CHAPTER II

Essay

Information, Education and Communication Strategies : The factors affecting of the use and non use of insecticide treated bed nets for malaria prevention in Laos.

2.1 Introduction

Insecticide Treated Bed Nets (ITNs) are one of the strategies that has been selected for malaria prevention and control in parts of Laos since 1988 such as in Luang Prabang province in the north, Xieng Kuang, Vientiane and Bolikhamxay provinces in the central and Savannaket, Saravan and Sekong provinces in the south. This has been supported by the Lao Government, international agencies, NGOs and some from community participation. Malaria is a serious disease and is important as a health problem and cause of death of the Lao people. Therefore, in the National Public Health Conference 1992 it was ranked as the first priority of communicable diseases to be controled by the year 2000 (IMPE, 1996). The purpose of the control activies is the interruption of malaria transmission (man-vector contact). In this conference, the positive impact and high effectiveness of ITNs were shown, and therefore, it was selected to be a control measure for malaria prevention. The program has been implemented by the Institute of Malariology, Parasitology and Entomology, Ministry of

Public Health (IMPE., MoPH). Since then ITNs has been decentralized to other provinces, population covered and numbers of nets has also increased in the entire country.

During the program, evaluation was done which showed both negative and positive results. The positive results were that the incidence of malaria has decreased in many places where the ITNs program was supported by IEC strategies such as health education materials, campaign and volunteer health workers. The negative results were that the incidence of malaria has not changed and it was still high in the places where the ITNs program was not supported by IEC strategies. Without IEC support, people do not use, accept and participate with ITNs program (IMPE. 1996). Therefore, the situation in the places where malaria has not changed and it is still high due to IEC was not support is the issue of this study and it will be proposed to find out a better solution in the proposal of this thesis. There are many factors affecting the non-use of distributed ITNs which is one of the factors influencing malaria transmission. These factors include health services, especially information education and communication strategies for the promotion of the use of ITNs and malaria prevention; people's knowledge, attitude and practice; and socio-cultural and economic as the following:

People aspect: lack of knowledge, attitude and practices of the people in the use of ITNs and malaria. They do not know about the causes, symptoms, treatment or prevention. They have the wrong perception of malaria such as malaria is caused by ghost, eating inappropriate food and drinking unboiled or dirty water and contained

mosquito's eggs. These people's perceptions affect both the curative and prevention of malaria because traditional healers and the use of self medication will be the first priority in their treatment seeking behavior. Similarly, environmental maintenance, personal and family protection and malaria transmission interruption is not practice prevention.

Health services factors: health services does not cover the whole country because of limited budget, lack of experience and human resources. Low coverage of health services is caused by people having low income and they cannot afford access to health care. Lack of and inappropriate information, education and communication strategies based upon people's knowledge and ability; inadequate pre-testing of IEC materials before printing especially health education materials for malaria prevention such as posters, leaflets, brochures etc.; causes misunderstanding and unacceptability of ITNs by people in the rural areas (CIEH, 1996) as well as the lack of monitoring and evaluation of information, education and communication program due to a limited budget is another serious problem for development.

Socio-cultural and economic factors: people do not use, no accept and not participate with the ITNs program because, most people in the rural areas believe that malaria is caused by ghosts, ITNs might have side effects and be harmful to health when they touch and sleep under nets. They have no experience of ITNs use in the past and cannot change their old ideas and behavior. For example, they complain of feeling

hot and difficulty in breathing and they do not like it. Low income, preventing the purchase is one factor for unaffordability of the nets or health care services as well.

The issue could therefore conclude that if the people do not understand, accept and participate in the program, they will not use it and then they may have the chance to be exposed to mosquito bites. This is the cause of malaria transmission so malaria incidence has not changed after the introduction of ITNs. The report shows that malaria incidences have not changed and are still high in the places where ITNs were distributed without health education support (CIEH, 1996: IMPE, 1996). There are a low number of malaria cases in some villages of Laung Prabang and Xieng Kuang provinces where ITNs were distributed with IEC materials and volunteer health workers support for health education campaign to encourage people's knowledge and behavior change for malaria prevention (CIEH, 1994; IEC Department, UNICEF, Laos, 1996). So, to encourage the people's knowledge, attitude and human behavior for malaria prevention, IEC is most important for every health program particularly for prevention (Dignan and Carr, 1992). The reduction of malaria cases will succeed if people can understand and protect themselves from the disease. Therefore, a malaria control program, especially the use of ITNs for malaria prevention should be supported by IEC or health education in order to obtain high effectiveness and sustainability of the ITNs program.

To obtain data and information about each factors, in order to find out the possible interventions to solve the problem the follwing will be done: A field study to

identify the most relevant information on socio-cultural and economic conditions of the village; their knowledge and attitude about malaria and the use of ITNs; human behavior of the people about malaria for both treatment and prevention; and perception of the people on existing IEC materials for malaria prevention. These will be used to develop IEC strategies for the promotion of the use of ITNs for malaria prevention which is the objective of the study.

2.2 Information, education and communication related to behavioral change in the use of ITNs for malaria prevention.

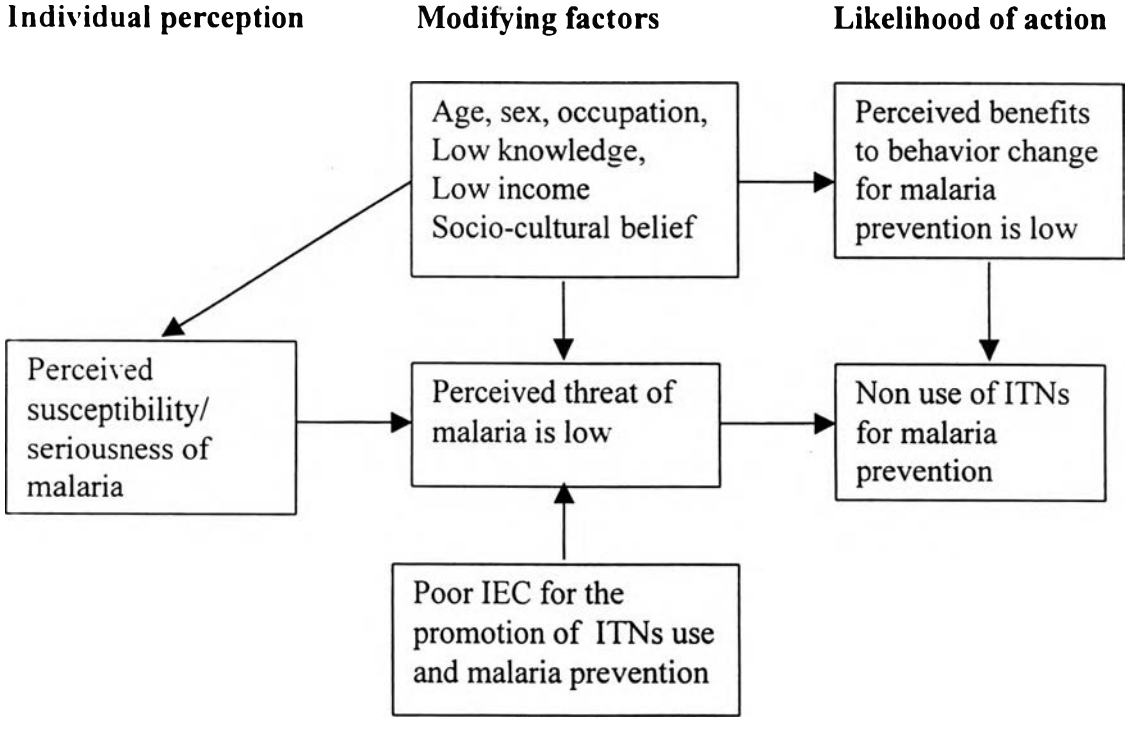
Information. education and communication is a means to increase the people's knowledge and cause positive changes in human behavior for both preventive and curative aspects of disease (Dignan and Carr, 1992). The change of human behavior is affected by many factors. One of the important factors is people's perception. People will know the mechanism of the disease and understand how to prevent it if there is a good and appropriate IEC support to increase their perception. In the Health Belief Model (HBM Figure 2.1): IEC is one of the modifying factors which it is necessary and very important for behavior change for ITNs use (Sornmani and Fungladda, 1991). According to the HBM, there are four elements: (1) individual's perception of the susceptibility and seriousness of malaria; (2) perception of threat from malaria; (3) modifying factors, e.g. IEC, demography, sex, age, occupation etc.; and (4) perception of benefit of the use of ITNs for malaria prevention (Dignan and Carr, 1992).

