-forty percent of the world population.

Worldwide prevalence of the disease is estimated to be on the order of 300-500 million clinical cases each year.

More than ninety percent of all malaria cases are in sub-Saharan Africa. Two-thirds of the remainder are concentrated in six countries; India, Brazil, Sri Lanka, Vietnam, Columbia and Solomon Islands, in decreasing order of prevalence.

Mortality due to malaria is estimated to be in range of 1.5 to 2.7 million deaths each year The vast majority of deaths occur among children in Africa, especially in remote areas with poor access to health services (6).Other high risk groups are women during pregnancy, and non immune travelers, refugees, displaced persons and laborers entering endemic areas.

Political instability and financial administrative shortcomings rising inflation or increase of price in procurement of equipments, insecticides, and operation supplies were factors responsible for inadequate coverage of areas to be protected (7).

Moreover, the introduction of alternative insecticides e.g. organo-phosphorous compounds and carbamate has been surpassed by rapid development of vector resistance in some extent (8).

Community participation is behavior reflecting knowledge, perception of the community itself to the disease problem. There is a discrepancy between the disease that people perceived and the disease malaria as diagnosed by physicians. People's knowledge about malaria variegated, for example, malaria may be viewed as a febrile disease, but its severe complications such as convulsions, anemia and even splenomegaly are sometimes considered completely unrelated to the causative disease(8). In some places convulsions from severe malaria are believe due to supra-natural origins. It is acknowledged that people keep certain attitudes dependent upon a variety of inputs coming from the environment and from these attitudes, future practices are likely predicted. Studies (6, 7, and 8) showed that education can affect positive prevention behaviors which in turn will lead to active activities to relieve the relevant disease or health problem.

Malaria in Thailand remains a significant problem of the people living along the border especially in Eastern and Western borders. This is partly because these regions are often remote and less developed, population flows to and from neighboring countries where malaria control is non existent. The main problem is the high level of resistance that P.falciparun has developed against the available anti-malaria drug (9).

Reported cases of malaria per 100,000 Population, by years: In 1998, as follows: South Region 18,017 cases with the case rate of 223.35 per 100,000 population, The second one is central region 29,309 cases with the case rate of 148.90 per 1000,000 population, North Region 16,790 cases with case rate of 138.08 per

100,000 population and North-East region 2,961 cases with rate of 13.89 per 100,000 population (10).

In 1999, reported cases of malaria per 100,000 population, by region in Thailand, as follows: North region 24,978 cases with case rate of 205.71 per 100,000 population, the second one is central region 32,573 case with case rate of 163.46 per 100,000 population(8). Third one is South region 13,080 cases with case rate of 161.29 per 100,000 populations; the last one is North-East 5,536 case with case rate 25.29 per 100,000 populations.

Srakaeo province was one of the malarious areas in Thailand, a province of 7,195 square kilometers, approximately 50 kilometers near the Cambodia border. The province is divided into 7 districts and 2 sub-districts namely Tapraya, Muangsakaeo, Kogsoong, Watananakorn, Kaochacan, Aranyaprathet, Wangsumboon, Wangnumyen, and Klonghad. It has 58 tamboons, 706 villages and 57 communities with 150,258 households and a total population of 541,441. By the report of the ministry of public health, because of the economic crisis way back 1997-1998 the incidence and mortality rate of malaria were increased especially in the Thailand border. However, with regular malaria activities such as active and passive case detection, and treatment, residual house spraying, treating the mosquito nets, destruction of the breeding places they were able to lower the incidence rate to 0.64/1000 and mortality rate by 0.3/100,000 population (15).

With respect to the social inadequacy of malaria control programme, it is pointed out by the WHO that existing control measures and their implementations usually neglect or lack, understanding of peoples beliefs and attitude toward the disease which may have rendered failure to the programme despite their technical soundness, and health education programmes should be developed effectively to modify perceptions and behaviors (9).

It should be obvious that a disease control programme such as malaria could not do without active participation from the community, there is an urgent need to

assess the beliefs and consequent behaviors of the target population so that subsequent control strategies and interventions, health educations programmes could be developed effectively to modify perceptions and behaviors

It must be made clear at the onset that the primary objective of the present study is to assess the knowledge, perception preventive behavior among people living along the Thai-Cambodia border, Klonghad district Srakaeo province, Thailand.

1.2 Research Questions

What are the preventive behaviors of malaria among people living along the Thai-Cambodia border, Khlonghad District, Srakaeo province, Thailand?

1.3 Research Objectives

1.3.1 General objective

To identify preventive behavior of malaria among people living along the Thai-Cambodia border, Khlonghad District Srakaeo province, Thailand

1.3.2 Specific objectives

1.3.2.1 To determine the malaria preventive behavior among people living along the Thai-Cambodia border.

1.3.2.2 To assess the knowledge on malaria among people living along the Thai-Cambodia border.

1.3.2.3 To assess the perception on malaria among people living along the Thai-Cambodia border.

1.3.2.4 To identify the socio-demographic factors (Age, Sex, Occupation, Family Income, income with savings and education) associated with preventive behavior in malaria control

1.3.2.5 To find out the difference in the knowledge, perception and preventive behavior between the malarious areas and non malarious areas..

1.4 Conceptual Framework of Study

The basic conceptual framework for this study was a modified health belief model. focusing mainly on the organismic factors, it consists of two main variables: “independent variables” included socio-demographic characteristics (age, sex, education, occupation, family income and income with savings), knowledge about malaria, and perception on severity, susceptibility and benefit minus barrier. “Dependent variable” was the preventive behavior of malaria categorized into two: personally initiated like sleeping inside mosquito nets, taking drug chemoprophylaxis, wearing special clothing, using chemical repellant, blood smear examination and house screening. While the externally initiated such as indoor house spraying, biological and environmental management and using impregnated mosquito nets (see figure 1).

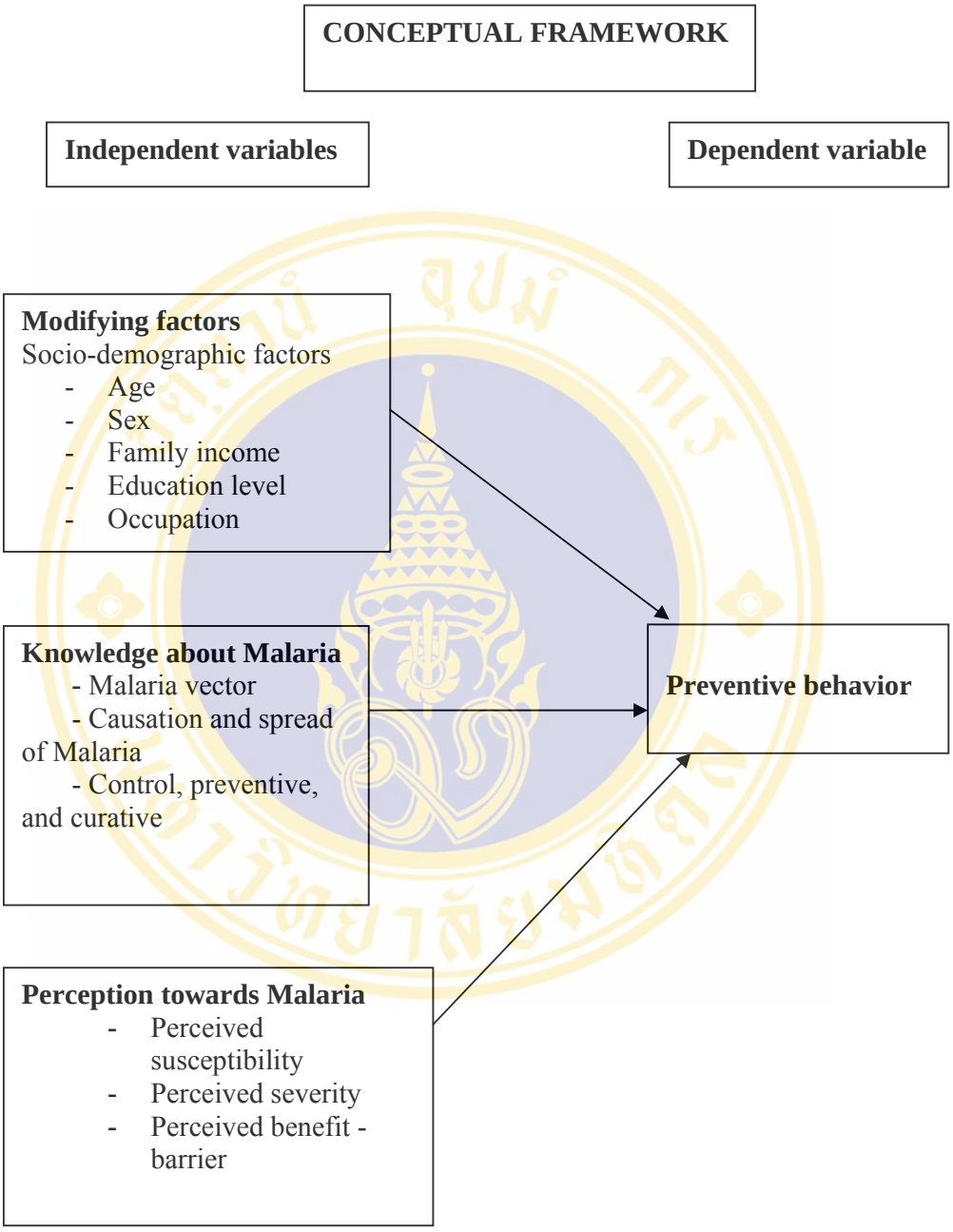


Figure 1 Conceptual Framework

1.5 Operational Definitions

Socio-demographic characteristics

Socio-demographic attributes of an individual such as age, sex, education, occupation, and family income.

