

CHAPTER II

LITERATURE REVIEW

This research aimed to study the dengue prevention and control behavior of caretakers and the relationships between predisposing, reinforcing and enabling factors and the performance of caretakers for prevention DF. In this chapter, the related research literature related to the scope of this study is reviewed in the following topics:

1. Knowledge of dengue fever, mosquitoes, and the Larval Survey Index
2. Plans and criteria for the prevention and control of dengue fever
3. Family health leaders
4. Health behavior concepts and prevention and control behaviors
5. The PRECEDE-PROCEED
6. The concepts of knowledge and attitudes related to the prevention and control of a disease
7. Related research studies

1. Knowledge of dengue fever, mosquitoes, and the Larval Survey Index

Dengue Fever (DF) is caused by a virus, and its symptoms include high fever combined with hemorrhagic diathesis and hepatomegaly. Some patients may develop shock syndrome and death (Wangrunthap, 1993).

Causes of the disease

Dengue fever is caused by a virus. Laboratory tests have found that dengue virus causes dengue fever. It is a RNA virus in the Togaviridae Family, Flavivirus Subgroup (group b arbovirus), and has four serotypes (1, 2, 3, and 4). The most common types are Dengue 2 and Dengue 4. However, Dengue 1 and Dengue 3 have been increasingly found lately.

The infection

Dengue fever can be transmitted by *Aedes* mosquitoes, the disease carriers. Infection takes place when *Aedes* mosquitoes bite people with the dengue virus before biting other people, at the same time releasing the dengue virus into the blood circulation of the new persons. In so doing, the virus can increase in number dramatically.

The incubation period is about three to 14 days, but usually it takes seven to ten days.

Symptoms and presentation of the disease

The symptoms of dengue range from mild to severe conditions. Sometimes, the virus can even cause shock syndrome and death. The major symptoms of dengue fever are as follows:

1. Fever: every patient has acute high fever, which may reach 38-40°C, and some patients may even have seizures. Most patients have a red face and hot flushes at the neck, chest, and trunk, while some children also suffer from headache and myalgia, with sustained high fever lasting two to seven days.

2. Hemorrhagic diathesis has often been found, such as petechiae at the extremities, axilla, and trunk. Some patients may have epistaxis (nosebleed), conjunctival hemorrhage, and bleeding per gum. Severe bleeding may present, such as gastric and duodenal bleeding. Also, some patients may vomit old blood or have melena (dark, tarry stools). Hemorrhagic diathesis might appear on the second or third day after the onset of the illness. Petechiae might disappear in three to four days.

3. Hepatomegaly might appear and be palpable at the right upper quadrant and tender. This symptom has been found on the third to fourth day of the illness.

4. In severe cases, patients may develop shock syndrome, appearing on the third to fourth day of the illness. The shock period starts very quickly, and without immediate treatment it may cause death within 24-48 hours.

Mosquitoes: disease carriers

Mosquitoes in the *Aedes* family are of medium size, with black and white stripes at the trunk. They are usually found during the daytime, from 9:00 to 11:00 a.m. in the morning and 1:00 to 5:00 p.m. in the afternoon and early evening. They are particularly abundant in the rainy season.

Breeding area

The mosquitoes lay their eggs in water-filled containers, where there is still, fresh, and clean water, especially rainwater. Good places for breeding mosquitoes include water containers without covers, located both indoors and outdoors. The mosquitoes are also able to lay their eggs in dirty water, where the larvae undergo normal growth, the same as in clean water.

The life cycle of mosquitoes

Aedes mosquitoes lay their eggs one by one in water filled containers. The eggs are black, and 140-144 eggs are laid per time. *Aedes* mosquitoes lay their eggs over 24 hours, and the eggs incubate for approximately four days. The eggs can survive in dry conditions for one year. The larvae have a siphon with a short, black, vertical trunk to the water surface. They can move like a snake and avoid staying directly in the light. The larval period, of the four stages, takes about nine days to become a chrysalis, and then, over another two to three days, they slough and become adult mosquitoes in two to three hours, breeding and seeking blood. After another two to three days, the female mosquitoes might lay eggs. *Aedes* mosquitoes like to take human blood and stay out during the daytime and even in bright light at nighttime.

The Larval Survey Index

The quantity of mosquito breeding areas has been measured with many indexes. Some examples are as follows:

1. Container Index (CI): the CI is commonly used to represent the percentage of water-filled containers that were breeding areas for mosquitoes. However, this index seems to be useless for epidemiological work, because a family with a lower number of water-filled containers may have a higher population of larvae than a family with a higher number of water filled containers.

2. House Index (HI): the HI represents the percentage of families where mosquito-breeding areas are found. It is a rough predictor of the risk of infection, and it is not related to the numbers of water-filled containers where larvae are found. This

index is very useful to epidemiologists and entomologists to identify the risk of infection with dengue fever.

3. Breteau Index (BI): the BI shows the numbers of water-filled containers per 100 families found to contain larvae. It is considered the most accurate index for calculating the population of larvae, as it takes both the numbers of families and the numbers of water-filled containers with larvae into account.