Individual perception of the severity of malaria refers to feelings concerning the seriousness of contracting malaria as well as an evaluation of the consequences from the disease, e.g., fever or death from malaria. When individuals feel that they are at risk of contracting malaria, they may or may not act (use ITNs) to protect themselves depending on whether they know that malaria is severe or can cause death (Lengeler et al., 1996). Only then will they be more likely to protect themselves from the disease. This means that the two factors combined, perception of susceptibility and perception of severity of malaria influences the individual's likelihood to take a proposed action of the ITNs use for malaria prevention. The individuals perception of threat of malaria is the consequence of personal perception of susceptibility and severity of malaria. Because, if people realize the susceptibility and severity of malaria, they will perceive a threat of malaria and start to use ITNs to protect themselves from mosquito bites.

The mentioned perceptions are not the only influences to change behavior for the use of ITNs and malaria prevention. Human behavior change is also affected by modifying factors such as socio-cultural and economic status, and demographic characteristics (Agypong et al., 1995). Socio-demographic factors such as age, sex, occupation, and education are determinants of behavior change for ITNs use and malaria prevention. These factors affect an individual's perception of malaria and the perceived benefit the proposed methods of malaria prevention. For example, people who have higher education are at less risk from malaria than people who are illiterate because they understand prevention better.

Perceived benefits of the proposed action refers to the individual's beliefs regarding malaria prevention. The acceptance of susceptibility to malaria and use of ITNs is related to behavior and depends on negative or positive effects of the consequences after the action, e.g. people will use ITNs if they know that it can prevent malaria. But, they may not use it if they think that ITNs have negative side effects. The direction that one takes is thought to be influenced by beliefs regarding the relative effectiveness of known and available alternatives in reducing malaria through the use of ITNs. To encourage the use of ITNs for malaria prevention, therefore, the people's perception of malaria on both preventive and curative aspects and modifying factors should be identified so as to design and discoves ways to increase people's knowledge, attitudes and practices for the prevention of malaria through appropriate IEC strategies.

Figure 2.1: Behavioral change in the use or non-use of ITNs distributed for malaria prevention related to IEC for malaria prevention.



Adapted from: Sornmani and Fungladda, 1991. Social and economic aspect of malaria., CIEH, 1992. Health and Villagers Program. Research on IEC for malaria control in Luang Prabang, Savannaket and Sekong Provinces in Laos., and Dignan and Carr, 1992. Program planning for health education and promotion

There is not only the HBM model that can be used to change behavior for ITNs use for malaria prevention, but, there are other models that can be used for health promotion, e.g., health education for malaria prevention. People have been using nets since early time. so the use of nets is not a new idea for their daily lifestyle. One such model is the PRECEED-PROCEED model which is effective for change of human behavior and the success of health promotion program can be used to develop IEC strategies. The PRECEED-PROCEED model was developed to assist health educators and planners in conducting a study and evaluation of all the factors that influence change in human behavior (Kaplan et al., 1993). For malaria prevention and control, there are many strategies to be used for the success of the program. For example, control mosquito from biting, control breeding places and kill adult mosquitos. These strategies. health education or IEC are one of the very important methods for behavioral change. Because, people's perception will be changed if they know and understand what the disease is, its danger and how it can be prevented (Sornmani and Fungladda, 1991).

The processes of PRECEED-PROCEED model for malaria prevention through developing IEC for behavioral change involve decision making on how to increase the use of ITNs for malaria prevention among the people. There are five phases in the

PRECEED portion and four phases in the PROCEED portion of this model (Figure 2.2).

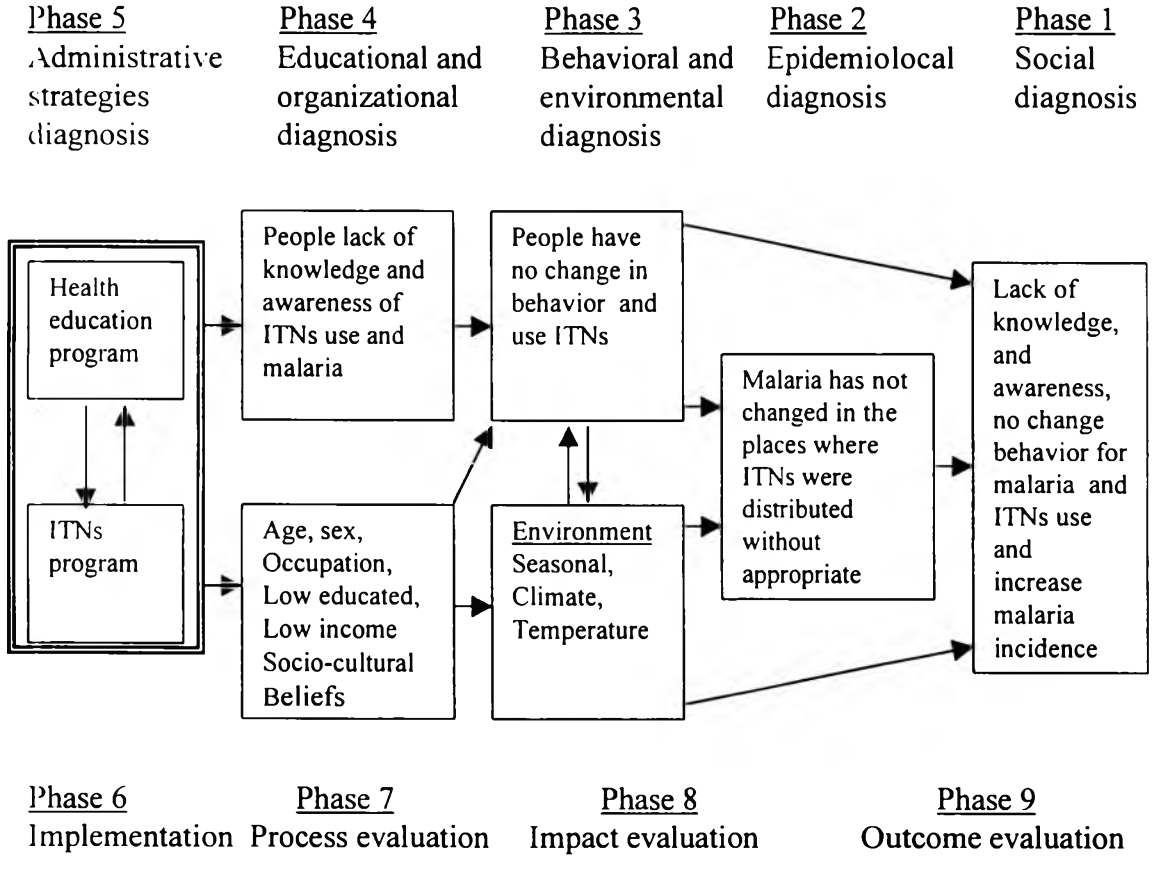
The components of PRECEED are: Phase 1 is social diagnosis. This phase shows the lack of people's knowledge and awareness and no change behavior for ITNs use and malaria prevention. It means that malaria will not be changed after ITNs program implementation if there is no appropriate IEC support. Phase 2 is health problem diagnosis. This is related the current concerns and existing problems in the areas. The main purpose is to collect and identify the problems and select which one is a priority and can get the outcomes after ITNs program has been implemented. It is shown that malaria has not changed in the places where ITNs were distributed without IEC support. Phase 3 is behavioral and environmental diagnosis. The behavior and environmental factors affect and relate to people's use and non-use of ITNs for malaria prevention. For example, people may have never used it so they have no experience. They may think that ITNs have side effects such as feeling hotter than ordinary nets and difficulty in breathing. Environmental factors are also important such as seasonal, climate, temperature etc. which affect malaria. These are existing and/or often beyond the malaria control and health education program. It is also a contributing factor for vectors and parasites breeding of malaria. Therefore, knowledge of behavior and environmental factors are necessary in the development of IEC strategies. This phase shows the reasons for non use and lack of environmental maintenance by people.