Education- defined as highest level of formal education attained by respondents classified as primary, secondary, college and others.

Occupation- defined as the main job of respondents, which is the main source of income achievement. Categorized as rice farmer, trader, forestry worker, miner, construction laborer and others

Family Income- the average total amount of money earned by all family members within one month.

Knowledge about malaria - The ability of respondents to identify the cause, etiology, transmission, symptoms, severity of malaria, and malaria preventive measures.

Perception about malaria - The report of awareness of respondents related to malaria in terms of:

a) Perceived susceptibility to and severity of malaria.
b) Perceived benefits minus barriers to undertake malaria preventive measures.

Preventive Behavior- is related to malaria preventive practice, conceptually distinguished between personally initiated behaviors and externally initiated. Personally initiated behavior such as sleeping inside mosquito net, taking blood smear examination for malaria diagnosis when suspect of getting malaria, and never stay outdoor at night time without protection, and externally initiated like acceptance of insecticide indoor house spraying, and using impregnated mosquito nets.

1.6 Limitations

The malaria coordinator/field supervisors were the ones who collected the self administered questionnaires and as well as the interviewer for those respondents who cannot read and write, so the bias cannot be prevented.

CHAPTER 2
LITERATURE REVIEW

The number reported malaria cases in Southeast Asia had been increasing in many areas in-spite of availability of many antimalarials and residual insecticides, which used to provide a powerful weapon in malaria control program. However, in the past few years, many antimalarials became useless due to the development of resistant strains of malaria parasite. Failure to control the disease, death of the patients from malaria and deteriorating malaria situation in Southeast Asia were mainly due to emergence of drug resistant strains of plasmodium falciparum. In addition, failure of vector control might also be a contributing factor (10).

To mention, there was a decline in incidence during the malaria eradication era of the 1950 and 1960. Malaria started reappearing in epidemic proportion in the mid-seventies and reached a peak of 7.2 million cases in 1976. The overall malaria situation remained the same for over a decade. In 1995, however, though 3.4 million cases were reported, the actual number was estimate to six times higher. An alarming feature of the malaria situation in the region was increased in the proportion of Plasmodium falciparum(10).

There are other areas where rising incidence and increasing proportion of P. falciparum infections justify concern for the future. In most of these areas poor political stability and economy as well as technical constraints such as drug resistance of P. falciparum are the major obstacles to malaria control(12). At present, malaria remains endemic in areas where the standard preventive measures of eradication program have not been effective or cannot be used in large scale, or the large scale application of preventive measures already resulted in a decrease or an interruption,(8).

2.1 The present strategy of malaria control activities

The global malaria control strategy stresses selective use of preventive measure whenever they can lead to sustainable results. Such strategy should also aim at minimizing the wasteful use of resources, halting the current deterioration in malaria situation and contributing to the development of health care service, intersectoral cooperation and community participation(8).

2.1.1 Disease Management

Early diagnosis and prompt treatment, disease management or secondary prevention is fundamental to malaria control. They are a basic right of the affected population and the need to be available wherever malaria occurs. Populations at special risk of malaria must be identified and specifically defined so that diagnosis and treatment facilities can be focused and prompt management of disease ensured.

In general, malaria control services should insure the quality of disease management within the general health services, as well as the correct use of the services by the affected population. They should provide the community with information on the risks of malaria, its prevention and action to be taken when infection occurs. Official and unofficial drug providers should be furnished with understandable information on the use of antimalarial drugs and the importance of ensuring that patients take the full curative dose and seek immediate care in the event of continued illness (8).

2.1.2 Disease Prevention

Prevention of malarial disease encompasses a variety of measures that may protect against the development of disease in infected individuals. Measures that protect against infection are directed against the vector mosquitoes and can be classified as either personal protection, aiming at protecting individuals or households against infective bites, or transmission control, aiming at reducing the risk of malaria to entire communities or population. Measures for protecting against disease without preventing infection include immunization (still at the experimental stage) and

chemoprophylaxis. It must be emphasized that the efficacy or any preventive measure should be gauged from the incidence of malarial disease and its effect (8).

2.1.2.1 Personal Protection

Individual and collective protection can be obtained by a variety of means: protective clothing, repellents, screening of houses, insecticide-impregnated bed nets, etc. Bed nets impregnated with pyrethroid insecticides have been well received and shown to give protection in some areas of Africa, America, Asia and the Pacific (8).

2.1.2.2 Immunization and chemoprophylaxis

Immunization against malaria may become possible in the future. Although some vaccines have been tested in the field, they are still at an early stage of development. Even when available for utilization, it is expected that they will be applied, not as the sole solution to the malaria problem, but as a component of strategies that include other measures.

As a control measure, chemoprophylaxis is no longer recommended for young children or other large groups, except for temporary use in special circumstances. Chemoprophylaxis remains desirable for pregnant women, but it is necessary to weigh the risks, costs and benefits of the available drugs in each local situation. A combination of personal protection and chemoprophylaxis is to be encouraged for non-immune migrant laborers, soldiers, police, travelers and similar groups working in strictly controlled situation (8).

2.1.2.3 Vector control

Selective vector control is the application of targeted, site-specific control methods which are cost-effective. The principal objectives of vector control are to reduce malaria morbidity and mortality by decreasing the level of transmission.

The measures available for control of transmission include the use of chemical insecticides and biological agents and environmental management. of these, reliance has so far mainly been placed on spraying with residual insecticides. In the right

circumstances, this can be highly efficacious; but the proper use of insecticides is a complex matter, involving considerable expense and trained personnel and demanding sustained application, usually for many years.

Environmental management can reduce or eliminate mosquito-breeding sites. It should be more often applied by local communities for collective protection from vectors and be incorporated into the planning of development projects. Its incorporation into development activities requires collaboration between the health sector and those involved in development, agriculture, water supply and other relevant activities. At the same time budgetary provision needs to be made for the action required, including maintenance (8).

2.1.3 Prevention and control of epidemics

Epidemics occur in areas of social, economic and political instability where basic services have disintegrated or do not exist. Most malaria control programmes with centralized structures are not designed to detect or react quickly to emergencies. There is an urgent need to strengthen the capacity for early detection of epidemics and to speed up the communication between the health services and the staff of the control programme. Ignorance and lack of supervision of programme staff in areas where basic services do exist can lead to the exacerbation of epidemics.

Areas prone to epidemics can be identified by epidemiological stratification that takes account of vectoral transmission capacity, environmental conditions, social and economic conditions, population migration patterns and other factors. Local health services have much to contribute to this process, and should be the first to report a suspicious increase in the number of patients with fever. On the basis of this stratification, a limited set of indicators of epidemic potential or risk factors can be prepared that can be monitored by local health personnel and used to build up community preparedness and prevention.

Basic preparedness measure is to establish a central reserve of drugs, insecticides and spraying equipment that should be permanently maintained for rapid deployment should an epidemic arises (8).

2.1.3.1 Indoor residual spraying

Confidence in indoor residual spraying has often been exaggerated. Its main mechanism of action, when an effective insecticide is used against an endophilic vector, is the selective killing of those vectors resting indoors. Most insecticides are only partially effective since many of them, including DDT have an irritant or repellent action. Moreover, since most vectors are partially exophilic, many mosquitoes will no be killed indoors, but instead be forced outdoors, thereby avoiding insecticide contact. Their longevity and vectoral capacity, although they will not be eliminated, may thereby be reduced.

The even application of insecticide to all the interior surfaces of all the houses in a locality at an appropriate dose and the regular intervals, as required to maintain an insecticide deposit appropriate dose and at regular intervals, as required to maintain an insecticide deposit above the minimum lethal concentration. As most vectors do not rest long enough on the walls before biting, a sprayed house does not protect its occupants from transmission if most of the houses in the neighborhood are not sprayed, as the vectors survive. People can still be bitten and infected in these unsprayed houses. It is therefore most important to assess the acceptability of spraying, like most of those suffering malaria resurgence. It is common in such areas to attribute the resurgence to poor quality spraying and to propose a number of measures, such as the training of spray men, the strengthening of supervision or health education as the solution, which at best may only produce a very limited and short-lived improvement, since the main cause of poor coverage is the lack of acceptance by the population.

2.1.3.2 Impregnation of bed-nets

In areas where bed-nets are already widely used, e.g., in epidemic-prone areas with a high density of nuisance mosquitoes, the reimpregnation of bed-nets maybe the

most effective way of controlling transmission and preventing its spread to new areas or its renewal in transmission seasons.