The indexes for mosquito larvae populations commonly used can be divided into two types as follows:

1. BI (Breteau Index) this index is used to measure the larvae population per house by calculating the numbers of water-filled containers found with larvae per 100 families. The value might be < 50, and may be calculated as follows:

$$BI = \frac{\text{Water-filled containers in which larvae are found}}{\text{Number of houses in the survey}} \times 100$$

2. CI (Container Index) this index is used to measure the population of larvae, such as per school building, as well as the percentage of water-filled containers found to contain larvae. The CI value might be < 10, and may be calculated as follows:

$$CI = \frac{\text{Water-filled containers in which larvae are found}}{\text{Number of containers in the survey}} \times 100$$

2. Plans and criteria for prevention and control of dengue fever

The causes of dengue fever are composed of three components viruses, humans, and mosquitoes as disease carriers. Nowadays, there is no treatment to directly cure the disease, so prevention and control of the disease and reduction in the risks for the spread of the disease are considered the most effective means. The community must join force to try and solve the problem, such as by promoting health education among the people and reducing/eliminating mosquito breeding areas. Currently, prevention and control of the disease has focused on eliminating mosquito-breeding areas, which is a common and inexpensive practice. The prevention and control of dengue can be summarized as follows:

2.1 Elimination and reduction of mosquito breeding areas

2.1.1 Covering the open surfaces of water containers properly, such as with a plastic plate, with a rubber plate on the top beneath the cover.

2.1.2 Turning unused containers upside down to prevent them from being filled with water. Burning and disposing of rubbish or unused materials that may become mosquito-breeding areas is also recommended.

2.2 Prevention and control and elimination of mosquito larvae

2.2.1 Physical treatment involves the same practices as the elimination of mosquito breeding areas, which is inexpensive and requires non high technology. However, it requires the cooperation and participation of everyone, and every participant has to adopt the practices regularly and sustain them for the whole year. Some activities might be undertaken by every family every seven days, such as turning unused containers upside-down and eliminating unused containers to avoid

their being filled with water, refilling water containers every seven days, and refilling open-surfaced containers every seven days to help eliminate mosquito larvae.

2.2.2 Biological treatment bacteria or hormones can be added to the water, resulting in the arrest of larval growth. Giant larvae are used to control the numbers of mosquito larvae, but it is not quite successful in actual practice. However, the most common and inexpensive way is to use fish to control the numbers of mosquito larvae. This is easy, economical, and safe, and it is suitable for use with open containers. However, it could be malodorous.

2.3 Chemical treatment this includes the use of Abate sand, which is guaranteed safe by WHO. Abate sand is suitable for non-closed containers, and it plays a significant part in both physical and biological treatment. Abate sand needs to be used as specified, at one teaspoon per 100 liters of water (10 grams/100 liters). It can kill larvae within one to two hours, but it does not affect the chrysalis. Abate sand remains effective for three months, and refilling the water and adding Abate sand every one to three months is necessary, depending on water usage frequency. Abate sand is a chemical substance, and the proper amount must be used, as higher concentrations may harm health. Also, it has a very strong smell, so that it is not suitable for use with drinking water, though the WHO has agreed to use Abate sand for drinking water since 1971. The Ministry of Public Health has also approved the use of Abate sand to control dengue since 1972, but has found it very costly and scarce in the market, so it is insufficient for the whole-year prevention, even though its use is supported by the Ministry of Public Health. Thus, the priority choices are physical and biological treatments rather than chemical treatment with Abate sand. In

addition, small water containers, such as bowls under food cabinets, bowls under flowerpots, or others, need to be filled with chemical substances, such as salt, vinegar, or detergent that could prevent mosquitoes from laying their eggs. Moreover, they need to be refilled with water every seven days. Bowls under flowerpots need to be filled with sand to approximately $\frac{3}{4}$ of their depth.

2.3.1 Control and elimination of adult mosquitoes by the use of chemicals and traps: the use of chemicals to cover whole areas is divided into two types: spraying (Ultra-low Volume or ULV) and thermal fogging. Both types are ingested whenever the mosquitoes seek blood. The use of chemicals is considered necessary for two reasons: (1) to control the spread of the disease or in case of an emergency where an infected patient has been found in the area, by spraying 50-100 radial meters around the house where the first patient is found and every house when other infected people are found at the same time. This is a direct approach to eliminate mosquitoes carrying the virus, and it is also very important for reducing the infection cycle; (2) prevention of the disease in areas that usually have outbreaks or areas of high risk of the disease, and using additional plans together with the main plan with a focus on controlling mosquito breeding areas.

2.4 Prevention of infection by mosquitoes

Several measures can be taken to prevent infection by mosquitoes as follows:

2.4.1 Sleeping in a mosquito net or in a room with a window screen. The mosquito net may be a commonly used type, or impregnated with insecticide.

2.4.2 Using a chemical liquid (repellent) to prevent mosquito bite.

2.4.3 Using herbal products to prevent mosquito bite, such as basil leaves, citronella grass, *Zingiber cassumunar*.

3. The Caretakers

The caretakers

The ministerial policy on primary health care, issued in the Eighth Public Health Development Plan, has shifted to human development at both individual and family levels, to direct good health promotion and disease prevention behaviors, in which people are enabled to practice basic public health activities voluntarily.

The work plans comprise of the following:

1. To support people in their relationships at family and community levels, to practice permanently based on good health among family members and the community.
2. To support people's knowledge and skills beneficial to their health statuses and those of their family members, also sharing responsibilities for preventing and solving public health problems in their communities.

As in the past, the village volunteers have taken responsibility in the village, and each volunteer has principal responsibility for eight to 15 families, to form networks and mobilize the efforts of the people and their community. However, it has been found that they lack clear concepts of how to deal with people, in which each family should have at least one person to work closely with the village volunteers and the public health staff.

Family health leaders are family members with the primary responsibility for arranging health support for each family member, to develop healthy conditions in the family (The Basic Public Health Committee Office, 1999).

A family health leader could be anyone in the family, such as a father, mother, uncle, aunt, brother, or sister. They have to be able to work completely and willingly participate in the activities, as they need to gain knowledge about health from the newspapers, printed media, and electronic media, or talk with public health staff, village volunteers, and other non-public health staff. Therefore, they might partly lose knowledge caused by the sources and listeners, which is needed to improve the skills and knowledge of each family health leader to support each family member's health condition.