In Phase 4, there are predisposing, reinforcing and enabling factors. Predisposing factor is that the individual's behavior can be explained as a function of the characteristics of the individual. These include demography, health believes and attitudes about disease etc. (Sommani and Fungladda, 1991). Enabling factor, includes all factors that affect the affordability of people of malaria prevention methods. In the ITNs program, the enabling factor is community participation. The community participation can be increased by appropriate IEC by letting them know that it is their problem and they should be responsibility for it by themselves. Therefore, health education should be considered to develop a positive change in human behavior. Phase 5 is administrative diagnosis. As mentioned above there are many strategies for malaria prevention and control. Each strategy has a different value based upon suitability, ability and the local situation in the area such as human resources, funding, management etc.

The component of PROCEED are phases six to nine. They are concerned with the implementation and evaluation of the intervention. For the promotion of the use of ITNs for malaria prevention and control through IEC promotion, phase six of implementation is not easy to do, because. the main purpose of implementation is changing of behavior. In reality, no change in behavior may noticed in some people even when they have knowledge and awareness such as in the case of smoking. Therefore, during the implementation of the program, monitoring should be considered. Phase seven to nine are evaluations. Any program needs to be evaluated in terms of process, impact and outcomes for development and improvement. For

example; in malaria control, ITNs distribution without IEC support or giving IEC without ITNs support are not enough for malaria reduction and behavioral change. Almost all people who are at risk of malaria are poor and do not realize that malaria prevention is important for the maintenance of their health and earning money for food and living. Therefore, one of the better ways to increase and/or change the people's knowledge and ensure sustainability of ITNs program is evaluation to find out the better strategies and cost-effective methods for people. They will then cooperate and participate with the ITNs and IEC program.

Figure 2.2: PRECEED-PROCEED model for developing IEC for the promotion of the use of ITNs and change behavior for malaria prevention



Adopted from: Sornmani and Fungladda, 1991. Social and economic aspect of malaria, CIEH, 1992. And Kaplan et al., (1993). Health and human behavior. McGraw Hill, Inc. International editions. Psychology Series

2.3 Insecticide treated bed nets and their importance

ITNs are the nets which have been impregnated by insecticides. They are many kinds of insecticide for impregnation such as Permetrin, Pyrethroide etc. Nets are usually made by weaving cotton or nylon thread with tiny holes from where mosquitoes can not enter inside. Insecticide Treated Bed Nets is one of the better control measures for malaria prevention in many malaria countries in the world. It has been used for malaria control for many years because the use of the ITNs can protect people from mosquito bites when they are under ITNs or nets. The positive impact of ITNs has shown that they not only protect from mosquito bite but it can also kill the mosquito when they get exposed to the nets (WHO, 1996). If the people use the ITNs for malaria prevention and avoid mosquito nuisance, they will not suffer from malaria. This argument shows that people should know and understand that malaria is caused by infected mosquito bite. Therefore, to protect from mosquito bites, the insecticide treated bed nets as a control measure could be better and highly effective for the reduction of malaria incidences.

Several field trials have demonstrated that the protective effect of mosquito nets can be greatly enhanced by treating them with a special insecticide (Maremba et al., 1995., Marsh et al., 1996 and Jambulingam et al., 1989). Because of odour of the insecticide, mosquito either fly away or are killed if come into contact with nets. ITNs and nets are useful to all ages but especially to the young children because malaria mosquito usually bite from sunset to sunrise and young children usually sleep by sunset

(WHO, 1996). There are many studies which document the positive impact and high effectively of ITNs. Malaria incidence were reduced by 45% for a 9 month period by the introduction of ITNs in Africa (Lengeler et al., 1996). One such intervention that was found to be highly effective for malaria reduction in studies in China, Vietnam, Solomon Islands and Papua New Guinea (Self, 1989) and Malaysia (Hii et al., 1987) is insecticide treated bed nets. A similar, unpublished study by the National Malaria Control found that ITNs could reduce malaria incidence by 88.7% within seven months in Cambodia (Yeang, 1992 and Boravuth et al., 1996). Impregnated bed nets were accepted in trials in Papua New Guinea and in other tropical areas because the community can become involved in making and treating nets. For example, families brought their nets to the treatment centers for impregnation with insecticides (Knell, 1991). 45% of people's nets (excluding the nets of the program) were brought for impregnation in some villages of Thailand because the people learned that ITNs were highly effective.

2.4 Malaria

Malaria is one of the most serious diseases to affect people in developing countries with tropical and subtropical climates (WHO, 1996). It is communicable and a protozoan disease caused by infection with parasites of the genus *Plasmodium Falciparum* and transmitted to man by the bite of certain species of infected female *Anopheles* mosquito (WHO, 1989-1990). The cycle of malaria begins as a flu-like illness 8-30 days after being bitten by an infected mosquito and typical cycles of fever, shaking chills and drenching sweats may then develop. The periodicity of these cycles

depends on the malaria species and coincides with the stages of parasite multiplication, development and destruction of red blood cells (Zeneca Public Health, 1994).

2.4.1 Causes of malaria

Malaria is communicable and a protozoan disease caused by infection with parasites of the genus *Plasmodium falciparum* and transmitted to man by the bite of certain species of infected mosquito (WHO, 1989-1990). Only *Anopheles* mosquitoes can transmit the protozoan parasites of genus *Plasmodium* which are responsible for malaria in man. When an *Anopheles* feeds a blood meal from a person who has malaria it swallows parasites with blood. If the same *Anopheles* mosquito inoculates a healthy person for a blood meal, the parasites will be transmitted into that person's blood stream and becomes parasite infected and then becomes ill (Park, 1994). There are four species of *plasmodium* that causes malaria in man; *P. Falciparum, P. Malariae, P. Ovale and P. Vivax.* The main areas in which they occur are: *P. Falciparum*; throughout tropical Africa, Asia and Latin America. *P. Malariae,* Worldwide in tropical and sub tropical zones, but with a very patchy distribution. *P. ovale;* mainly in tropical Africa. And *P. vivax;* Worldwide in tropical, sub tropical and some temperate zones (Zeneca Public Health, 1994).

2.4.2 Effects of malaria

Malaria is dangerous to all groups of people but especially in pregnant women and children under five years old. If they get malaria the severity of illness develops rapidly and may even result in death. People living in malaria areas may develop some

extent of resistance. But in people who come from non malaria areas to malaria areas, if they become ill with malaria, the disease may be severe (WHO, 1996). If people are infected by *P. Vivax.* they may be not fatal. But, if people are infected by *P. Falciparum,* it may be fatal because cerebral hemorrhages will occur. The first characteristic of malaria is high fever, excessive sweating after few hours of fever and then reduction of temperature. Some times it is difficult to diagnose whether a sickness is caused by malaria or some other disease. In this situation if the patient's condition has not improved with adequate other treatment after 2 days, she or he needs to seek urgent care in the nearest hospital or malaria clinic.

2.4.3 Malaria mosquito

There are different kinds of mosquitos. All *Anopheles mosquito* do not cause malaria. The mosquito which causes malaria is called malaria mosquito or vector. Male mosquitos do not suck blood. so do not bite and can not cause malaria. The life cycle of malaria mosquito depend on environmental condition. For example, tropical climate, rainfall. humidity etc. Female *Anopheles mosquito* lay eggs on stagnant or non flowing water. The eggs are very small and can hardly seen. They breed in collection of water within 2 kilometers of the place where people live. The larvae comes out 2-3 days after the eggs are laid and lives in the water surface. Then develop to pupa and still remains in water. After few days pupa becomes adult mosquitos. If it is a female mosquito it may bite people and feed on their blood. It take about 7-14 days for a mosquito to grow from an egg to an adults. A new adults does not have malaria parasites in their bodies if they do not bite some one who has malaria. Mosquitos

usually rest on a nearby surface for a while after feeding and it will fly away. It will then lay eggs and the above life cycle repeats again.

2.4.4 Transmission of malaria

The transmission of malaria occurs through exposures to the bites of infected female mosquitos. The parasites multiply many times in the liver and then in infected red blood cells. Vector mosquitos become infected by feeding on the blood from infected people, and the parasites then undergo another phase of reproduction in the infected mosquito (WHO. 1989-1990). The main transmission depends on three epidemiological factors: the host (human), the agents (vectors and parasites) and the environment (physical, biological and socio-economic).