Practically, the only insecticides suitable to bed-net impregnation are the new synthetic pyrethroids, because of their low toxic hazard and residual effect. Permethrin, delmethrin and lambda-cyhalothrin, which are those currently, recommended for indoor residual spraying or bed- net impregnation. However, other residual pyrethroids are being rapidly developed and several that are currently being tested seem to offer characteristics at least as good as those mentioned. It is advisable, therefore, to check which pyrethroids are suitable for bed-net impregnation and to consider any others that may be available (5).

2.1.4 Protection against mosquito bites

2.1.4.1 Deviating mosquitoes from man to animals

Deviating mosquitoes from man to animals sometimes called animal prophylaxis of zooprophylaxis, has considerable attention for some years after Roubaud and Rizzi suggested it as a measure for malaria control. The intensity of malaria in some areas depends somewhat on whether and to what degree local anophelines are naturally anthropophilic or zoophilic. Anophelism without malaria, which often is due chiefly to inadequate density of vector species, is probably sometimes dependent on the fact that local anophelines are attracted to animal blood more often than to that of man. To mention, some vector species, such as A. minimus flavirostris in the Philippines, feed on man or on animal as occasion permits, without any well-marked preference. In such instances animals do not primarily deviate anophelines, but they dilute the blood supply adding to the host population a quantity of unsusceptible vertebrates which serve to nullify a considerable percentage of bites (13).

2.1.4.2 Wearing special clothing

For example in Alaska, people veil the head as a measure of mosquito protection in some areas. One type of hood net can be worn over hat or toped, or even when lying down without headgear. Such head veils or hoods have limited practical

application in ordinary prophylaxis. Their chief value lies in special cases when one must travel in regions where mosquitoes are extremely abundant and troublesome. A coarse head net with apertures measuring ¼ inch in diameter, is more comfortable and gives greater visibility. It will repel mosquitoes for three of four hours if thoroughly treated with dimethylphtalate.

Special gloves and mosquito boots are sometimes practical and often add materially to one's comfort and safety. They can be dyed black and made suitable for use at evening social functions. In emergencies, newspaper may be wrapped around the ankles inside socks or stockings. Two pairs of socks or stockings will usually defeat a mosquito. Sarongs or pillowslips are effective temporary leg covers for thwarting mosquitoes. It is said that they were at one time regularly supplied to guests at royal functions in Bangkok.

Mosquitoes may pierce ordinary cloth which is in contact with the skin but not the tightly woven varieties, such as Byrd cloth, heavy nylon, and certain cotton twills. Such cloth is useful for shirts or overalls to be worn in highly malarias areas, provided that it does not obstruct ventilation of the skin (13).

2.1.4.3 Site Selection

One should appraise a prospective site when planning a home, a labor or military quarters, or a new village in a malarous area as to possibilities of disease and not merely as to practical and aesthetic advantages. The more removed from breeding waters of malaria vectors a house is the better and the upwind side is safer than downwind. It maybe cheaper to pump water some distance to a labor barracks than to put the buildings near the water and then have an ever-present expense account for drugs and insecticides. Each area will have unique criteria, and what may be entirely safe in one country may be deadly in another (13).

2.1.4.4 Screening or mosquito-proofing

There are only two kinds of houses important as regards malarious, the unscreened and those provided with screens and with people disposed to use them

properly. It has shown statistically that mosquito proofing by screens offers a considerable protection against malaria and that results become apparent during the first season of use.

No evidence suggests that an unscreened house can be built according to some design, which would make the structure so unattractive to mosquitoes, that the 4 inhabitants would be protected from malaria. The conception that a dark, damp and dirty house is conducive to malaria, in proportion to its attractiveness to anophelines congregate in the daytime give no certain indication of where they are likely to be found feeding at night. Furthermore, imperfect screening, no matter how bad, keeps out more anophelines than no screening at all (13).

2.1.4.5 Using bed-nets

Bed-nets are in use throughout the tropics, and although they add a little to discomfort, yet they afford excellent protection. Good nets also protect against scorpions and centipedes, stink bugs and driver ants, beetles which may enter to the ears or may eject irritant poisons, ticks, flies some of which may lay eggs in skin or nose and give rise to maggots-snakes, lizards, rats and assorted small verminous creatures.

The shape of the net requires attention. It should not be conical but rectangular. No side openings should be provided for entrance or exit unless fitted with zipper fasteners for perfect closure. To enter a net, one lifts the bottom carefully and slips inside quickly, then tucking in the bottom all round. No rents or tears should be tolerated, as mosquitoes appear to spend much time searching for such entrances. Repairs are easily made with needle and thread, or with adhesive tape.

Nets should not sag or hang loosely. They should be lowered before dark and always searched for stray mosquitoes. During the daytime they should be so rolled and folded that mosquitoes cannot hide in them. It is a good habit, after one has tucked in a net for the night, to use a light in a careful search to see that no mosquitoes are inside (13).

2.1.4.6 Chemical repellants

Many chemicals have been recommended as culcifuges to be applied to the skin to repel mosquitoes from biting. Some repellents have been more objectionable to man than mosquito, all have had the common fault of short duration of effect. But a number have been useful for temporary protection when out-of-doors at night. Whether they actively repel mosquitoes or merely disguise an odor is not certain.

A chemical repellant should have the following characteristics:

1. It should repel mosquitoes and other blood-sucking insects, ideally for twelve hours after one application on skin or clothing.
2. It should not irritate the skin or have any toxic effects.
3. It should not tend to macerate the skin, especially in humid tropical climates.
4. It should not offend the olfactory sense.
5. It should not stain clothing and equipment.
6. It should be easily usable, should not leave a sticky or stiff film on skin or cloth, and should not be adherent that it cannot be washed off with soap and cold water, yet it should resist perspiration and rain.
7. As packed, it should not deteriorate under widely differing climatic conditions during prolonged storage.

2.2 Drug Prophylaxis

Many substances have been used to ward off the attacks of malaria, including “chips from the gallows and places of execution” mentioned by Thomas Browne in 1652. He was the one who first used the cinchona bark as a prophylactic and at what date is not known. Jesuit missionaries in 1693 in China aborted attacks of malaria by giving the bark a day before paroxysm dies. In the nineteenth century its use became much more common for restricted communities such as labor forces and army units. But for the protection of the general public against malaria, programmes based exclusively on chemoprophylaxis have seldom been successful and are not yet generally practical.

Different drugs nowadays have been made in drug prophylaxis for malaria.Some of these drugs are chloroquine, amodiquine, proguanil, quinine, etc.Chemoprophylaxis right now is recommended for special risk groups:

Pregnant women living in areas where transmission is very intense and parasitemia and anemia are the causes of low birth weight.

Non immune persons living in close communities in endemic areas for fixed periods e.g. labor force and military units.

Non- immune travelers, but chemoprophylaxis has become more and more difficult in recent years because the choice of safe drugs is narrower and at the same time, the increasing recognition of adverse effects of anti malarial drugs entails poor compliance of the community and facilitates the expansion of drug resistance (13).

2.3 Human Factors in Malaria Control Activities

Malaria has been in close relationship to human activities so far. Human ecology and its socio-demographic factors as well as knowledge and perception have greatly influenced endemicity of malaria in pertinent areas. Interactively, malaria has also conditioned behavior and perception of people living in malarious regions.

2.3.1 Socio-demographic factors

In endemic areas, some socio-demographic factors expressed their relevance as follows:

Age groups: different degrees of exposure to mosquitoes biting relating well to different age specific incidence.

Sex difference: according to Pinikahana, J, sex difference may intervene in exposure to malaria which is well correlated with people who stay or work outdoors during periods of mosquito activity. Males are more likely to be exposed to anopheline vectors due to their body poorly covered when they work in the field late in the evening(4).

Income: in study of 2 villages in Ethiopia found that the risk of exposure was not different to the poor and the rich, but regarding to behavior, unpopularity of using bed net seemed to be associated overwhelmingly with low socio-economic conditions of the villagers (14). Regarding to knowledge, Hongvivatana (1987) also noted that the higher the income, the better the respondents were informed about how malaria spread.

2.3.2 Knowledge about malaria

D' Alessandro et al. (1994) found that 85 percent of Gambia rural women interviewed knew at least one basic symptom of malaria. But knowledge about malaria also varied according to endemicity of each region: Hongvivatana (1987) reported that people living in control areas having higher knowledge of malaria symptoms than people in partial or integrated areas. Pinikahana, J. (1994) also observed that most villagers in 2 villages in Sri lan ka seemed to understand that chills, violent shivering, headache, and inconstant fever are major symptoms of malaria. For causation of malaria, in D' Alessandro's study, only 17.3 percent respondents could answer correctly the cause of malaria due to mosquitoes bites. To most of them, malaria was attributed not only to mosquito biting but also to air, water and even personal contacts. These observation coincided well with those from Hongvivatana reports, that as high as 70 percent of villagers had rather vague ideas of malaria causation.

Regarding to malaria control activities in Thailand, rural settings, villagers are relatively well informed about the presence and operations of local malaria units, but there is an inconsistency of answers from people living in different areas about malaria control activities(4).