The roles of family health leaders (Pleankam, 1999)

The family health leaders have primary responsibility as follows:

1. To be family leaders who raise their family members to be healthy.
2. To perform good health practices for everyone in the family.
3. To assist the family in any participative problem solving and in the improvement of public health in the family and their community.

Improvement of family health leaders

The improvement of the family health leaders might take place by the public health staff and the village volunteers, who try to keep close contact so as to understand the family health leaders. Then, they have to consider which member in each family is able to support the health of the other family members, since the public

health staff and the village volunteers might be familiar with the community and know well who would be the leaders to support the health of their families and would become the family health leaders.

The family health leader could gain knowledge from many sources. The village volunteers and public health staff could offer skills and knowledge about health to the family health leaders, and also conduct follow-ups to help and support them towards full understanding, so that they could then practice by themselves and lead their family members as well. Moreover, the family health leaders could gain knowledge about health from other sources, such as the radio, television, newspapers, and any periodicals or journals, as follows:

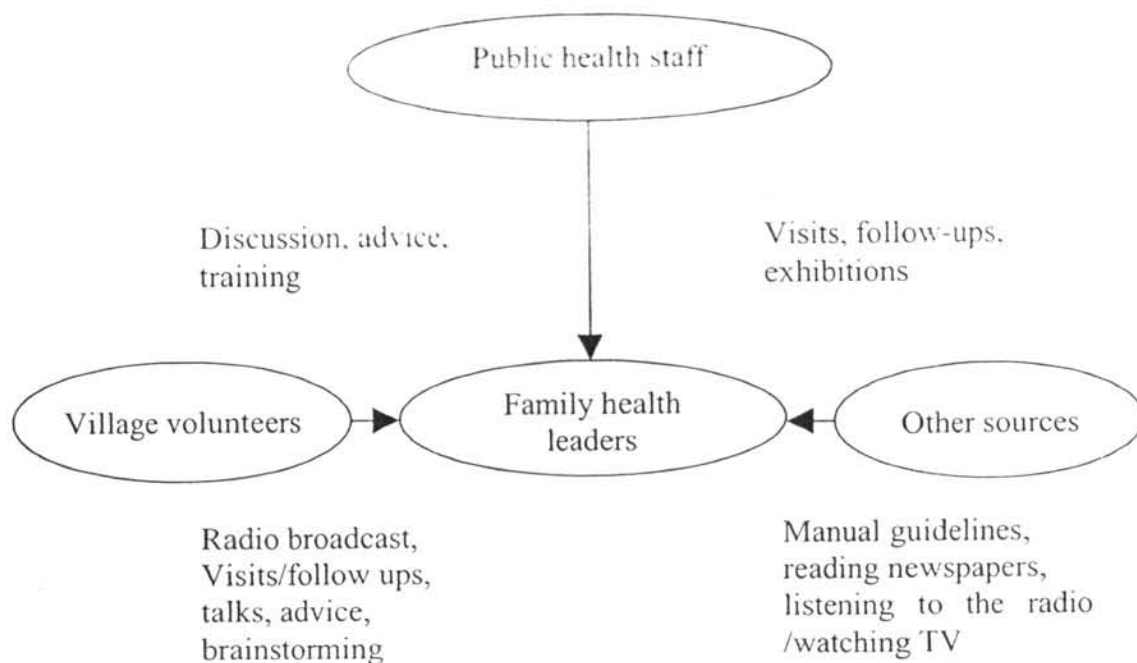


Figure 2: Sources of knowledge and teaching methods for the family health leaders

The family health leaders are trained in basic knowledge about health and the fundamentals of public health in a one-day seminar, whose contents may be summarized as follows:

1. Knowledge about health for the individual and family
2. Knowledge of fundamental treatments
3. Knowledge of information resources and places for public health services
4. Knowledge about prevention and solving public health problems, in which each family needs to collaborate with their community

4. Concepts of health behavior and prevention and control behaviors

4.1 Health Behavior

Different researchers and scholars have defined health behaviors as follows:

Suwan (1991) describes health behavior as a topic related to other behaviors, specifying only health topics, such as the practices for cleaning the body, eating, brushing the teeth, etc. To study and give meaning to health behavior might involve disease and the causes of the disease, or weakness of the body, and also include disease-preventive behaviors and sickness behaviors, which may be totally different, such as beliefs, experiences, knowledge, community, environment, and many other factors.

Manonyapiju (1985) defines health behavior as the relation of knowledge, attitudes, and health practices.

According to Rakpao & Doungkomsawat (1997), health behavior entails changes in covert and overt behaviors and includes practices that are observable and internal changes that are not observable but can be measured.

Health behavior influences public health work, and it can be divided into two types (Rakpao & Doungkomsawat, 1997) as follows:

1. Unsatisfactory behavior it produces health problems for the individual and family or leads to community health problems, such that most public health problems are caused by improper practices that harm health.

2. The health solution for the individual and family, or the public health solution for the community, can be implemented by correcting the health behaviors of individuals. The solution to the public health problems, which rely on health behavior, needs to be supported by satisfactory health behavior, which can be developed since childhood or at maturity.

The health behavior of an individual can be classified as follows (Rakpao & Doungkomsawat, 1997):

1. Health-supportive behavior the practices of individuals that help improve their own health as well as their family's health.

2. Preventive behavior the practices of individuals to prevent themselves and their families or community from exposure to illness, whether they have been infected or not.

3. Illness behavior the practices individuals or their family members perform when they are sick.

4. Treatment behavior the practices of individuals under a doctor's advice or the treatment regimen when they are sick.

5. Participation behavior the practices of individuals that aim to prevent or solve public health problems for the community and other community problems.

6. Self-spontaneous behavior the health practices for individuals themselves or for their families when they are ill, as well as the prevention and control of the disease and the health support that rely on their self-health capability level.