2.4.5 Malaria Prevention and control measures

The prevention of malaria is protection from mosquito bite. There are many control measures to protect from mosquito bite. Since malaria varies throughout the world, no single prescription can be made for the control of malaria in all countries. On the contrary, each country's circumstances will influence the organization of practicable program to identify local problem and priorities and design and implement appropriate interventions. The key is competent local action (WHO, 1993). The best control strategies should have both curative and preventive components (WHO, 1996). But, the following strategies only focuse on the prevention of the disease. According to the strategies of WHO, there are three main ways to prevent malaria as the following control measures (Table 2.

Table 2.1 Control mosquito and malaria

Control activities	Control measures
Prevent mosquito from biting people	Sleep under mosquito nets or ITNs. Screen all windows and doors in the house, or at least in Rooms where people sleep. Apply mosquito repellents to the skin. Burn mosquito coils. Protective clothing
Control mosquito breeding	Eliminate places where mosquitoes can lay eggs. Reclaim land by filling and draining. Introduce special fish that eat mosquito larvae. Put special insecticides in the water to kill mosquito larvae.
Kill adult mosquitoes	Spray rooms with insecticides before go to bed. Participate in activities carried out by the health service, such as spraying the inside walls of houses with insecticides that kill mosquito.

Sources: WHO, 1996; Malaria a manual for community health workers, Geneva.

1. Prevent mosquitos from biting :

Insecticide treated bed nets : Nets will be better protection if they are treated with a special insecticide that is called Insecticide Treated Bet Nets (ITNs). ITNs are one of the better control measures for malaria prevention in many malaria's countries in the world. ITNs is not harmful for health if used correctly. The positive impact of ITNs has shown that they not only protect mosquito bite but it can also kill the mosquito when they get exposed to the nets (WHO, 1996). They are many kinds of insecticide for impregnation such as Permetrin, Pyrethroide etc. If the people use the ITNs for malaria prevention and avoid the mosquito nuisance, they will not suffer from malaria. This argument shows that people should know and understand that malaria is caused by infected mosquito bite. Therefore, to protect from the mosquito bite, the insecticide

treated bed nets as a control measure could be highly effective for the reduction malaria incidence.

Mosquito nets : Use of mosquito nets is a very good way to protect people from getting malaria. Mosquito nets do not kill mosquitos, but while people are underneath them the mosquito can not bite them. Malaria mosquitos usually bite from sunset to sunrise. Therefore, mosquito nets are especially good for protecting young children who are already asleep by sunset. Nets are also good for protecting older children and adults because some mosquitos bite during the night. Therefore, they should go to sleep early under nets to avoid mosquito bites during the evening. Mosquito nets will not prevent malaria unless they are used correctly; torn sections must be repaired, nets should be hung up properly to cover the sleeping area and low enough to allow netting to be tucked in under the mattress.

Screening : A single ITN or nets provides only for those sleeping under it, but screening the windows, doors or house will protect the whole family. Effective screening is possible only in house that are well constructed and maintained. Various materials can be used for screening such as metal, and plastic. Frequent inspection is necessary to detect damage to the screens and to make early repairs. Another way of keeping mosquitos out is to use curtains made from netting or similar materials.

Repellents : Repellents are chemicals that people can apply to the skin to keep mosquitos away. Repellents prevent mosquitos from landing on the body. It is very

useful early in the evening when people are not under mosquito nets or inside screened houses. And it is also very useful when people are in the forest. They are usually active for 5-8 hours, then they have to be applied again.

Mosquito coils : When mosquito coils burn, their smoke keeps mosquito away. If mosquitos fly through the smoke, they may even be killed. The coils are not very expensive and are especially useful early in the evening when people sit outdoors.

Protective clothing : Long boots, thick socks, trousers and full sleeved shirts made up of thick clothes and gloves may provides good protection against mosquito bites and are especially useful for people on guard at night and who work in the farm or forest. But, one should be aware that mosquitos may pierce through clothing, which is in contact with the skin. So protective clothing should be thick enough to avoid mosquitos from piercing.

2. **Mosquito Control :**

a). **Chemical method :** Chemicals are insecticides which either kills malaria mosquitos or keeps mosquitos away from the area where insecticides have been sprayed. Insecticides are an effective method for mosquito control and widely used in many parts of the world. Though it is learned that some malaria mosquitos have developed resistance against some insecticides. Some commonly used insecticides are DDT, Malathion, Permethrin, Deltametrin etc. Insecticides are mixed with water and are sprayed through pressure sprayer. There are includes as the follows:

Biological : This method of mosquito control is the introduction of various pathogens and predators of insect vectors of disease into the environment. Among various biological methods the use of larvivirous fish is common. Those fish eat mosquito larvae. Cisterns, shallows, ponds, small streams, ornamental pools are ideal places for mosquito control by fish introduction.

Space spraying : Space spraying is done by releasing insecticides into the air as smoke or as fine droplets. As result of which the numbers of mosquito reduce not only in dwellings but also temporarily in outside breeding grounds. Due to the effect of insecticides mosquito either die or due to its odour they fly away and do not come where it is sprayed.

Residuals spraying : Insecticides possess residual properties after spraying its residue remains on the surfaces where it has been sprayed. The effect is that it kills mosquitos and because of its odour the mosquitos do not come where it is sprayed. Residual spraying is generally done in the houses. The effect is about 3 months if the house walls are made up of wood planks (WHO, 1997).

b). Sources reduction : The control of mosquitos is one of the methods to protect the community against the disease. It can be done by source reduction. For example; elimination of mosquito breeding places through environmental modification and manipulation. This method is to control, not kill the mosquito. For source

reduction, it is essential to know or have knowledge about the breeding places of mosquito. Malaria mosquito may breed in (WHO, 1996):

- freshwater or brackish water, especially if it is stagnant or slow-flowing;
- open streams with very slow-flowing water along their banks;
- pools of water left on the riverbed after the rains have ended, or as a result of poor water management;
- swamps, rice fields, and reservoirs;
- small ponds, pools, borrows-pits, canals, and ditches with stagnant water, in and around villages;
- animal hoof-prints filled with water;
- cisterns (water tanks) for storage of water; and
- anything that may collect water- plant pots, old car tires, etc.

It has to be remembered that the mosquitos that bite people usually breed within 2 kilometers of where people live. The individual and the community can attempt a joint effort to reduce breeding places by the following activities:

- Use sand to fill in pools, ponds, borrow-pits and hoof-prints in and around the Village.
- Remove discarded containers that might collect water.
- Cover cisterns (water tanks) with mosquito nets or lids.
- Clear away vegetation and other matter from the banks of streams this will speed up the flow of water.

- Pools of water may be caused by leaking taps, spillage of water around stand-pipes and wells, or poor drains. These pools can be eliminated by repairs or improvements to the water supply or drainage system.

c). **Anti-malaria parasites :** This method is usually used for treatment with malaria cases after diagnosed with infected malaria parasites. Anti-malaria parasites are used in malaria drugs. In the area where localized or focal outbreaks or in the case of epidemics of malaria, all people living in that area are treated with anti-malarials which is called mass drug administration. Similarly, for travelers, wood cutter, soldiers etc. who are coming from non endemic areas short terms measures of chemoprophylaxis (treatment with anti-malarials) is given.

2.5 Factors contributing to malaria

2.5.1 Behavior and environment of host factors

Human behavior : Human behavior shows an action of people of both the curative and preventive aspects of diseases. It is very important for the control of malaria transmission because health behavior is mostly related to the prevention of man-vector contact. People's daily activities pattern such as working in farms, forests and gathering for social functions at night time and no use of ITNs or nets can maximize the contact with malaria vectors (WHO, 1997). For treatment aspect, human behavior affects transmission of use self medication, delay to treatment, treatment with traditional healers and family doctors, those who have no experience with malaria treatment.

These behavior lead to uncompleted doses and resistance to the drugs and severe malaria.

Living practice : The patterns of people's living style influences malaria transmission. There are many people who sleep outdoors without bed nets during the mosquito biting time. This habit increases man-vector contact which is attributable to increasing malaria infection (WHO, 1997). People in developing and less developed countries have a pattern of life style and living practice relating to natural environment especially people who are in rural areas. They have poor sanitation and cleanliness practices such as cleaning of house and surrounding, gardens, pools and drainage. These types of habits lead to an increase in the vector density and it is a favorable situation for man-vector contact which ultimately raises the risk of malaria infection (WHO, 1996). Some minority groups of population have more chance of getting malaria because they are in mountains and forest where there are more mosquitos. Low literacy also affects living practices and lack of knowledge of diseases prevention. Therefore, these groups of people do not realize and pay little attention that malaria is dangerous for their health.