2.3.3 Perception towards malaria

Concerning the perceived susceptibility of malaria to people living in endemic areas, 77.3 percent Gambian women think that malaria is impossible to avoid and 85 percent believe that untreated malaria is fatal, but at the same time, they also consider malaria playing no impact to their health regarding to capacity of a household to

produce crop. In a study conducted in Sri lanka, though villagers perceived malaria as moderately dangerous, commonly occurring illness, they rank malaria, chicken pox, asthma in the middle after cancer, tuberculosis, cholera(4).

Concerning perceived beliefs, Hongvivatana noted that 90 percent of respondents agreed that antimalarial drugs could prevent ones from malaria, and 41 percent believed drugs inducing no side effects to health. Though many writers have highlighted human resistance to indoor DDT spraying, 88 respondents agreed that insecticides spraying reducing transmission and 25 percent disliked spraying because of perceived negative effects. In Sri lan ka, villagers told that after DDT spraying, the house was flooded with mosquitoes on the day of spraying, and thereafter, most of them disappeared for 2-3 days but a few days later the situation returned to the previous situation.

2.3.4 Behavioral aspects

In Thailand, the rate of regular bed nets users among permanent residents reached 54 percent and 41.8 percent for irregular and 4.12 percent non users in control areas. But for temporary migrants, the rate of non users was as high as 29.8% (3). Moreover, even with regular users, bed nets were used only for a few hours, roughly from 10 PM to 5 AM so that dwellers might still be exposed to mosquito biting in the remaining hours. As usual, Sri lanka never sleeps outdoors because of nuisance of mosquito and uncomfortably of sleeping outside (4).

Concerning anti malarial drugs taken for prophylactic purposes, migrant workers never used drugs reached 875 as compared to people living in control areas 57.6 percent never used and 27.9 percent frequently used. Whenever being sick,80.4 percent Gambian villagers requested for blood examination, but the patterns of seeking treatment varied distinctively: in Gambia, treatment in government hospital was the most preferred choice, whereas in Ethiopia,(14) found that only 17.3 percent went to government hospitals, though 97 percent of malaria patients use modern treatment and more than 70 percent went to see injectionist or self medication.

In Thailand, Hongvivatana reported 30.2 percent people in control areas and 42 percent in consolidated/ integration areas resorted to self medication for initial treatment. This phenomenon was observed similarly in Sri lanka and explained partially as people getting medicines from private clinics because of unsuccessful previous treatment given by government hospitals and because of inaccessibility of government hospitals. For DDT spraying, though rate of refusal to accept indoor spraying varied largely according to respective settings, but the excuses are very similar. Bad odor, fear of poisoning water and food at home, fear of killing domestic animals, discoloration of the wall in good houses, fear of getting sick especially among children, and inconvenience caused by removing furniture and other belongings and even due to perceived ineffectiveness of spraying.

2.4 Malaria Situation in Thailand Border area

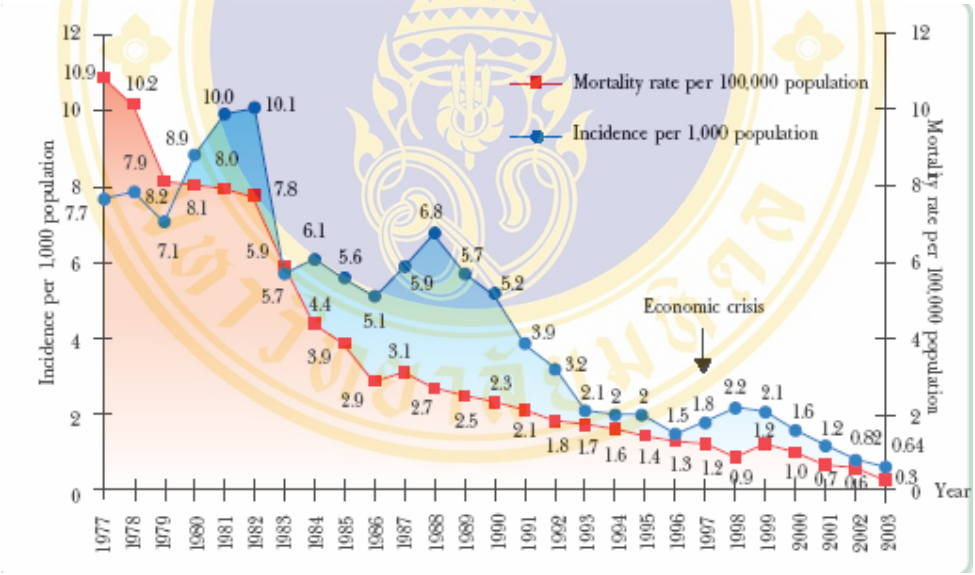
Malaria is a forest-related disease being prevalent along the international borders where as on the central plain areas. In Thailand foreigner, malaria cases had been on the increased from 48,000 in 1991 to 66,570 cases in 1998.

Table 1 Malaria cases in border area (1996-98)

Year	1996		1997		1998	
Border area	Thailand	Foreign	Thailand	Foreign	Thailand	Foreign
Thai-Myanmar (10 provinces)	60,365	58,841	58,439	59,699	56,892	56,939
Thai-Laos (10 provinces)	3,616	1,648	3,618	2,472	2,812	1,592
Thai-Cambodia (6 provinces)	8,699	294	20,571	3,718	16,350	8,015
Thai-Malaysia (4 provinces)	2,523	44	3,367	107	10,740	24
Total	75,203	60,867	85,995	65,996	86,731	66,570

Source: Tan Chongsuphajaisiddhi, Border Malaria Issues in the Mekong Region,Bangkok, Thailand, 1998(15).

Thailand has succeeded, to a certain extent, in its malaria control efforts, leading to a considerable reduction in incidence and mortality rates However, in some regions particularly the Thai-Myanmar and Thai-Cambodian border areas, the problem remains critical, especially drug resistance. It is noted that during 1997-1999 the malaria incidence rose slightly but the mortality rate was stable. This phenomenon is postulated to be involved with the discontinuation of DDT spraying, EI Nino phenomena and the restructuring of communicable disease control programmes. As a result, Malaria Units were upgraded to be Vector-borne Disease Control Units, which are extensively responsible for the prevention and control of dengue hemorrhagic fever, filariasis and encephalitis. In the beginning, there might be some problems, but since 2000, the incidence and mortality rates have been declining.



Sources: (1) Department of Disease Control, Ministry of Public Health.
(2) Bureau of Policy and Strategy, Ministry of Public Health.

Figure 2 Incidence and Mortality Rates of Malaria in Thailand, 1977-2003

Plasmodium falciparum continues to be the dominant species encompassing 59 percent of cases and the second place resides P.vivax, P.malariae, P.ovale and mixed forms take the remaining positions. Five major species of anopheline mosquitoes responsible for malaria transmission in Thailand are A.minimus, A.dirus, A.sundaicus, A.Aconitus, and A. maculates (16).

In 1974, morbidity rate was approximately 286/1,000 population and by the year 1991, this rate was reduced to 3.96 percent and mortality rate was 2.1 per 100,000 population. In 1992, the number of detected malaria case was 168,370 and API was 3.15/1,000. In 1993, incidence of malaria decreased gradually, and the numbers of positive cases were 117,946 and API was 2.17/1,000.

2.5 Problem in the Anti-Malaria program in Thailand

Though anti-malaria programmes were launched in Thailand more than 20 years ago, malaria is still concern in terms of a communicable disease. Problems will be encountered in many aspects including parasite resistance to drugs, changes in vector behavior and vectors resistant to insecticides, and not less important is low acceptance of community to insecticide spraying (17).

-P, falciparum has become relentlessly resistant to most anti-malarial drugs. P.falciparum was reported as highly resistant to widely used Chloroquine. In some regions, resistance degree 3 reached over 80 percent of cases treated (16). Newer drugs including Mefloquine faced with the same situation. The resistance to Mefloquine has been reported in other places not only from the northeastern region of Thailand(18).

-Vectors began to change their response to insecticides: DDT was used as the main weapon for vector control during the period 1950-60 owing to its long acting insecticide effects. Lately, its effectiveness became decreasing, partly due to change in biting and resting behavior of vector (14). Entomological studies carried out as early as in 1960s have found that A.minimus at that time was highly endophagic and endophilic so that indoor spraying of DDT was a rational measure. But recent investigations reported that they had developed strong exophagy and exophily (19). Therefore, some researchers came up with ideas that DDT was no longer produced a significant mortality to this anopheline species. The same finding coincides to A. dirus which is totally exophagic and exophilic.

-Widespread human resistance to indoor spraying: this resistance has limited effectiveness of antimalarial activities in the country (20). The following reasons for this low acceptance are:People did not like the whitish color of DDT depositing on the wall.People did not like the intrusion of inconvenience from spraying workers. People believed that DDT is harmful to health of their children, pregnant women and domestic animals.Migration of people from hypo-endemic areas for working. They lived in temporary shelters, which provided little or no protection from vector attack, and they might work during night time (the peak period of vector activity) so they had greater chance of being infected to malaria (20).International migration especially from Cambodia has contributed a significant increase in P. falciparum morbidity and dissemination of strains highly resistant to Chloroquine, Fansidar and even to Mefloquine (21).