In general, behavior is composed of three parts (Suwan, 1991):

1. Cognitive behavior the behavior that involves knowledge, understanding of meaning, and ability, skills, and intelligence of individuals.

2. Affective behavior acts and feelings, attitudes, and positive thinking about unpleasant things that affect the mind.

3. Psychomotor the physical behaviors characterized by intention or action which would appear in the future.

Behavior modification (Nattesri, 1996)

Behavior is modified along with growth throughout the life span. The forms of behavior modification may be classified into three types as follows:

1. Modification due to compulsion laws are used to compel individuals, so that if they violate them, punishment might take place.

2. Modification due to imitation to adhere to particular individuals, such as parents, teacher, superstars, singers, or other influential people.

3. Modification due to trust modification is straightforward, with the individuals' own ideas and attitudes, so they are used in practice because they enable problems to be handled by individuals themselves.

4.2 Prevention and control behavior

Interest in the prevention and control of the disease, self-practices for good health, and health support by the government have recently increased. It has reduced the incidence of illness or death and also helped save the money that is used to care for sick people. Moreover, it affects individuals' minds, by easing anguish and eliminating anxiety. Some meanings of prevention and control of the disease is as follows:

Ramasuitra (1998) defines prevention and control of a disease as practices that yield positive results in preventing a disease, including examining patients and infected people for treatment, which might prevent the spread of a disease. Separation, isolation, and follow-up have been used to prevent the spread of a disease as well. The recovery stage has also been part of the prevention and control of a disease, aiming to reduce mortality rates, incidence, duration, and mortality of those diseases.

4.3 Prevention motivation

Prevention motivation emphasizes evaluation of the information receiving process. Evaluation is undertaken due to the apprehension produced by the

media and the degree to which they have motivated people. Roger (1983) who has evaluated the information receiving process, which is subsequently referred to in Mackay (MacKay, 1992), defines three factors that cause individuals' apprehension as follows:

1. Noxiousness this results from the threat of negative results, through the media, if an individual disregards doing something, as well as any distributed information that threatens people, such as messages like "hazardous to death" or any message that shows a minor level of severity, such as "slightly irritating to the lung." Such information that makes people afraid would result in more effective attitudinal and behavior modification than the information that only makes people slightly afraid. The process of evaluating the information receiving process produces a better understanding of the deadliness of a disease.

2. Perceived Probability this involves the use of the media with threats of likely harm to health, in which people are persuaded to think of their health risks. This is because personal beliefs are directly caused by health practice advice, whether people are ill, or not. Each person has many different levels of beliefs, and they need to avoid exposure to a disease by performing preventive practices and keeping themselves healthy. Thus, personal belief relies upon the accuracy of diagnosis by the doctor and the prognosis of future illness.

3. Response Sufficiency it is created by providing information about practices that help reduce the risk of an illness, in which the communication makes people more vigilant, by introducing forms of modification for some negative behaviors and reducing ignorance. Research has found that behavior modification increases with greater expectations and higher intention.

In conclusion, prevention and control behavior means every practice that contributes to individuals taking care of themselves to maintain health and to prevent the disease, in which separation, detention, and follow-up to prevent the recurrence of the disease are directly observable practices.

5. The PRECEDE-PROCEED

This model is composed of two parts: (1) the diagnostic phase, called PRECEDE (Predisposing, Reinforcing, Enabling Cause in Educational/environmental Diagnosis and Evaluation) and (2) the development phase, which would be taken after completion of the first stage, involving making plans that become practices, and evaluation. This second part is called PROCEED (Policy Regulatory and Organization Constructs in Education and Environmental Development). In the current study, the researcher applied the 4th stage of the first part to analyze problems and the causes of behaviors or ignorance. It was anticipated that the analysis would help make plans and improve the components that would result in the modification and support for the required behaviors.

The PRECEDE-PROCEED Model was first developed by Lawrence W. Green, and Marshall W. Kreuter, from the PRECEDE framework, in 1980. It was completed as a simulated model in 1991, in which it comprised two basic parts (Suwan, 1997) as follows:

1. Health risk behaviors resulting from weakness, which have many causes.
2. Since there are many causes of health risk behaviors, anything that would affect behavior modification, as well as environmental and social changes,

require various methods that are combined from many fields of knowledge, such as biomedical science, including medicine and public health, behavioral science, sociology, political science, and educational management.

The PRECEDE-PROCEED Model is widely used in making plans and evaluation. Health promotion could start from the target, which is a determined output that refers to the quality of life or healthy condition. The model is composed of six stages, with the sixth stage involving practices that need to be implemented in the plan, whereas the evaluation stage may be included in the seventh or eighth stages, as follows (Suwan, 1997):

Stage 1: Social diagnosis this focuses on specific groups of individuals, such as patients, students, and employees/consumers, as well as studied needs, personal expectations, and social problems that can be measured.

Stage 2: Epidemiological Diagnosis this stage involves the particular subject that affects the target or social problem. The information for the analysis, such as medical and epidemiological statistical data, is processed in priority order.

Stage 3: Behavioral and Environmental Diagnosis this stage involves the environmental and health-related behavioral factors related to the health problems found in Stage 2. Environmental factors are considered external factors that individuals are unable to control, but could affect health behavior modification and their quality of life. The influence of these factors upon individuals' behavior can indicate that health education that emphasizes personal health behaviors has been introduced incorrectly and other supports that contribute to behavior modification are then needed. These supports could be provided at national, regional, community or internal levels.