Age : Malaria is a communicable disease and is caused by the *Anopheles* infected mosquito bite. Therefore, anybody can have a chance for malaria infection if they do not protect from biting by themselves. Malaria is dangerous for all ages but particularly for young children under 5 years old. If a young child gets malaria, severe illness may

rapidly develop and may even result in death (WHO, 1996), because this group of people have low immunity.

Gender : Malaria can affect to both men and women but it is specially dangerous in women particularly pregnant woman. If a pregnant woman gets malaria, severe illness may rapidly develop and may even result in death (WHO, 1996). Because this group of people have low immunity. Men have more chance to get malaria than women because they usually work outdoors where there are more vectors to be exposed and to bitten.

Immunity : In areas where malaria is very common, people may get the disease several times during their lives. This gives them some resistance to the disease. so the attacks of malaria often become less severe as they get older. However, adults who come from areas where malaria is not common become very ill with malaria just like children (WHO, 1996).

Occupation : Occupation alone may maintain the transmission of malaria. Malaria affects the people who work with at risk occupations which increases the exposure to mosquito bite. These at risk occupations are like farming, hunting, wood cutting, fishing, wood gathering, cattle herders, salesperson or workers. However, in a number of areas endemic for malaria, infection occurs as a results of workers staying overnight in the forest where they are exposed to the vectors, or working in the field at times when they are likely to be bitten. This group of people may then reintroduce malaria to their communities when they come back.

Labor force movement : When there is population movement or migration for work from city to rural areas where there is malaria, they may get infected and also assist to the spread of disease. Many factors cause population movement. Many Laborers connected with various engineering, irrigation, forest, construction, agricultural and other projects have more chance of mosquito contact. The occupational season when observed showed that the migratory pattern of fishermen community had a direct bearing on malariogenic conditions. The fishermen visit many endemic areas, during the course of their fishing activities, invariably contract malaria and return sick to their native villages where they form the foci for further local transmission (Ramalingaswami, 1984).

2.5.2 Socio-cultural and economic factors

Malaria transmission is also influenced by socio-cultutral and economic conditions. The long held traditional belief of people can lead to malaria infection because they have no change their old knowledge and behavior. For example, some groups of people believe in ghosts and they think that malaria is caused by ghosts and is not caused by mosquitos. Therefore, new methods and techniques of malaria prevention such as use of ITNs or bed nets, DDT residual spraying are not realized by them as being helpful. They think that ITNs have side effects and are harmful to health. Some people are not allowed to use ITNs due to cultural reasons. Certain tribes and race do not live in one place and have a practice moving from one place to other for working, earning purpose and sleep outdoors or huts without bed nets. This group of people have more chance to get malaria infection.

The levels of income determines affordability to health care services, protective measures, quality of dwelling such as the quality of the house. Therefore, poor people have more chance to get malaria because they can not afford the above mentioned measures. In endemic areas, diseases like malaria are especially prevalent among those who are poorest and where there are no primary health care post or rural health center or lack access to appropriate medication and its regular supply. This is made worse by insufficient food and inadequate nutrition. Action in the case of acute illness such as taking a sick child to the clinic may be delayed where a poor woman lacks money for transportation, medication, bed nets for all household members even if they accept intervention in theory (Agyepong et al., 1995).

Laos is one of the less developing countries in the world. Most of people have low income especially the those who live in the rural areas. Their income is from farm production and is not available as discretionary income. Their money earned is mostly used for food but they cannot afford health care services and treatment when they get sick. This type of income can affect malaria transmission.

2.5.3 Health services and political system factors

Infrastructure of health services do not cover the whole country due to limited budgets, this also affects the people who have low income and can not afford to take care of their health. Lack of monitoring and evaluation of the program, and human resources who do not have experience are also serious problem for health development. Inappropriate information, education and communication strategies based upon people's

knowledge and ability levels, inadequate pre-testing before printing of health education materials for malaria prevention such as posters, leaflets, brochures etc., are the causes of misunderstanding, unacceptability and less participation of the rural people (Lengeler, 1996).

The political system in some countries is one factor influencing malaria transmission. Politicians are people who have the power for decision making, planning policy and allocation of the country's budget. Therefore, if health is the first priority to be supported the health facilities and services will be developed so as to cover the people who can not access and afford to the politician is also a person who can encourage community participation more than others. Ten years ago in Laos, more of the country's budget was allocated to the Ministry of Interior and Defense than others Ministries such as the Ministry of Public Health. Due to this factor the health programs could not be implemented with a better quality of services because of lack of budget.

2.5.4 Information and technology factors

Information influences people's knowledge, attitude and behavior towards action which can have both negative and positive impacts on the disease. (Dignan and Carr, 1992). Therefore, new and appropriate information will help the people to understand patterns of transmission of malaria and identify possible interventions. For example; if the vector breeds and lives at the forest fringe, away from the village settlements, and usually bite outdoors in the late afternoon, then it would be unlikely that use of bed nets or ITNs will substantially reduce malaria transmission. Because, mosquito would

rarely be found indoors in the village and will not bite when people are sleeping. However, if the vector is the forest dweller but a night biter, the use of bed nets by villagers when they sleep in the forest could help reduce transmission. This information is useful for people to reduce and protect the man-vector contact (Agyepong et al., 1995).

The new technology of high building construction, irrigation and deforestation in developing country destroy the living and breeding places of the mosquito. This technology can cause direct and indirect reduction of the mosquito population. New products such as drugs and insecticides can cure and kill mosquitos and parasites. Some types of drugs can also work when the parasites has already developed resistance to other drugs. In the places where there is new equipment for diagnosis such as microscopes etc., malaria control activities will be better than other places where there is no equipment because quick and accurate diagnosis and treatment will be possible.

2.5.5 Behavior and environment of mosquito and parasite factors

Seasons : Malaria is a seasonal and communicable disease. The seasonal incidence of malaria is rainy season because they have a long life expectancy and transmission due to the humidity and temperature which is favorable for sporogony. Seasonal variation in humidity that shortens the life expectancy of a very potent vector species may cause malaria transmission to cease even though the temperature is favorable for sporogony (Knell, 1991).

Rainfall : Rainfall causes water collection and influence malaria transmission in several ways. The surface water collection can create a breeding place for malaria mosquito. Evaporation of surface water can keep humidity high and thus prolong the life span of the mosquitos. However, heavy rain may flush the breeding places of mosquito and terminate larvae survival (Agyepong et al., 1995).

Temperature : Temperature is one factor for more or less spread of mosquito breeding because lower and higher temperatures can cause mosquitos to die. Mosquitos of the genus *Anopheles* are common in most temperate and tropical countries. provided that there are suitable breeding sites. To develop from egg to a new adult *Anopheles* takes about 7-12 days but it depends on temperature. In warm wet condition the reproductive potential of the female *Anopheles* is enormous, and is a major factor in the success of the malaria parasite. The developing time of plasmodium is suitable at an ambient temperature of 30 C (Knell, 1995).

Topography : Areas and location of the country affects the vectors breeding and transmission of malaria such as forest. plane areas. rainy seasons, tropical climate, because they are suitable for long life expectancy of the mosquito and parasites. The border areas with endemic areas lead to malaria transmission due to migrants carrying malaria parasite in their blood without symptom, and then it will be spread when they are bitten by malaria vectors and then bites someone else.

Breeding site preference : The type of water selected by each species for breeding can determine the ease of control. It may affect the proximity of breeding site to village, the interval between successive blood meals and any seasonal variations in malaria transmission. Breeding site preference also influences the effect of rain on mosquito numbers. For example, *Anopheles punctulatus* and *Anopheles koliensis* increase during the rainy season, but *Anopheles farauti 1* is reduced with rainfall, because its larvae are flushed from their brackish-water breeding sites. This preference influences malaria control (Knell, 1991).