2.6 Conceptual Theory

The HBM(Health Belief Model)was originally developed as a systematic method to explain and predict preventive health behavior. It focused on the relationship of health behaviors, practices and utilization of health services. In later years, the HBM has been revised to include general health motivation for the purpose of distinguishing illness and sick-role behavior from health behavior. Originated around 1952, it is generally regarded as the beginning of systematic, theory-based research in health behavior.

The HBM has been applied to all study all types of health behavior. A person's motivation to undertake a health behavior can be divided into three main categories: individual perceptions, modifying behaviors, and likelihood of action. Individual perceptions are factors that affect the perception of illness or disease; they deal with the importance of health to the individual, perceived susceptibility, and perceived severity. Modifying factors include demographic variables, perceived threat, and cues to action. The likelihood of action discusses factors in probability of appropriate health behavior; it is the likelihood of taking the recommended preventive health

action. The combination of these factors causes a response that often manifests into action, provided it is accompanied by a rational alternative course of action.

The HBM states that the perception of a personal health behavior threat is itself influenced by at least three factors: general health values, which include interest and concern about health; specific health beliefs about vulnerability to a particular health threat; and beliefs about the consequences of the health problem. Once an individual perceives a threat to his/her health and is simultaneously cued to action, and his/her perceived benefits outweighs his/her perceived benefits, then that individual is most likely to undertake the recommended preventive health action. There may be some variables (demographic, socio-psychological, and structural) that can influence an individual's decision.

Perceived Susceptibility - Each individual has his/her own perception of the likelihood of experiencing a condition that would adversely affect one's health. Individuals vary widely in their perception of susceptibility to a disease or condition. Those at low end of the extreme deny the possibility of contracting an adverse condition. Individuals in a moderate category admit to a statistical possibility of disease susceptibility. Those individuals at the high extreme of susceptibility feel there is real danger that they will experience an adverse condition or contract a given disease.

Perceived Seriousness - refers to the beliefs a person holds concerning the effects a given disease or condition would have on one's state of affairs. These effects can be considered from the point of view of the difficulties that a disease would create. For instance, pain and discomfort, loss of work time, financial burdens, difficulties with family, relationships, and susceptibility to future conditions. It is important to include these emotional and financial burdens when considering the seriousness of a disease or condition.

Perceived Benefits of Taking Action - taking action toward the prevention of disease or toward dealing with an illness is the next step to expect after an individual

has accepted the susceptibility o f a disease and recognized it is serious. The direction of action that a person chooses will be influenced by the beliefs regarding the action.

Barriers to Taking Action - However, action may not take place, even though an individual may believe that the benefits to taking action are effective. This may be due to barriers. Barriers relate to the characteristics of a treatment or preventive measure may be inconvenient, expensive, unpleasant, painful or upsetting. These characteristics may lead a person away from taking the desired action (22).

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Study design

A cross-sectional descriptive study aimed to determine the preventive behavior on malaria among people living along the Thai-Cambodia border, Khlonghad District Srakaeo province, Thailand.

3.2 Target Population:

Study population were all Thai people living along the Thai-Cambodia border, Klonghad district, Srakaeo province, literate and mentally sound including those who cannot read and write aged 18 years old and above. Non Thai and migrant were excluded.

3.3 Sample Size Estimation:

The sample size required in this study was based on the formula:

$$\mathbf{n} = \frac{Z^2_{\alpha/2} P(1-P)}{d^2}$$

n: estimated sample size

Z: In this study, it was set up to 95% Confidence interval of estimation, therefore Z= 1.96

d = degree of accuracy desired, setting at 0.05

P: Anticipated proportion of individual in population possessing the characteristic of the study interest. Since there was no data presently available on preventive behavior, it was assumed at 50% (0.5)

Thus, $N = (1.96)^2 (0.5)(0.5)/ (0.05)^2$

$= 384$

3.4 Sampling Technique

Along the Thai-Combodia border there are 4 malaria endemic districts (Khlonghad, Tapraya, Aranyaprathet, Kogsoong) in Srakaeo province. The sampling was conducted by purposive method since the malaria prevalence was high in Klonghad. In Khlonghad district, there were 7 subdistrict, 71 villages, 8,448 households and a total population of 34,911. The sub-district of Khlonghad, Khlong kai tuan, Thai Udom, and Benjakorn with a total of 43 villages are endemic with malaria, while sub-district of Sai-Diew, Sai-Thong, Makrood and Benjakorn were non malarious area. Multi-stage sampling technique was used for 384 respondents: Stratified random sampling was done for malarious and non malarious area. There were six villages in malarious area and four villages in non malarious area, each village represented was based on the size of the population. From each village with malaria 42 respondents will be given a self administered questionnaire by the health personnel, while the non malarious area each village 33 respondents.

3.5 Research Instruments

A self administered questionnaire in Thai language as a tool was used in collection of data. The original English form was translated into Thai language. It consists of 4 parts:

1. Socio-demographic characteristics (age, sex, education, occupation, family income, income with savings)

2. Aspect of Knowledge on malaria related to malaria vector, breeding sites, cause of malaria, preventive and curative measures.

3. Aspects of Perception on malaria related to malaria susceptibility, severity, benefit minus barrier on malaria.

4. Aspects of Preventive behavior focusing on preventive practice

3.6 Data Collection

A pre-test survey was performed with provincial health personnel prior to data collection with the supervision of the provincial coordinator. The pre-test data were analyzed for reliability coefficient for knowledge about malaria, perception on susceptibility, severity and benefit minus barrier and malaria preventive behavior. The results were, 0.64 0.63 and 0.50 for the knowledge, perception and preventive behavior respectively. And after the pre-test survey, format and presentation of questionnaires including wording clearness, sequence, translation accuracy and sufficient space for answer was revised.

Data was collected by the following steps:

1. Contacted the Provincial Health Office about the research project and asked for their permission.
2. At Operational District level, meeting with Health personnel and responsible malaria personnel and discussed about the research project.
3. Contacting the head of the village and village volunteers to guide them about data collection using the questionnaires.
4. The questionnaires were translated in Thai language and explained to the Health personnel how to make an interview.
5. The data was collected by well trained Health personnel with the support of two assigned coordinators.

The entire data collection was started from 2nd to 15th of February 2006.

3.7 Data analysis

After examining and correcting the returned questionnaires, data were entered to Epi-data programme and analyzed by Minitab 13 program

Mean and standard deviation was calculated for age, family income, knowledge, perception and behavior.

Frequency and percentage was used for describing socio-demographic characteristics.

Chi-square test was used to test association between independent and dependent variables.

Correlation coefficient test was used to test the association of knowledge, perception and preventive behavior.

Mann-Whitney test was used to compare the knowledge, perception and preventive behavior between the malarious and non malarious areas.

Scoring of Knowledge, Perception and Behavior

For the knowledge about malaria prevention, the correct answer got (1) score and incorrect or doesn't know (0) score. The correct total score of this part was 15 scores

For the perception towards malaria prevention, the answers were categorized into three levels, regarding the positive question, those who answered "agree" will get (3) scores, those who answer "Not sure) will get (2) scores and those who answer "disagree" will get(1) score. Regarding to the negative question, the score was the reverse of the positive question. The correct total score of this part was 42.

For the behavior of malaria prevention, those who practice regularly will get (2) scores, those who practice just sometimes will get (1) score and those who never practice on malaria prevention will get (0) score. The correct total score of the behavior part was given 22.

For the classification of score levels was categorized into 2 levels as good and poor. Regarding the knowledge and behavior on malaria prevention based upon the 60% of the total score of each level. Those who got equal or above 60% will be classified into good knowledge and the rest was poor. Regarding perception towards malaria prevention based upon mean score plus standard deviation of each level or each part of perception. In each part or level, those who got the score equal or above mean plus standard deviation were categorized as good perception and the rest were poor.

CHAPTER 4
RESULTS

The data collection has been performed from 2nd to 15th of February, 2006 among people living along the Thai-Cambodia border Klonghad District, Srakaeo province especially the Sub-district of Klonghad, Klong kai thuan, Sae-deow, and Sae thong. In this research study, the data were collected from 380 respondents using a self administered questionnaires facilitated by 2 trained coordinator described in the following sessions:

1. The malaria preventive behavior among people living along the Thai-Cambodia border Klonghad district, Srakaeo province.
2. The socio-demographic characteristics, knowledge and behavior on malaria prevention.
3. The association between socio-demographic factors, knowledge, perception and preventive behavior on malaria.
4. The association between knowledge, perception and behavior of malaria prevention
5. The difference in knowledge, perception and preventive behavior between the malarious and non malarious areas.

4.1 Socio-Demographic Characteristics

In this study, socio-demographic characteristics included age, sex, education, family income and income with savings of the respondents. The distributions of the different characteristics were presented in table 2. The 380 respondent had a mean age of 41.5 years and standard deviation of 14.2 years. Range of age was, minimum of 18 years and maximum of 91 years. Approximately 77 percent of the total respondent belong to the older group, only 23 percent to the younger group.

The proportions of female respondents were greater than male around 15 percents. As expected, the findings showed that the study subjects were mostly belong to low education (primary) 63.2 percent. About 42 percent of the total respondents belong to the rice farmer group and 40 percent belong to employee (private and public) and only 2.4 percent for civil officials.