Stage 4: Educational and Organizational Diagnosis basic behavioral knowledge indicates that many factors influence health behavior. This model divides these factors into three groups predisposing, reinforcing, and enabling factors. Predisposing factors comprises knowledge, attitudes, beliefs, social customs, and information from data that influence behavior modification. Enabling factors comprises skills, resources, or any obstruction that affects behavior modification and also environmental changes. These factors may produce positive aspects (supports for behavior) and negative aspects (barriers to behavior), such as by means of stresses in society, insufficient facilities, and personal resources or internal resources, such as income or laws. Status may have both positive and negative aspects, while the skills used to express behaviors may be enabling factors. Enabling factors include all of the factors that contribute to supporting/facilitating behavior modification or environmental change. Finally, reinforcing factors include personal satisfaction or feedback from other individuals after they have done something, which may support or obstruct any practice.

It is worth noting at this point that the analysis of these four stages could help delineate the priority of each factor and enable the intervention by appropriate activities. The choice of activities depends on the priorities and existing resources that can be produced.

Stage 5: Administrative and Policy Diagnosis this involves evaluating the capabilities and resources of any organization and its management, which can lead to planning and integration into practice. However, many problems have been found to interfere with the plan and practices, such as limited resources, lack of planning, inappropriate policies, inadequate time, etc. Nevertheless, these problems could be

solved with support from the local office or provincial unit. Moreover, this stage also involves the strategies and methods that could be applied to each location to support the health promotion program, such as the community, factory, clinical school, and health service station.

The practices and evaluation of the Model are as shown in stages 6, 7, 8, and 9, while stages 7, 8 and 9 also involve evaluation as considered necessary and appropriate. In fact, evaluation is an additional section that has proceeded since the beginning of the plans for the model. It can be seen that the PRECEDE-PROCEED Model is multidisciplinary, including epidemiology, sociology, behavioral science, education and public health management. This model is well suited to analyzing the causes of behavior, and it enables the analysis of both internal and external individual factors, in which the strategic plan covers most problems. Furthermore, it emphasizes both knowledge to solve the predisposing factors and the skills to use with the environment and resources that would benefit practice. Moreover, it also arranges for enabling factors that support and motivate individuals to conduct systematic, multidisciplinary analysis. However, as many factors are used for the analysis, there are some problems with the database (Rakpao & Dungkomsawat, 1997). For instance, in the present research, the researcher used the PRECEDE Model to limit the analytical methods to elucidate the related factors, which affected the behaviors of the family health leaders in the prevention and control of dengue, with regard to three factors—predisposing, reinforcing and enabling factors. The study focused on the predisposing factors, such as knowledge and attitudes for the prevention and control of dengue, and the reinforcing factors, such as information about the disease, prevention and control of dengue and information sources, adequacy of resources for

the prevention and control of dengue, and finally the enabling factors, such as advice, follow-up on the disease, and the prevention and control of dengue. As can be seen from the related research, these factors might potentially affect the prevention and control behaviors for dengue. This study aimed to produce results that would be useful for planning and finding the most appropriate way to modify inappropriate behaviors and support the required behaviors for the effective outcome the prevention and control of the disease.