Feeding habit : *Anopheles farauti 1, Anopheles punctulatus* and *Anopheles koliensis* differ in feeding habits. The different species has a different feeding time, indoor or outdoor. *Anopheles farauti 1* is most active in the evening biting before midnight and feeding indoors and outdoors. Consequently people are at greatest risk from *Anopheles farauti 1* when they gather socially in the evening, before going to sleep. By contrast, *Anopheles punctulatus* and *Anopheles koliensis* feed mostly after midnight and indoors biting with sleeping people. Under such circumstances bed nets may provide protection against malaria.

Resting time : Many mosquito vectors rest indoors on walls and ceilings before and after feeding. This habit is important for malaria control, because such resting sites are good targets for persistent insecticides. A mosquitoes species which rests is easier to control than another which does not. House construction affects the entry of mosquito, and their resting habits.

2.6 Required information for the study

Good information is very useful for making a decision on intervention and control (WHO, 1997). Required information depends on the factors influencing the non use of ITNs (Figure 2.3). They are: socio-cultural and economic information, knowledge and attitudes about malaria and ITNs use, human behavior for malaria prevention, treatment and perception on IEC for malaria prevention.

1. Information on socio-cultural and economic

In malaria areas, information about socio-cultural and economic factors such as the size of the population. patterns of population distribution, people's occupation and movement, morbidity of population. types of dwellings and income levels are important factors in selecting control measures against malaria. It is also important for the willing, acceptance and participation of people to the program (WHO, 1997).

Population size is important for the reason that it indicates the total number of people at risk. It helps to plan improvements of health facilities and the amount of anti-malaria drugs needed. Distribution of population indicates accessibility of people and rural and urban environment which helps to determine the type of surveillance and malaria control activities required. Occupation indicates the risk of acquiring malaria among different occupational groups e.g. farming, wood cutting, fishing etc. It is useful to find out who needs to know more about malaria and to know what control activities

is required to them. High people's morbidity due to malaria increase the possibility of the outbreak of an epidemic.

Movement of the population from city to rural areas which is endemic for malaria, for purpose of construction or as refugees influences morbidity. This information is useful to plan control activities and allocate resources where they are most needed. The information on types of dwellings and their location in relation to breeding sites is essential. Because, open dwelling are difficult to spray and easy for mosquito entry. This information will help malaria staff and planners to determine appropriate vectors control measures of malaria. The levels of income of people in a community indicates the affordability to the health care services. use of preventive methods and quality of dwelling (WHO, 1997). This information could be used to design cost effective but equitable systems of health care supply. For example, treatment. nets and spraying.

2. Information on human behavior

Human behavior affects both treatment and prevention of disease. It is influenced by many factors such as education level, socio-cultural and economic factors and health promotion campaign. Some groups of people have good knowledge but their behavior does not chang. For example; smoking cigarettes. For treatment, behavior influences early diagnosis and prompt treatment. People may delay and use self medication before coming to the hospitals. It may be used to identify barriers to obtaining early diagnosis and treatment and to determine information needs of the

community and health care provides. For prevention of disease, behavior indicates environmental maintenance such as poor drainage, canals and water pumps which create breeding sites for mosquito. This information also indicates what the people have done for personal and family protection from malaria. It helps for health education planning to encourage people to prevent the transmission and come early to the hospital if they get fever or malaria.

3. Information on disease, vectors and parasites

Information about disease is another important factor for malaria control. These includes morbidity, mortality due to parasites species, drug resistance status, case distribution and parasite incidence. These kinds of information helps to determine the extent of transmission. Morbidity determine the scope of the problem and impact on the community which helps to plan health facilities. Similarly, information on mortality will also help to determine the scope of the problem and impact on the community. It is useful to plan health facilities, to assess quality of health care and the need for training and improvement. Sex distribution of the disease shows who is at more risk of malaria, where transmission and epidemic occurs. This information can be used as if mainly males are infected it may be occupational, if pregnant women are infected there should be focus control efforts an urgent treatment.

Parasites and mosquito species can determine what kinds of treatment and control should be used. Because, different parasites and mosquito have a different treatment and control. If *P. falciparum* is predominant then there will be more

complications and even results in death. This information will tell the health educators and planners or physician to take quick action for promotion and prompt treatment where there is *P. falciparum*. The information on drug resistance shows the need for peripheral laboratory services, it also influences the choice of effective drugs, effectiveness of self medication and cost of drug provision. Information on mosquito species. breeding sites, biting and dwelling could have implications and influence over control strategies.

4. Information on the environment

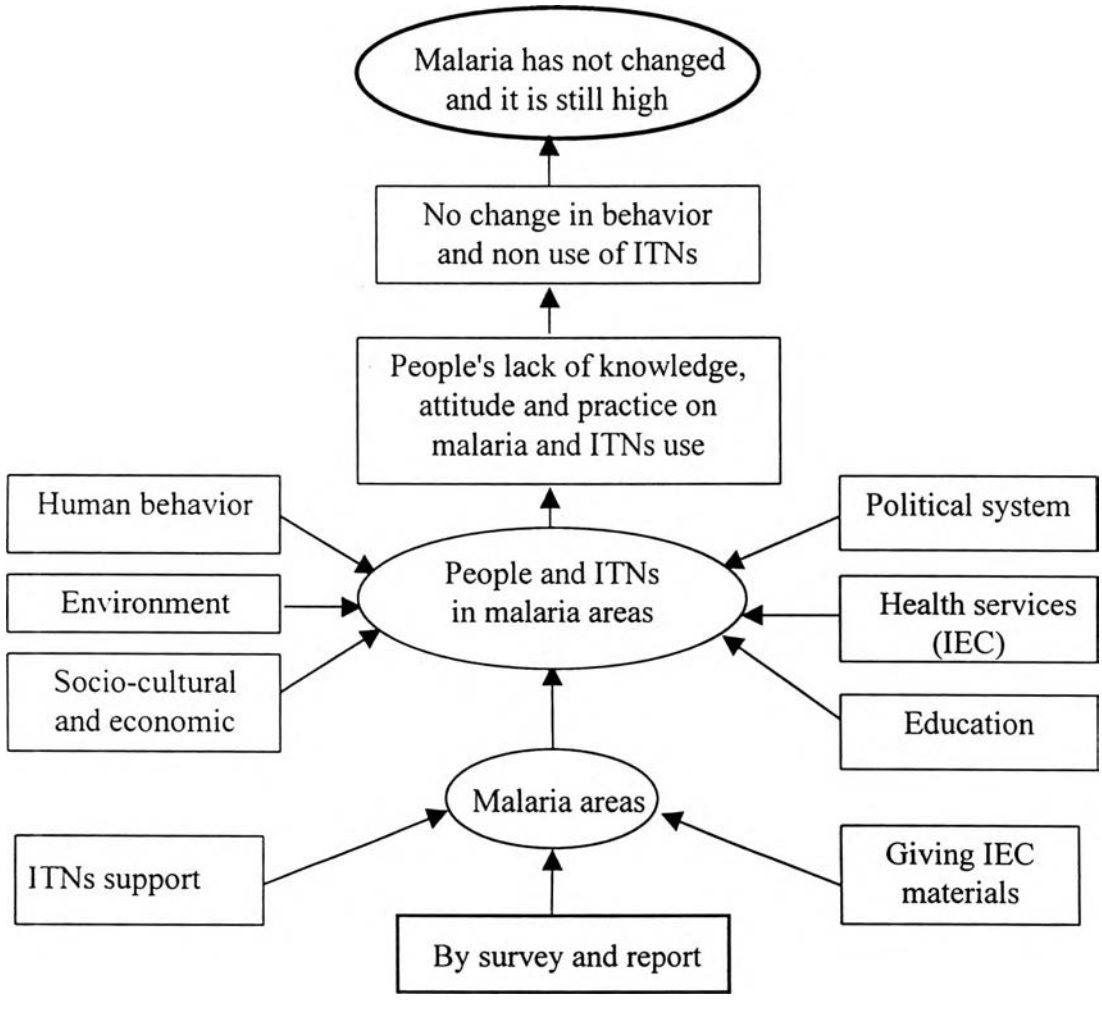
Malaria is a communicable and seasonal disease. It is found in the areas where there is a tropical climate with adequate rainfall (Knell, 1991). Malaria is not found at high altitudes where the climate is cold. So information on climate, rainfall, temperature. topography is important because these affect the suitability for transmission and epidemic of malaria. This information will determine where there is higher malaria incidences and helps planners. health educators, malaria staff to make action plans for control and prevention of transmission.