The monthly family income had a mean of 5,606 baht with standard deviation of 5,592 baht and a median of 4,000 baht, it was grouped into two; equal or more than 4000 baht and less than 4000 baht, and majority of the respondent earned more than or equal 4000 baht monthly. In addition almost half of the respondent had insufficient income but without debt

4.2 Knowledge about Malaria

The questionnaire about knowledge on malaria prevention was categorized into three parts: 1) Malaria vector (6 question items) 2) Causation and spread of malaria (one question item) and 3) Control, Preventive and Curative measures of malaria (17 question items). A total score of 24, with a mean of 12.29 and standard deviation 3.88, each part was classified the score level into good and poor level depending on the 60 percent of the total score of that part. Those who got the score of equal or above 60 percent of score were classified to be good knowledge and those who got the score below 60 percent were classified to be poor knowledge.

After data analysis, the result on table 2 revealed that only 28.3 percent for the overall good knowledge about malaria. However, approximately 72 percent of the total respondents had only good knowledge on causation and spread of malaria

Table 2 Socio-Demographic Characteristics

Socio-demographic	Frequency	Percentage
Total Sample	380	100
Age (years)		
- 18 – 30	87	22.9
- 31 – 40	118	31.1
- 41 and above	175	46.1
Mean=41.5,**S.D**=14.2	Min. = 18, Max = 91.	
Sex		
- Male	161	42.4
- Female	219	57.6
Education		
- Cannot read/write	59	15.5
- Primary school	240	63.2
- Secondary school	57	15.0
- High/voc.school	15	4.0
-..College/Univ.	9	2.4
Occupation		
- Rice farmer	158	41.6
- Trader	44	11.6
- Construction worker	17	4.5
- Civil officials	9	2.4
- Others	152	40.0
Family income		
- >4000	192	50.5
- <4000	188	49.5
Mean=5,606, **S.D**=5,592	**Min**. = 300 baht, **Max.** = 30,000 baht	
Income with saving		
- Sufficient with savings	54	14.2
- Sufficient without savings	98	25.8
- Insufficient without debt	190	50.0
- Insufficient with debt	38	10.0

Table 3 Knowledge about malaria

Knowledge on malaria prevention	Level of Knowledge			
	Good		Poor	
	no.	%	no.	%
Malaria vector	80	20.1	300	79.9
Causation and Spread of malaria	273	71.8	105	28.2
Control, preventive and curative measure	122	32.1	258	67.8
Overall	108	28.3	272	71.7

4.2.1 Aspect of each item of knowledge

After assessing the knowledge on malaria of the respondents Table 3, shows that 66 percent of the respondent answered correctly on the statement concerning the breeding sites such as(buffalos foot prints), 78 percent identifying the vector, 72 percent spreading malaria from patient to healthy person, 85 percent detection of malaria by blood smear examination, 53 percent prevention of malaria by anti malarial drugs, and for the cardinal signs and symptoms of malaria around 82 percent can answer correctly, moreover, about 73 percent of the respondent felt confused because of abdominal pain and painful spleen which are difficult to distinguished especially if the patient had not yet experienced/new case of malaria. However, 54 percent still believed that blurring of vision, itching, nausea and vomiting, chest pain, difficulty of breathing and coughing with sputum were included as signs and symptoms of malaria.

But the poor answer related to breeding sites especially the (water from the discarded utensil and domestic water container accounted for 40 percent probably because they think that aedes aegypti the responsible mosquito vector for Dengue hemmorhagic fever had the same breeding place with anopheles mosquito)and because some of the respondents had inadequate/no education at all they failed to identify especially the feeding time of mosquitoes, specify insecticides which control mosquitoes, way of insecticides act on mosquitoes and availability of drug that cure malaria.

Table 4 Correct answer on each item of Knowledge on malaria

Aspect of Knowledge	Correct	
	Number	Percent (%)
Identify malaria vector	297	78.2
Breeding sites of malaria vector:		
Domestic water container	96	25.3
Water from discarded utensils	58	15.3
Slowly moving water	189	49.7
The buffalo's foot print	250	65.8
Time of mosquito feeding	68	17.9
Transmission of malaria	273	71.8
Effect of insecticides on mosquitoes	123	32.7
Specify insecticides which control malaria mosquitoes	153	40.3
Detection of malaria by blood smear examination	324	85.3
Prevention of malaria by anti malaria drugs	201	52.9
Signs and symptoms of malaria:		
Severe headache	342	90.0
Chills	356	93.7
Blurring of vision	114	30.0
High grade of fever	351	92.4
Profuse sweating	224	59
Itchy	286	75.3
Nausea and vomiting	58	15.3
Chest pain	206	54.2
Painful spleen	87	22.9
Abdominal pain	113	29.7
Difficulty of breathing	174	45.8
Coughing with sputum	226	59.5
Availability of drug cure malaria	102	26.8

4.3 Perception towards malaria

4.3.1 Aspect of level of perception

The perceptions towards malaria were categorized into three parts with 16 questions item together. First part was the perception of susceptibility consists of 5 question items, the second part was the perception of malaria severity had 3 question items and the third part was the perception of benefit-barrier on malaria had 8 question items.

The score level of each part was given base on mean score plus standard deviation of that part. For those who got the score above or equal mean plus standard deviation were classified to be high perception and the rest were low perception.

Through the table 4 showed that more than 85 percent of the total respondents had a good perception on susceptibility, severity, and benefit minus barrier with an overall of 90.2 percent good perception on malaria.

Table 5 Level of perception towards malaria prevention

Variables	Level of perception			
	Good		Poor	
	no.	%	no.	%
Malaria susceptibility	345	90.8	35	9.2
Malaria severity	327	86.1	53	13.95
Benefit minus barrier	373	98.2	7	1.8
Overall	377	90.2	3	0.8
Median = 39.00 IQR = 6.00	**Minimum = 3 Maximum = 48**			

4.3.2 Aspect of each perception

The results on table 6 showed that more than 70 percent of the respondents agreed with the positive statement that malaria is a “severe and fatal disease, high risk of getting malaria for people working and sleeping overnight in the forest, malaria prevention is certain with anti malarial drug, reliable blood smear examination and effectiveness of treated mosquito nets to prevent malaria”.

For the negative statement more than 60 percent did not agree with fever and headache exactly getting malaria, and nausea, vomiting are side effects of anti malaria drugs.

Table 6 Item of Each Perception Towards Malaria

Aspect of Perception	Frequency and Percentage					
	Agree		Not sure		Disagree	
Occupation make you prone to get malaria	190	50.0	93	24.5	97	25.5
Living condition make you prone to get malaria	199	52.4	103	27.1	78	20.5
Fever and headache are exactly getting malaria	49	12.9	81	21.3	250	65.8
More prone to get malaria when family member had malaria	91	24.0	106	27.8	183	48.2
Work and sleep overnight in the forest more risk of getting malaria	335	88.2	27	7.1	18	4.7
Malaria is very severe disease	305	80.1	37	9.8	38	10.0
Malaria severity might cause disability	141	37.1	104	27.4	135	35.5
Case fatality rate of malaria is high	290	76.3	41	10.8	49	12.9
Malaria preventive is certain with anti malaria	269	68.9	95	25.0	23	6.1
Nausea and vomiting are side effects of anti malaria*	54	14.2	96	25.3	230	60.5
Confirmation of malaria is possible by blood smear examination	340	89.5	32	8.4	8	2.1
No negative effect of taking blood for smear	323	85.0	29	7.6	28	7.4
DDT or other insecticides reduce transmission of malaria	314	82.6	48	12.6	18	4.8
Treated mosquito nets effective to prevent of getting malaria	294	77.4	61	16.1	25	6.5
Insecticide spraying harm children	274	72.1	62	16.3	44	11.6
Insecticide aerosol cause respiratory disorder	248	65.3	86	22.6	46	12.1

4.4 Malaria preventive Behavior

The structure of questionnaire of the behavioral aspects was classified into 2 parts as shown on table 7, one was the treatment seeking behavior with only 1 question item and two was the preventive practice consists of 12 question items.

To assess the preventive behavior level of the respondents depending upon the 60 percent of the total score of each part independently. The respondents that got the score above or equal 60 percent were classified to be good practice.

Table 7 Behavior on malaria prevention

Treatment seeking behavior	Frequency	Percentage
Self medicated	17	4.5
Consult to traditional healer	3	0.8
Consult to volunteer worker	30	7.9
Go to Private clinic	223	58.7
Go to Public hospital	234	61.6
Do nothing	1	0.3

Table 8 Item of each behavior of malaria prevention

Behavior Aspects on malaria prevention	Frequency and Percentage						
	Regularly		Sometime		Never		Mean S.D.
Sleeping under bed net during night time	325	85.5	47	12.4	8	2.1	1.8 0.4
Ever sleep outdoor without bed net during night time	159	41.8	187	49.2	34	9.0	1.3 0.6
Check hole before sleeping under bed net	148	38.9	177	46.6	55	14.5	1.2 0.7
Use of impregnated bed net during sleeping	69	18.2	124	32.6	187	49.2	0.7 0.8
In the late evening, staying outside without using repellant	109	28.7	218	57.4	53	13.9	1.1 0.6
During overnight stay in the forest sleep inside bed net	224	58.9	156	41.1	0	0	0.6 0.5

Table 8 Item of each behavior of malaria prevention (Cont.)