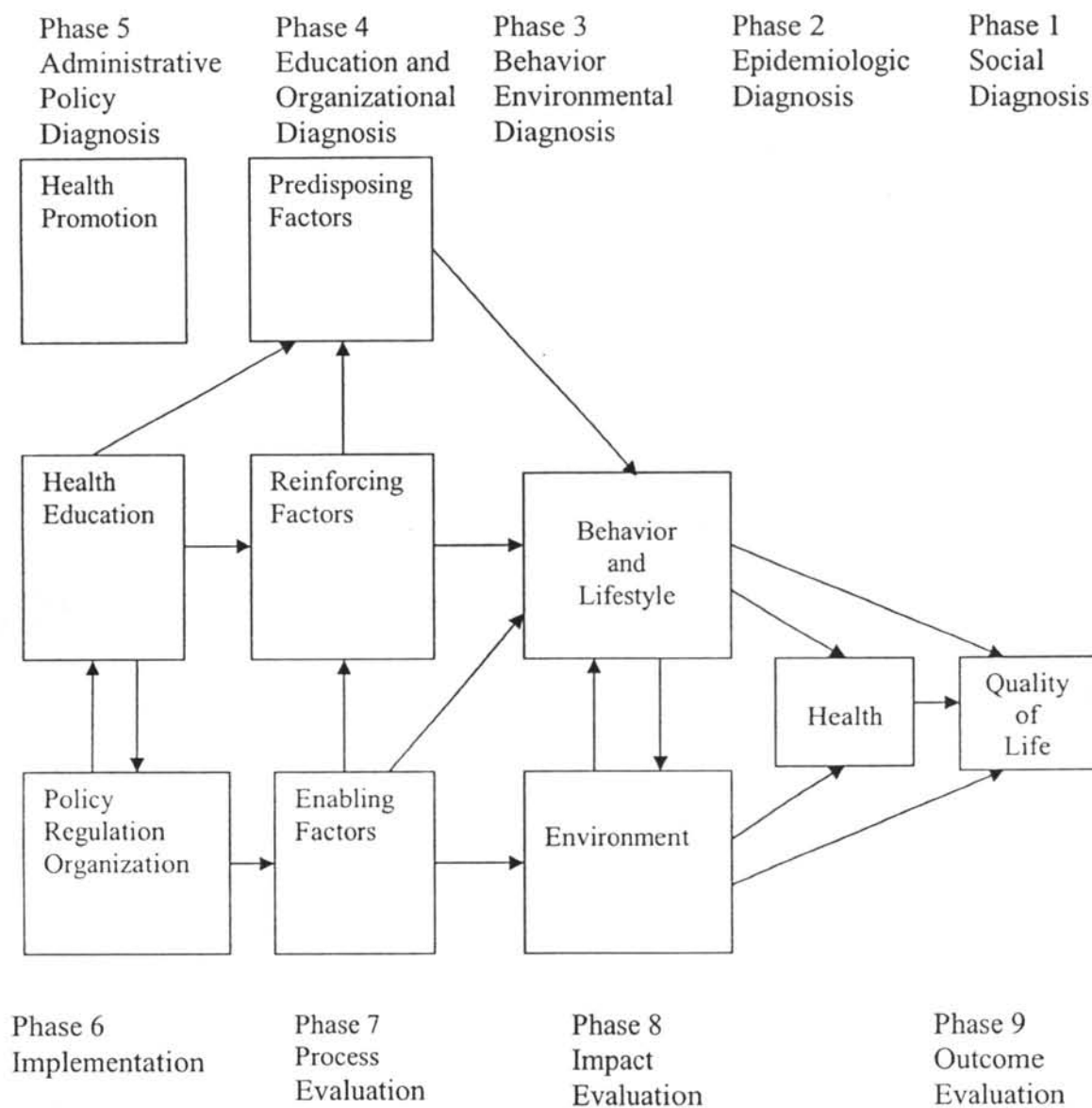


Figure 3: PRECEDE Diagram 2 THE PRECEDE-PROCEED MODEL
(Green & Kruter, 1991: 150)

6. The concept of knowledge and attitudes related to the prevention and control of the disease

Knowledge about the disease and the prevention and control of the disease and their meaning is discussed in this section.

6.1 Knowledge

Different scholars and researchers have defined knowledge in different ways as follows:

According to Wangpanit (1983), knowledge is the facts or details of the circumstance and experiences of people that are transferred to other generations.

Suwan (1991) defines knowledge as a fundamental behavior which learners can gain by training, looking, listening, and recognition. Knowledge comprises definition, meaning, methods, theory, structure, solution, and standard.

Kittisupompan (1992) describes knowledge as a type of behavior that is originated from learning. The results of such learning produce three types of behavior, i.e. knowledge, understanding, and the ability to perform activities skillfully, correctly, and quickly. Knowledge stimulates the emotions, values, moral principles, and love.

In conclusion, the meaning of knowledge related to disease and the prevention and control of disease according to the researcher means the experiences that individuals gain over a long period of time by listening, looking, or recognition and then it is represented with individuals' expressions.

6.2 Attitudes related to disease and the prevention and control of disease

Attitude is intangible, and psychologists have defined it with many different ways. Also, many methods have been used to explain the structure of attitudes, and the meaning of attitudes has been explained in relation to individuals' behaviors. Some examples are given below.

Muangman & Suwan (1986) define attitude as the fully prepared situation of the mind of each person who has integrated ideas and beliefs that might be motivated by emotions and feelings. Furthermore, it is prepared to let individuals perform what they really need to do, or it influences people's behavior, to respond with pleasure or displeasure.

According to Larsuwong (1981), attitude is characterized as follows:

1. It is gained from learning or experience, and is not innate.
2. It is a characteristic of behavior. If people have a good attitude, they tend to have good behavior. In contrast, if they have a bad attitude, they tend to resist that behavior or withdraw.
3. Attitude can be transferred from one person to another.
4. Attitude is changeable because it derives from the learning or experiences of each person. If individuals' learning or behaviors change, such change might result in changes of attitude as well.

In conclusion, the meaning of attitude as related to disease and the prevention and control of disease in this study refers to the beliefs, attitudes, opinions, expressions, or practices related to dengue and the prevention and control of dengue.

The components of attitude (Suwan, 1983; Kitpredaborisuit, 1992) are as follows:

1. Knowledge or wisdom (cognitive component) this is a fundamental component of attitude, involving different knowledge, beliefs, thoughts, and opinions on anything.

2. Feeling (affective component) this is a component about the emotions and feelings that motivate knowledge, as well as the understandings and opinions of individuals. The influence of feelings about anything depends on the duration and frequency related to that thing or the differences for each person. Feelings may be divided into two types: good and bad feelings, or so-called positive and negative feelings.

3. Behavior component it enables action to take place immediately according to a motivator, such as thoughts and feelings. Appropriate motivation may result in a certain action being taken by individuals.

Generating and modifying attitudes

Kelman (cited in Kunnajak, 1973) explains attitude modification and the social environment in terms of the following behaviors:

1. Compliance this means that individuals willingly do what they are asked to do.

2. Imitation refers to individuals' means copying someone else's actions in order to be accepted by others.

3. Internalization this component refers to making something, such as a belief or a set of values, become part of individuals' attitudes or ways of thinking.

Somprayoon, S. describes the causes of attitude as follows:

1. Attitude is caused by the accumulation of both tangible and intangible experiences.
2. It is also caused by short-term experiences, which are intense, exciting, strong, and quick.
3. It is caused by other individuals' influences, like teaching or motivation, which affect the way individuals think or act, or what happens.
4. Attitude is realized from the past experiences of individuals.
5. Good attitudes towards health derive from good examples or a hygienic environment.

7. Related Research

A review of existing research regarding dengue has revealed that a large number of studies have been conducted on different aspects as follows:

7.1 Knowledge

Arsarat (1994) studied the behaviors related to dengue among primary students in Zone 9 and found that most students had a medium level of knowledge of dengue, which is similar to their prevention and control practice levels for dengue.

Poungngan (1994) investigated the dengue situation in a slum area in Huaykwang District, Bangkok. The study focused on the dengue situation, the environment around that area, and the prevention and control of dengue practices of the staff in Bangkok, as well as the dengue knowledge, prevention and control attitudes, and practices of the people in Huaykwang. The sample (family leaders or other family members) were selected from each family, with a total of 712 subjects

from 629 families. Data were collected by means of interviews conducted in September to December, 1994. The study findings indicated that almost half of the sample had a very poor level of knowledge about dengue. Moreover, their knowledge was significantly related to dengue prevention and control practices, at P value < 0.05 .