5. Information on control activities

Information for this aspect is more related to health educators, malaria staff and planners who are making decisions and planning for control strategies. This information determines the types of personal and family protection, ability for treatment and health care service. It will shows the area whether there is sufficient or lack of health services and promotion. And it also indicates which control strategies and/or

IEC are more beneficial and accepted by people such as public health services, private sectors (clinics, pharmacies), traditional healers, family doctors etc. This information are useful to provide the best access for all affected people to early diagnosis, treatment and appropriate prevention through developing IEC strategies for malaria control.

Figure 2.3: Analytical issue of the non-use of ITNs for malaria prevention for required information of the study: Factors affecting of the non-use of ITNs for malaria prevention in Laos



Sources: CIEH, 1994. Health and Villagers program. Research on information education and communication for malaria control and IMPE, 1996. Malaria control program by the year 2000. The Third National Meeting on Malaria 1996

2.7 Global and regional problem statement of malaria

Malaria is a serious public health problem in many countries of all regions of the world except North Africa, part of the Middle East and Australia. Some of Pacific Islands have never been endemic for malaria due to the absence of mosquito vectors (WHO, 1996). The disease is no longer endemic in the area where there is socio-economic improvement in the developing world. Nowadays as is a major public health problem of developing country malaria affects people of low socio-economic. Estimated 300 to 500 million people in the world gets malaria and approximately 1.5 to 2.7 million die from this disease (WHO, 1997). About 100 countries were affected and 2,100 million people at risk to malaria (WHO, 1989-1990). One child under the age of five dies every minute, day and night. It is estimated that 140 to 280 million clinical cases and 1 million deaths occur annually in children less than 5 years old (WHO. 1997). Most of these deaths take place in Africa. The countries in Western Pacific region are almost developing countries and located in tropical climate area, which is suitable for malaria transmission. Therefore, malaria in this region is also high when compared with other regions or developed countries. Between 1984 and 1991 there was a marked increase of about 30% in microscopically identified malaria cases in all countries of the region except China. Malaria morbidity and mortality was high in China, Laos, Cambodia and Vietnam (WHO, 1996).

2.8 Background of Laos

2.8.1 Geographic structure and climate:

Laos is located in South East Asia between Vietnam and Thailand. The country occupies a total area of 236,800 sq. km of which 230,800 sq. km is on land and landlocked by a 5,038 km long boundary. Laos has a total population of 5,035,000. There are 3 main ethnic groups: Lao Lum 75%, Lao Sung 15% and Lao Theng 10%. The predominant religion is Buddhism which is 85% of total population. The main occupation is farming. It has low literacy rate and low income (National Statistics Center, 1996). The climate of Laos is tropical, but wide variations in temperature occur in different areas, chiefly because of variations in elevation. The main climatic features are determined by the monsoons. The wet summer season prevails from about May to October, with rainfall averaging 1,778 mm. And a dry cool season extends from about November to February. The remainder of the year is hot and humid. In malaria aspect, malaria is communicable and seasonal disease, if the climate is hot and rainfall, it make humidity and the water surface collection for breeding and a long life expectancy of the vector population. The vector density also depends on the climate and environment. Therefore, Laos is one country which has a suitable climate for malaria transmission.

2.8.2 National health policy

In 1990 to 1993, the national health policy of Lao Government emphasized human resources development and curative diseases. Since late 1993, it was changed to

human resources development and preventive strategies. The objectives of the policy is to reduce mortality and morbidity by the year 2000 especially from communicable diseases e.g. malaria, diarrhea and pneumonia. Health education and promotion is one component selected to support the policy. For malaria control, the integration between health education and promotion and malaria control programs has been emphasized. The Institute of Malariology, Parasitilogy and Entomology and Center of Informatuion and Education for Health were assigned of the responsibility.

2.9 Malaria problem in Laos

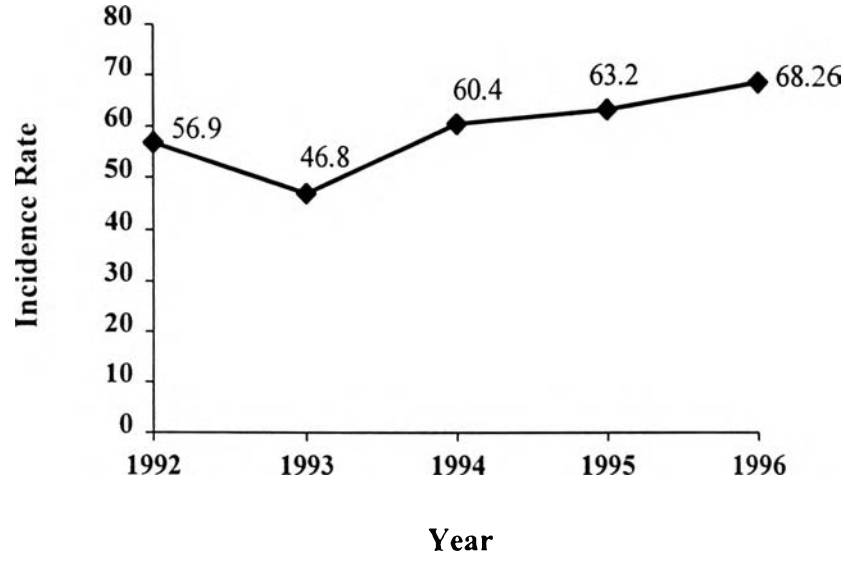
2.9.1 Magnitude of malaria

Malaria has been a serious disease for Lao people for many years. Many people were infected and many deaths occurred from this disease in the whole country. It is always cited as one of three most important public health problem with diarrhea and acute respiratory infection. Most times it ranks number one. Malaria cases throughout the country were diagnosed based upon estimates and clinical cases. It has high incidences when compared to a total population in the country .

About 1.2 million people out of a total population 5 million living in the rural areas are at risk of malaria. About 65% of a total number of patients in the whole country suffered from malaria (MoPH, 1993). Since many years ago, the Government has spent a lot of budget and human resources to control malaria. But, the incidence of malaria has been not decreased. Malaria incidence has increased from 1992-1996. It

has only decreased in 1993 because there was more budget support and integration from many agencies after the Ministerial Malaria Conference in Amsterdam 1992. (Figure 2.4)

Figure 2.4: Malaria Incidence Rate 1992-1996 in Laos (per 1000 population/year)

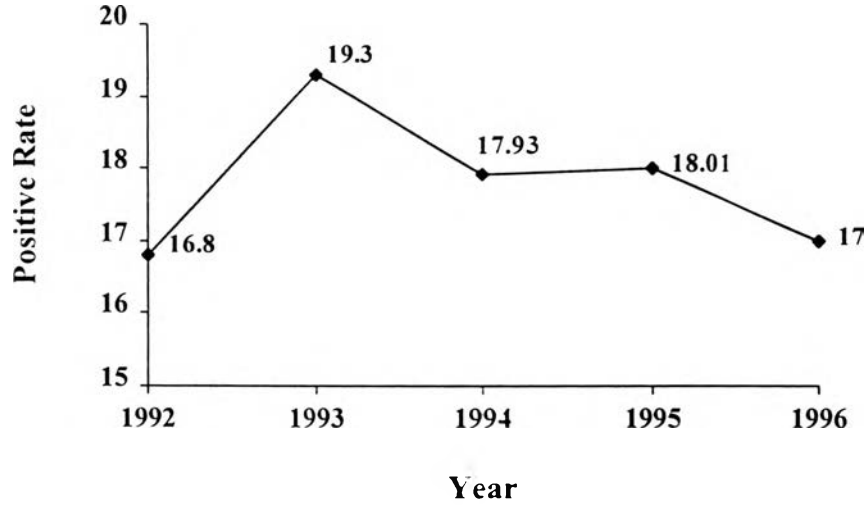


Sources: IMPE, 1996

Almost always the diagnosis of malaria in Laos has been done based upon clinical profile than microscope, especially in rural area. In the past, blood smear examination was only done in the hospital at the central, provincial and district levels. In the village or health post it could not be examined because of lack of microscopes and technicians. The case detection is not a priority of malaria control program. Only few areas had detected malaria cases by mobile team of IMPE and provinces. Therefore, the result of blood smear examination may not represent the malaria

incidence in the whole country if compared to malaria case reported clinically, because checking blood was not covered. The slide positive rate has increased from 1992-1996. It was higher in 1993 because malaria case detection was introduced which recorded symptomatic and asymptomatic cases of malaria in some provinces (Figure 2.5)