Behavior Aspects on malaria prevention	**Frequency and Percentage**						
	Regularly		Sometime		Never		Mean S.D.
Accept spraying of DDT	127	33.4	210	55.3	43	11.3	1.2 0.6
Taking prophylactic drug	17	4.5	60	15.8	303	79.7	0.2 0.5
Participate on anti malaria activities	90	23.7	215	56.6	75	19.7	1.0 0.7
Join the health personnel on malaria program	59	15.5	113	29.7	208	54.8	0.6 0.7
Visited health center /malaria center for blood smear examination	145	38.2	181	47.6	54	14.2	1.2 0.7
Wearing protective clothing during night time	176	46.3	166	43.7	38	10.0	1.4 0.7
Median = 12.00	**IQR = 4.00 Minimum = 4.00**				**Maximum = 21.00**		

With respect to treatment seeking behavior, most of the respondents know that they should received medical treatment from physician either from public hospital/private clinic at a more or less equal proportion (59.0 and 62.0 percent) and only small fraction of the respondents that used the services of non medical professions like VHV, traditional healers or self treated.

To determine the preventive behavior among people living along the Thai-Cambodia border at Srakaeo province as shown in table 7, more than 70 percent of the total respondent regularly practiced sleeping under bed net at night and during overnight stay in the forest sleep under bed net to prevent mosquito biting. Approximately 20 percent of the total respondents participate on anti-malaria campaign and attend malaria control program activities, and almost 50 percent never use treated bed net.

4.5 Association between knowledge, perception and preventive behavior

To find out the correlation coefficient between knowledge, perception and preventive practice among the respondents, the result analysis on the table 9 revealed that regarding the knowledge, it was statistically significantly correlated between the knowledge level (malaria vector, and control, preventive and curative measures) and preventive practice on malaria prevention with the same p-value = <0.001, except for the causation and its spread statistically no significance. Regarding the perception level such as malaria susceptibility, malaria severity, benefit minus barrier, only perception of malaria severity was found highly statistically significant P-value = <.001 but others were at less significant.

Table 9 Correlation Coefficient between Knowledge, Perception and Preventive Practice

Variables	Preventive Behavior	
	r	P value
Knowledge on Malaria		
Malaria Vector	0.244	<.001
Causation and its spread	0.95	0.064
Control, preventive and curative	0.344	<.001
measure	0.362	<.001
Overall		
Perception towards malaria	-0.118	0.022
Malaria susceptibility	0.251	<.001
Malaria severity	0.103	0.044
Benefit - barrier	0.123	0.016
Overall		

4.6 Association between socio-demographic factors and preventive behavior

Data from table 10 showed the association between socio-demographic factors and preventive behavior on malaria. The result showed among socio-demographic factors, there were no significant association between preventive behavior and sex group, age group and education levels.

There was significant association between preventive behavior and occupation. In other words, civil officials, when comparing with other occupation, more than half (55.56%.) of them can perform good preventive behavior .On the other hand, the trader performed the worst in preventive behavior with only 11.36% of them had a good preventive behavior. There was significant association between preventive behavior and family monthly income. Those who had a low income, when comparing with those who had a high income, had a good performance in preventive behavior. There was significant association between preventive behavior and savings from income. Those reported insufficient with debt had a poor preventive behavior when comparing with those reported sufficient with savings.

Table 10 Association between socio-demographic characteristics and preventive behavior

Socio-demographic factors	Preventive Behavior				χ^2	P-value
	Good		Poor			
	No	%	No	%		
Age					0.926	0.629
18 - 30	21	24.1	66	75.9		
31 -40	32	27.1	86	72.9		
≥40	52	29.7	123	70.3		
Sex						
Male	44	27.3	117	72.7	0.01	0.9
Female	61	27.9	158	72.2		
Education						
Can't read/others	11	18.6	48	81.4	2.828	0.243
Primary	70	29.2	170	70.8		
Secondary	24	29.6	57	70.4		
Occupation					15.909	0.003
Rice farmer	56	35.4	102	64.6		
Trader	5	11.4	39	88.6		
Construction worker	4	23.5	13	76.5		
Civil officials	5	55.6	4	44.4		

Table 10 Association between socio-demographic characteristics and preventive behavior (Cont.)

Socio-demographic factors	Preventive Behavior				χ^2	P-value
	Good		Poor			
	No	%	No	%		
Occupation (Cont.)						
- Others	35	23.0	117	77.0	5.320	0.021
Monthly family income						
Less than 4000 baht	62	33.0	126	67.0		
More than 4000 baht	43	22.4	149	77.6		
Income Savings						
Sufficient with savings	25	46.3	29	53.7	14.496	0.002
Sufficient with out savings	31	31.6	67	68.4		
Insufficient with out debt	41	21.6	149	78.4		
Insufficient with debt	8	21.6	30	72.4		

4.7 Association between knowledge and preventive behavior

Table 11 indicated that there was a significant association between knowledge and preventive behavior. The respondent who had high level of knowledge also had good preventive behavior .For those who reported a good level of knowledge, majority (76.92%) of them also had good preventive behavior .Among those who had lower level of knowledge, and about 81 percent of them had poor preventive behavior.

Table 11 Association between knowledge and preventive behavior

Knowledge	Good		Poor		χ^2	P-value
	Number	Percent	Number	Percent		
Good	10	76.9	3	23.1	40.424	<.001
Low	52	19.1	220	80.9		
Moderate	43	45.3	52	54.7		

4.8 Association between perception and preventive behavior

As in table 12 showed that there was no association between perception and preventive behavior. Whether the respondents had positive or negative perception about malaria they had poor preventive behavior.

Table 12 Association between Perception and preventive behavior

Perception	Good		Poor			
	Number	Percent	Number	Percent	χ^2	P-value
Positive	60	29.7	142	70.3	0.925	0.336
Negative	45	25.3	133	74.7		

4.9 Comparison of knowledge, perception and preventive behavior between malarious and non malarious areas

Table 13 showed that preventive behavior was slightly significantly difference between malarious and non malarious areas as compared to perception that there was highly significantly difference in non malarious areas.

Table 13 Knowledge, Perception and Preventive Behavior Between Malarious and Non Malarious Areas

Variables	malarious	Non malarious	P - value
Knowledge			
Mean	0.5	0.5	0.4
SD	0.1	0.2	
Perception			
Median	38	40	0.000
IQR	5	4	
Preventive behavior			
Median	13	12	0.05
IQR	4.25	3	

CHAPTER 5
DISCUSSION

The study was conducted along the Thai-Cambodia border Klonghad district Srakaeo province to point out the information about what villagers knew, perceived and behaved concerning the malaria prevention.

Based on the results on the table 3 revealed that only 22 percent of the total respondent could not identify the vector of malaria correctly, they just knew it was the mosquito but failed to specify anopheles mosquito. Approximately 60 percent of the respondents had a good knowledge about malaria breeding sites such as; slowly moving water and foot prints of buffaloes, and 40 percent felt confused on domestic water container and water from discarded utensils considered as malaria breeding sites.

Noteworthy, the poorest knowledge was the feeding time of mosquitoes, only 18 percent could specify the right time that mosquitoes bite, surprisingly almost 60 percent among the respondent could not specify any insecticides which control mosquitoes as well as its effect.

The malaria control program activities in Thailand was on its wide scale up to the far flung area, so the availability of any malaria insecticides to control anopheles mosquitoes was not much of concern, however, 11 percent of the respondent still buy insecticide sprays (Baygon) from the market to control mosquitoes in their houses because they felt the unpleasant smell of insecticides influenced the negative effect to their health. Regarding to the knowledge of causation and symptoms of malaria, it was better than the previous study by Alessandro et al (1994), which only 17.3 percent and 85 percent that the Gambia rural women could answer correctly the cause and symptoms of malaria respectively.

Commonly, for the overall knowledge on malaria prevention, which comprised of 24 question items more than 70 percent of the total respondents were classified as poor, so the higher the chance of getting malaria infection.

Other ways, as shown on table 8, it was shown that the inadequacy of the knowledge related to some factors of socio-demographic characteristics such as occupation, family income and savings from income. There were statistically significant differences ($P < 0.000$).Furthermore, table 9 shows that the knowledge revealed also the significant correlation by malaria preventive practice with $P = 0.000$ to each level.

Concerning each item of perception, almost all of the people felt not sure on fever and headache were classical signs and symptoms of malaria, but they knew at least more than one basic symptoms of malaria. About 16 percent of respondents were not sure about malaria re-infection. Majority of the people agreed with anti malaria drug could prevent malaria disease and about 60 percent did not believe that drug induced side effect to their health. These results were higher than the result of Pinihakana, J,,.1993 which confirmed the respondents agreed with anti malaria drug could prevent malaria and believed drug inducing no side effects to health , 90 percent and 41 percent respectively except for the anti malaria. Around 80 percent of the respondent agreed with DDT or insecticides play a vital role in reducing the transmission of malaria, which was higher than the previous study conducted by Vo Vanloung 1995, at 77.6 percent of the people in Chantaburi province Thailand.