Wiwatwarapong (1994) evaluated the dengue prevention and control program in primary schools in Muang District, Nakhon Ratchasima Province. The sample consisted of 210 teachers from 11 schools teaching classes in grades 3-6. The study focused on coverage and prevention and control of dengue problems. Furthermore, another group of subjects composed of 1,100 primary school students in grades 3-6 from 11 schools were also evaluated for their knowledge, attitudes, and practices for dengue prevention and control. Data were collected using questionnaires. The study results showed that only four schools had responded properly, while most students had a medium level of knowledge about dengue. In addition, findings also suggested that knowledge about health and disease, as well as prevention and control of the disease, was related to the prevention and control behavior, or health behavior of the study sample who had a medium level of knowledge.

7.2 Attitude

Wiwatwarapong (1994) evaluated the dengue prevention and control program in primary schools in Muang District, Nakhon Ratchasima Province, where 87.2% of all students had medium-level attitudes towards the prevention and control of dengue.

Makornsan (1995) carried out a study to examine the influences affecting the health behavior as declared in the national health practice for primary students. The sample consisted of 517 grade 6 students (252 boys and 265 girls) in Suphanburi Province. It was discovered that health attitudes were positively related to health behavior as declared in the national health practice, with a significant P value < 0.001 .

Jantharasa et al. (1996) studied knowledge, attitudes, and health behaviors among public health volunteers in Loei Province. The sample group for this study was 410 public health volunteers (127 males and 283 females) from 12 districts who attended a seminar on basic public health and consumer rights. The study results showed that attitude and behaviors were not related.

Suwanna (1998) investigated factors related to the health behaviors of children at school. The sample group was 361 grade-5 students (167 boys and 194 girls) in Muang District, Nakhon Srithammarat Province. Data were collected by means of questionnaires. According to the study findings, attitude was significantly positively related to the health behaviors of the students, at P value < 0.01 .

Based on research regarding attitudes, it was found that attitudes towards the disease and attitudes toward prevention and control behavior were both positively and negatively related to disease prevention and control behavior. However, the researcher believed that attitudes might be positively related to disease prevention and control behavior.

7.3 Information method

Sawaddiwudhipong et al. (1991) conducted a survey of dengue prevention and control knowledge, attitudes, and practices in an urban area in Thailand. The sample group was 417 housewives or elders from 417 families in Mae Sot District, Tak Province, recruited by group sampling method. Data collection was conducted by questionnaires. The study results showed that public health staff had given 52.5% of the people information about dengue, followed by listening to the radio and watching television at 47.7 and 46%, respectively, while 7.2% had never been given information about dengue. The findings of this study led to a conclusion that regular visits and provision of information was very important for every public health staff to distribute information.

Nounkam (1992) studied the socio-cultural factors that affected the iodized salt consumption behaviors of people in Mae Hongson Province. The study showed that the salt consumption behavior of the people was quite poor, at 51.7%. Meanwhile, media information about the diseases caused by iodine deficiency and advice about disease prevention by relatives and neighbors had no influence on their salt consumption behaviors.

Yanviroj (1991) conducted a study to examine the factors that influenced dengue in Chiang Mai Province by comparing districts where the highest infection rate (220 families) and the lowest infection rate (320 families) were recorded. The practices were determined by multistage-group sampling method with each questionnaire, together with environmental observation and a larval survey in every family. The study found that inappropriate behavior, lack of information about dengue, and use of Abate sand had caused the disease prevention problem.

In conclusion, research involving the information receiving method had been found to be both relevant and irrelevant to prevention and control behavior. However, the researcher suspected that the information receiving method should be positively related to disease prevention and control behavior.

7.4 The efficiency of resources for the prevention and control of dengue

Makmasin (1996) studied the potential of the dengue control program at school in 1993. The study aimed to examine the potential practices, problems, and information support, and chemicals by interviewing the principals of 225 schools. The study results showed that the practical problems were lack of information support about good health and delays in the delivery of chemicals.

Sangwaree (1994) studied the expenditure of the Ministry of Public Health for controlling the mosquito population. The findings led to a conclusion that dengue fever appeared every year and spread unpredictably. Each year, many patients were found, while the government experienced budget difficulties, whereas the budget for prevention and disease control had not been proportional to the numbers of patients, which showed that if the budget for disease control was adequate, the numbers of patients might be possibly reduced.

Pukaoluan (1997) studied disease-preventive behaviors related to iodine deficiency among primary school students in Krabi Province. The study showed that the support of their families and school was significantly positively related to disease-preventive behaviors for iodine deficiency among those students, at P value = 0.05. However, providing drinking water with iodine at school was not significantly related

to disease-preventive behaviors for iodine deficiency among the students, at P value > 0.05.

The conclusion from the related research involving the efficiency of prevention and control of disease resources had been both related and unrelated to prevention and control behaviors. Nevertheless, lack or inadequacy of resources may affect prevention and control of disease practices.

7.5 Advice and follow-up by public health staff

Budraj (1984) studied the promotion of mosquito population control in a small community by introducing the use of using Abate sand coverage at home and school to students grade 6 in Songkhla Province, as their teachers and public health staff had advised them. The program achieved coverage of 95% of water containers, 95% of families, and 90% follow-up. The results showed that after six weeks of using Abate sand, the mosquito population had significantly decreased, at P value < 0.01.

Likitprasert (1989) explored the factors that affected the acceptance of using Abate sand to control mosquito populations in Buriram Province, by comparing the most popular and least popular areas for Abate sand usage. The study compared each community leader and their public health staff by using questionnaires with 280 families and 25 staff for the most popular area for using Abate sand, and 240 families and 19 staff for the least popular area. The study findings showed that people who accepted the use of Abate sand had higher levels of participation in the prevention and control of dengue than people with less acceptance, with a significance of P value = 0.01.