Figure 2.5: Slide Positive Rate of Malaria 1992-1996, Laos

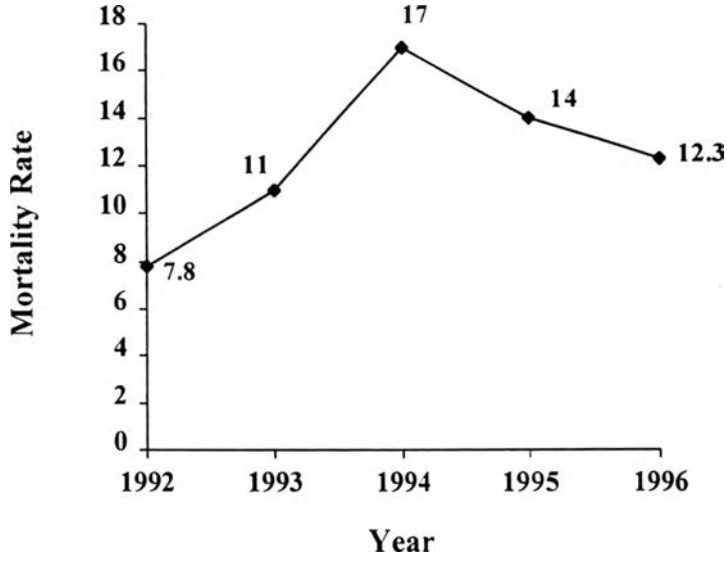


Sources: IMPE, 1996

Malaria is a disease with a higher death rate for the Lao people than other diseases, particularly in the people who live in the rural areas. They live away from health service centers. All the time they are already ill or severe before they reached the hospitals or health centers. Similarly, health facilities and services of the Government could not cover the rural areas. These are factors of high mortality rate when compared with other countries in South East Asia. Mortality from malaria has increased from

1992-1996, with a peak in 1994 because there was epidemic in two provinces and malaria statistics survey were made over the whole country (Figure 2.6).

Figure 2.6 Mortality Rate of Malaria 1992-1996, Lao PDR (per 100,000)



Sources: IMPE, 1996.

2.9.2 Vectors, parasites and drug resistence

The vectors of malaria in Laos are not fully known. In keeping with those nearby countries having a similar topography and rainfall it is accepted that *Anopheles (A) minimus* and members of the *A. maculatus* group are the principal vectors. While in adjacent countries *A. didus* has been incriminated as an important vector it is probable that the low level of DDT residual spraying in Laos in the 1960's and early 1970 has left the regional, indigenous *A. minimus* and *A. maculatus* groups largely untouched. Thus *A. durus* has been unable to establish itself as there was no appreciable impact

from DDT spraying. *Anopheles dirus* is not considered to be a serious vector problem in Laos at the present time. Such a situation could rapidly change if the existing vector population is dramatically reduced, or if development project result in environmental changes at particular sites or areas of country (IMPE, 1996).

Plasmodium falciparum is the major cause of malaria cases reaching 95.9% for the whole country while *P. vivax* is 4.07%, *P. malariae* 0.02% and *P. ovale* 0.002%. The *P. ovale* species is represented by just one case seen at Savanakhet Province in 1995. The diagnosis was based on morphological characteristic and was microscopically confirmed by AFRIMS Bangkok, Thailand. The level for *Plasmodium falciparum* malaria is the highest recorded in the region and indicated a potential for high level of illness due to malaria disease and death due to severe or complicated cases (IMPE, 1996).

Resistance to anti-malaria drugs by *Plusmodium falciparum* is not a serious problem in Laos. There are areas where Chloroquine resistent *Plusmodium falciparum* exists but does not seem to be widespread or well established. This mean that for the present, that chloroquine is still a very effective anti-malarial and as it is also the cheapest drug available, so is less of a financial burden to the program.

2.9.3 Approaches to malaria control

The objectives of national malaria control program are in keeping with the Ministerial Malaria Conference in Amsterdam 1992. There are 2 major objectives: to

reduce malaria related morbidity by 50% and mortality by 80% by the year 2000 by using the 1992 data as the baseline. There was 65.9 per 1000 population for morbidity and 7.8 per 100,000 for mortality in 1992 (MoPH, 1993). The approach to reduce mortality and morbidity are (IMPE, 1992):

a). Strategies to reduce mortality includes : Early diagnosis and prompt treatment by improving knowledge and skills of malaria staff and volunteer health workers on disease management. developing information systems for malaria control, monitoring and evaluation of the project implementation, reducing man vector-contact through vector control by encouraging the people use ITNs or nets, environmental maintainance.

b). Strategies to reduce morbidity includes : Increase in both community and health workers awareness of seriousness of malaria and the life threatening potential of malaria due to plasmodium falciparum, teaching individual, family and communities to recognize clinical malaria and to quickly refer suspected cases to the health workers, improving the clinical diagnosis of malaria, making more microscopic diagnosis available and introducing where appropriate method of malaria diagnosis.

2.9.4 Information system of malaria

An important aspect of successful program is a well developed information system. For disease control collection of information is surveillance. In malaria,

surveillance is the collection of information for action (WHO, 1993). Information collection is required to:

- Identify the situation and problem.
- Determine actions needed for planning and dicision for control.
- Allocate resources and evaluate the impact of control measure

Surveillance in Laos is aimed at early diagnosis and prompt treatment of cases, reporting system and community participation for interruption transmission (IMPE, 1996). The strategies used for surveillance are re-training health staff and volunteer health workers on disease management, health education and promotion skills and campaign aimed at people for malaria prevention, timely and emergency reports from bottom to top and top to bottom if an outbreak occurs.

2.9.5 Problems and constraints

The available information on malaria in terms of human, disease, environment and control activities at present do not cover the whole country. Training, monitoring and evaluation has not been done regularly. Health education materials and campaign for malaria control are limited as well as the materials are not pre-tested before printing. With the limited resources, technology and technical man power CIEH is unable to conduct a study on information of socio-cultural and economic factor, knowledge and attitude of the people about malaria and ITNs use, human behavior on malaria control and perception on IEC for malaria prevention in the location of ITNs program. These

have led to non availability of local information on the above aspects for developing appropriate IEC for health education campaign for malaria prevention.

2.10 Conclusion

Malaria is curable and preventable disease but it is still on the increase and kills many people in many countries in the world (WHO, 1996). In Laos, most people do not realize that malaria is very dangerous for their health. They do not know what causes malaria and how it is spread, so they are not able to protect themselves from the disease. People often think that they have a cold, influenza or other common infection. People have not changed their behavior in regard to treatment and prevention (CIEH, 1994). The people do not practice prevention by protecting against mosquito bite, environmental maintenance and go to the hospital as soon as fever occurs. For the prevention of malaria transmission, there are many kinds of control measures such as protection from mosquito bites, control of mosquito breeding ground and killing adult mosquitos. Out of these control measures, one such intervention that was found highly effective and could decrease malaria incidence was the use of ITNs (Boravuth et al., 1996). As mentioned previously, ITNs not only protect from mosquito bite, it can also kill mosquitos. But, ITNs alone can not decrease malaria incidences. Because, people do not use it due to lack of knowledge, attitude and practice of ITNs and realize the danger of malaria. Therefore, to increase people's knowledge and attitude for changing their behavior, IEC is most important for every health promotion programs particularly in the prevention side (Dignan and Carr, 1992). Human behavior will be changed if

people have knowledge and attitude of the susceptibility and realize the threat of the disease (Kaplan et al., 1993). Similarly, knowledge and attitude are influenced by IEC strategies.

At the present, there is lack of information on socio-cultural and economic aspects, people's knowledge and attitude on malaria and the use of ITNs, human behavior for malaria prevention and perception of people on IEC for malaria prevention in the places where ITNs were distributed. Therefore, to get information my proposal is to collect information on the factors affecting the use and non use of ITNs at a village where situation of malaria has not changed. This will be used to develop IEC strategies for the promotion of the use of ITNs as a means of prevention of malaria.

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