With respect to the perception levels towards malaria, more than two third of the total respondent had good perception. Regarding the association with preventive behavior table 9 shows that almost all the perception levels were significantly correlated with malaria preventive behavior with the ($P = 0.000$)

Regarding the malaria preventive behavior looking back the table 7, admirably about 86 percent they regularly slept under mosquito net during night time. This rate was higher than that of Hongvitana. T (1987) who revealed only 54 percent of regular

users among permanent residents in control areas and almost the same as the study of Vo Vanloung (1995) in Chantaburi, Thailand.

Even though they almost regularly slept under bed net during night time, about 89.6 percent of respondents did not check regularly for holes before sleeping as well as 20.8 percent sometimes they stayed out door at late evening without using repellant.

For regular residual house-spraying DDT insecticides, 55 percent of the total respondents not on a regular basis. More than half of respondents, sometimes they participated to anti malaria programmes or with health personnel regarding to eradication of malaria such as land filling or leveling or draining the water from the unwanted water places.

Since the aforementioned sub-district of Klonghad district were malarious, the people when infected with malaria, majority of them went to the public hospital and private clinics for medical intervention, only few utilized the non medical profession

When we compared the knowledge, perception and preventive behavior between the malarious and non malarious areas, preventive behavior was slightly significantly difference as compared to perception that was highly significantly difference p-value = 0.000 and knowledge not significant.

In Toto, malaria preventive behavior confirmed that the majority of the respondent had poor preventive behavior, thus influenced the malaria control programme and perhaps the main reason of the high prevalence of malaria in the community

CHAPTER 6
CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This cross sectional study was conducted to identify the preventive behavior among people living along the Thai-Cambodia border and the association of various socio-demographic characteristics (age, sex, education, occupation, income and income with savings). It also determined the relationship between knowledge, perception and behavior of malaria prevention.

As it was mentioned, knowledge was categorized into 3 levels, malaria vector and its breeding sites, causation and spread of malaria and the control, preventive and curative measures. About 72 percent of the total respondent had a poor knowledge about malaria

Regarding the perception, majority of the study population had a good perception on malaria such as malaria susceptibility, malaria severity, and benefit minus barrier to malaria

The preventive behavior, which was categorized into treatment seeking behavior and preventive practice, showed that the respondents would prefer to go to a public hospital or to a private clinic when they were sick. Looking at the preventive practice it was found that only 27 percent had good preventive practice. This could be the reason for the high morbidity rate of malaria in that area.

6.2 Recommendation

6.2.1 Recommendation for Program Implication

This study can be beneficial to the malaria control program on malaria preventive behavior among people who live in malarious areas. Some recommendations concerning relevant objectives of the study were suggested as follows:

The majorities of the respondent in the area had low educational background and worst no education at all, were mostly rice farmer who do not know how to control and prevent malaria effectively, though they knew that malaria is a severe disease and may even caused death, and ultimately affecting their family income.

Therefore, the malaria control programme should aim to intensify the primary health care approach strategy into the community by motivating them to understand the cause of malaria, mode of transmission and the risk of getting malaria and lastly the ability of the target population on how to protect themselves from exposure to anopheles mosquitoes and their participation to the health personnel to anti-malaria programme. And also continuous health promotion and education

6.2.2 Recommendation for Future Study

It is recommended that future study should focus on human aspects of malaria eradication e.g. to study more about the willingness of the people with malaria eradication in terms of eradicating breeding sites of mosquitoes and controlling by insecticide spray. Moreover it was felt that the self-administered questionnaire used in this research was not so sensitive to measure the preventive behavior of the respondent in the village and therefore, the results can only be limited of use. It is recommended to use a standard interview questionnaire for in-depth future research for a transparent picture of preventive behavior on malaria.

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APPENDIX

APPENDIX A

QUESTIONNAIRES

PREVENTIVE BEHAVIOR OF MALARIA AMONG PEOPLE LIVING ALONG THE THAI-CAMBODIA BORDER, KHLONGHAD DISTRICT SRAKAEO PROVINCE, THAILAND

ID……..

PART I

SOCIO-DEMOGRAPHIC CHARACTERISTICS

Please check the correct answer except number 1

1. Age……years

2. Sex

□ 1. Male □ 2. Female

3. Education

□ 1. Cannot read/write □ 4. High school/Vocational training school

□ 2. Primary school □ 5. College/University

□ 3. Secondary school □ 6. Others(please specify)

4. Occupation

□ 1. Rice farmer □ 3. Construction worker □ 5. Others (please specify)

□ 2. Trade □ 4. Civil officials

5. Monthly family income (monthly in Baht)

□ 1. < 4000 baht □ 2. ≥ 4000 baht

6. Do you consider your income is;

□1. Sufficient with savings □3. Insufficient without debt

□2. Sufficient without savings □4. Insufficient with debt

PART II: ASPECTS OF KNOWLEDGE ABOUT MALARIA

I. Malaria vector

Questions			
1. What is the responsible vector that can cause malaria to human? 1.1 Fly 1.2 Cockroach 1.3 Aedes Mosquito 1.4 Anopheles Mosquito 1.5 Rodent 1.6 Others(specify)			
2. For the following places, which one do you think that it is the breeding sites of mosquito that is malaria vector?	Yes	No	Don't know
2.1 The domestic water containers			
2.2 The pools of water in discarded utensil such as coconut shell and broken small jar			
2.3 The buffalos footprints 2.4 Slowly moving water			
3. What is the feeding time of Anopheles mosquitoes? 1. At day time 2. At day time and night time 3. Late evening till dawn			
II. Causation and spread of malaria			
4. Do you know how can human get infected with malaria? 4.1 By bad water 4.2 By bad food 4.3 By Aedes mosquito bite 4.4 By anopheles mosquito bite 4.5 By personal contact 4.6 Other (specify)……. 4.7 Don't know			
III Control, preventive and curative measures			
5. Do you know any insecticides which are able to control mosquitoes which carry the malaria disease?(If so please specify) 1. Yes I do 2. I don't know			
6. Do you know the effect of that insecticide on Anopheles mosquitoes? 1. Repellant 2. Kill mosquito by odor effect 3. Kill mosquito by touching it 4. Don't know			
7. Can blood smear examination detect malaria in human?			
8. Taking anti-malaria drug can help you to prevent			

malaria?			
9. The main signs and symptoms of malaria? 9.1 Severe headache 9.2 Chills 9.3 Blurring of vision 9.4 High grade fever 9.5 Profuse sweating 9.6 Itchy 9.7 Nausea and vomiting 9.8 Chest pain 9.9 Painful spleen 9.10 Abdominal pain 9.11 Difficulty of breathing 9.12 Coughing with sputum			
10. Do you know the drug which can cure malaria is available? If yes please specify			

PART III

ASPECTS OF PERCEPTION

I. Susceptibility	**Agree**	**Not sure**	**Disagree**
1. You think that your occupation make you prone to get malaria			
2. You think that your living condition make you prone to get malaria			
3. You are more prone to get malaria when your family member was sick by malaria			
4. If you have fever and headache, you may be getting malaria.			
5. If you work and sleep overnight in the forest, you are more risky of getting malaria			
II. Severity of malaria			
6. Malaria is a very severe disease			
7. Malaria is so severe that it might cause disability			
8. Malaria causes much chance of getting death			
III. Perceived benefit-barrier	**Agree**	**Not sure**	**Disagree**
9.Taking anti-malaria drug can really prevent malaria			
10 Taking anti-malaria drug has side effects as nausea, vomiting etc.			
11. Blood smear examination is reliable diagnostic procedure for detecting malaria			

12.Taking blood smear has no negative effects on your health			
13. DDT or other insecticide house spray can help to reduce transmission of malaria			
14.Treated mosquito net is effective to prevent of getting malaria			
15. Insecticide spraying may harm children in your family			
16. Insecticide aerosol can cause respiratory disorder			

PART IV

ASPECTS OF PREVENTIVE BEHAVIOR

Questions			
1. What you usually do when you get malaria? 1.1 Self medication 1.2 Treatment from traditional healers 1.3 Treatment from volunteer workers 1.4 Treatment from private clinic 1.5 Treatment from public hospital 1.6 Do nothing 1.7 Don't know			
Questions	Regularly	Sometime	Never
2. Do you sleep inside the bed net at night time?			
3. Have you ever slept out door at night time without bed net?			
4. When you sleep inside the bed net, do you check it for the hole?			
5. Do you always use impregnated bed net to protect from mosquito bite?			
6. Have you ever worked or stayed out doors late in the evening without using repellant?			
7. If you worked and sleep overnight in the forest what will you do to prevent mosquito biting? a. Fumigation b. Cover the body with the bed net c. Sleep inside the bed net			
8. Have your house ever received DDT or any insecticide spraying indoors to control Anopheles mosquito?			
9. Have you ever taken prophylactic drug to prevent malaria?			

10. Have you ever been participating to eradicate the mosquito breeding sites such as land filling or leveling of unwanted water places?			
11. Do you attend to the health personnel on malaria program to control/eradicate malaria?			
12. If you have fever and headache do you visit the health center for blood smear examination?			
13. Do you wear your protective clothing during night time?			

BIOGRAPHY

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