Limkamsuk (1996) evaluated appropriate technologies for the prevention and control of dengue in a case study in Trang Province. The study suggested that public health staff needed to provide health education information by offering knowledge of prevention and control of dengue, especially mosquito breeding, the importance of a good environment, the prevention and control of disease by using appropriate technology, and adequate resource support for the prevention and control of the disease.

In conclusion, as for the related research, according to the advice and follow-up of the public health staff for the prevention and control of disease, it was found that public health staff had been very valuable in giving advice and follow-up for the public health plan, and they also encouraged people to adopt appropriate behaviors for the prevention and control of disease in their communities and schools.

7.6 Dengue prevention and control behavior

Nantawong, & Talungpetch (2000) studied the adequacy of a health-education program for the prevention and control of dengue in a primary school in Muang District, Nakhon Srithammarat Province. The study aimed to determine the adequacy of a health education program for the prevention and control of dengue at a primary school by applying different methods, including convincing people and using social support for designing and conducting activities. The sample group comprised 91 grade 5 students in Nakhon Srithammarat Province divided into an experimental group of 45 students and a comparison group of 46 students. The program was conducted with many health education activities for the experimental group during an eight-week course, which comprised tutorial classes by video, demonstration,

encouragement, praise, and certified practices. The study results showed that, after the test, the experimental group had improved their understanding of the deadliness of the disease, risk, self-capability evaluation, expectations of the adequacy of dengue prevention and control, as well as dengue prevention and control behavior at home and at school, which were significantly better than those of the comparison group, at P value < 0.01 . This resulted in a reduction of the larvae survey index, the ratio of water-filled containers that were found with larvae at home and at school, as well as at the experimental group's houses.

Klinubon (2000) conducted a study on the factors affecting the dengue prevention and control behaviors of 400 primary school students (grade 6) in Petchaburi Province using questionnaires. Data were analyzed by descriptive statistics in the form of tables of frequency, percentage, mean, standard deviation, and multiple regression analysis. The results showed that the primary school students performed medium-level dengue prevention and control, while three factors influenced dengue prevention and control receiving information about dengue, warnings by staff, and knowledge of dengue. These three factors positively influenced the dengue prevention and control behavior, and could predict 20.4% of dengue prevention and control behavior among this group.

Sakchainanon & Usaha (1999) studied knowledge for the community as promotion of the dengue prevention and control program in 12 zones around the country. The study aimed to evaluate the knowledge, beliefs, and dengue prevention and control behaviors by using questionnaires with people before the program and one month after completion of the program. It was found that the popular sources of information about dengue were television (75.4%), followed by handbills or village

volunteers (68.1%). Meanwhile, most people (83.2%) had attended activities about the population control of mosquitoes and most (78.2%) had learned about dengue in group classes. However, beliefs about the deadly health risk of dengue, and dengue prevention and control behavior after the program, had not increased ($p>0.05$).

Makmog (1999) studied the dengue prevention and control behavior of students and the relations of the predisposing, reinforcing and enabling factors in a sample group of 350 grade-5 primary school students in Plabplachai District, Buriram Province. It was found that 67.2% of the students had medium-level dengue prevention and control behaviors, while the popular behaviors of the sample group were individual mosquito protection and the elimination of breeding sites for mosquitoes by using covers on open water containers at all times, while the less popular behaviors included eliminating larvae in some water containers, such as vases and saucers. Learning information was significantly positively related to dengue prevention and control behaviors, at P value < 0.05 .

Chunawutthiyanon (1989) found that most people understood dengue and had their own beliefs about the causes and its symptoms, the prevention and deadliness of the disease, larval habitats, and the danger of larvae and mosquitoes. However, they were not able to support the prevention of mosquito-breeding areas all the time because it was necessary to consider other related factors that affected the behavior that support the prevention of mosquito-breeding areas, such as the situation regarding the spread of dengue in the community, the involvement of leaders, past community prevention and control of dengue, and the thoughts and beliefs about how to make water clean.

Conclusion regarding the related research

The dengue prevention and control behaviors among the family health leaders had not yet been studied. However, the related research may be summarized into two types:

Studies were conducted with primary school students about the adequacy of the health education program or the influencing factors that affected the people's behaviors and their ignorance about dengue prevention and control, using various methods to analyze behavior, such as the PRECEDE-PROCEED Model or the Health Beliefs Model. Studies showed that most primary school students increased dengue prevention and control behaviors after learning about them. According to the health education program, most activities had been presented through explanation via video, demonstration, and warnings by the teacher, as well as praises and rewards. They had also produced good outcomes for dengue prevention and control and test results had reflected their improved dengue prevention and control behaviors. Moreover, larvae elimination activities and information perceptions about dengue were related to dengue prevention and control behaviors.

The research had studied provision of education in the community in many forms. The results were used to evaluate education, determine beliefs, and predict the prevention and control behavior of people, where most people had received dengue information from television, followed by handbills and health volunteers. Meanwhile, activities involving the prevention and control of dengue had significantly increased dengue prevention and control. The regular and continuous provision of information about dengue would result in greater appreciation of the prevention and control of the disease. According to the studies which employed two study methodologies, most

people possessed medium-level knowledge about the prevention and control of the disease, and people had been unwilling and lacked cooperation to prevent and control the disease. Moreover, people had not continuously eliminated the breeding areas of mosquitoes as a regular routine. This fact induced the researcher to be more interested in studying the prevention and control behaviors of the general community by focusing on family health leaders, who had been specifically trained about dengue. Thus, if the group took advantage of dengue prevention and control practices and tried to develop networks, the prevention and control of disease would be successful. The researcher introduced new disease prevention and control behavior concept using the PRECEDE-PROCEED Model, which involved predisposing and reinforcing factors. These factors were used to analyze the prevention and control behaviors of the family health leaders. The results would be compiled for developing a plan to subsequently prevent and control dengue in the future.