

CHAPTER II

LITERATURE REVIEW

This research aimed to study the dengue prevention and control behavior of family health leaders, and the relationships between predisposing, reinforcing and enabling factors and the dengue prevention and control behaviors of those family health leaders. Therefore, the researcher reviewed some methods and related research to limit the scope of this study, as follows:

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 Model for analyzing behaviors.
6. The concepts of knowledge and attitudes related to the prevention and control of disease.
7. Related research work.

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

Dengue Hemorrhagic Fever (DHF) is caused by a virus, and shows symptoms of high fever combined with hemorrhagic diathesis and hepatomegaly. Some patients may develop shock syndrome and death (Yongyut Wangrunghap, 1993).

Causes of 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 Family Togaviridae, Subgroup Flavivirus (group b arbovirus) and has 4 serotypes (1, 2, 3, and 4); the most common types are Dengue 2 and 4. However, Dengue 1, 3 have been increasingly found lately.

The infection

Dengue fever can be transmitted by *Aedes* mosquitoes, the disease carriers. Infection takes place by *Aedes* mosquitoes biting people with dengue virus and then biting other people, at the same time releasing dengue virus into the blood circulation of the new person, so that the virus can increase in number dramatically.

The incubation period is about 3-14 days, but usually 7-10 days.

Symptoms and presentation of disease

The symptoms of dengue present as mild to severe conditions. Sometimes, it causes shock syndrome and death. The symptoms of dengue fever are as follows:

1. Fever: every patient has acute high fever, which may reach to 38-40°C, and some patients may have seizures. Most patients have a red face and hot flushes at the neck, chest and trunk; some children have headache and myalgia, with sustained high fever for 2-7 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 present

with melena (dark, tarry stools). Hemorrhagic diathesis might appear on the second to third day after illness. Petechiae might disappear in 3-4 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 illness.

4. In severe cases, patients may develop shock syndrome, appearing on the third to fourth day of illness. The shock period starts very quickly, and without immediate treatment may cause death in 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 9.00-11.00 hr and 13.00-17.00 hr, and are 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 about 4 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 4 stages, takes about 9 days to become a chrysalis, and then, over another 2-3 days, they slough and become adult mosquitoes in 2-3 hours, breeding and seeking blood. After another 2-3 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, such as:

1. Container Index (CI): the CI was used to represent the percentage of water-filled containers that were breeding areas for mosquitoes. This index seemed 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 represented the percentage of families where mosquito-breeding areas were found. It was a rough predict of the risk of infection. It was not related to the numbers of water-filled containers where larvae were found. This index was very useful to epidemiologists and entomologists to identify the risk of infection with dengue fever.

3. Breteau Index (BI): the BI showed the numbers of water-filled containers per 100 families found to contain larvae. It was the most accurate index for calculating

the population of larvae, as it considered both the numbers of families and the numbers of water-filled containers with larvae.

Recently, indexes for mosquito larvae populations have been of 2 types:

1. BI (Breteau Index) - the index 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) - the index used to measure the population of larvae, such as per school building; 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 3 parts--virus, humans, and mosquitoes as disease carriers. Nowadays, there is no treatment to cure the disease directly, so the prevention and control of disease and reducing the risks for the spread of disease are considered effective. The community must join together to try and solve the problem, such as by promoting health education among the people and reducing/eliminating mosquito breeding areas. Currently, the prevention and control of 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 messy rubbish or unused materials that may become mosquito-breeding areas.

2.2 Prevention and control, and elimination of mosquito larvae.

2.2.1 Physical treatment used the same practices as the elimination of mosquito breeding areas, which was inexpensive and used non-high technology. However, it needed the cooperation and participation of everyone, and every participant had to adopt practices regularly and sustain them for the whole year. Some activities might be undertaken by every family every 7 days, such as turning upside-down and eliminating unused containers to avoid their filling with water, refilling water containers every 7 days, and refilling open-surfaced containers every 7 days to help eliminate mosquito larvae.

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

2.3 Chemical treatment – this included the use of Abate sand, which was guaranteed safe by the WHO. Abate sand was suitable for non-closed containers, and played a part in both physical and biological treatment. Abate sand needed to be used as specified, at 1 teaspoon per 100 liters of water (10 grams/100 liters), which killed larvae within 1-2 hours, but did not affect the chrysalis. It remained effective for 3 months, and refilling the water and adding Abate sand every 1-3 months, which depended on water usage frequency. Abate sand is a chemical substance, and the proper amount must be used, as higher concentrations may harm health; it also had a very strong smell, so that it is not good for drinking water. The WHO had agreed to use Abate sand for drinking water from B.E. 1971. The Ministry of Public Health had also used Abate sand to control dengue since B.E. 1972, but found it very costly and scarce in the market, so it was insufficient for the whole year, even though supported by the Ministry of Public Health. So, the priority choices were physical and biological treatments rather than Abate sand. In addition, small water containers, such as bowls under food cabinets, bowls under flowerpots or other types, needed to be filled with chemical substances, such as salt, vinegar, or detergent that could prevent mosquitoes from laying their eggs. Moreover, they needed to be refilled with water every 7 days, and bowls under flowerpots needed 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 2 types: spraying (Ultra-low Volume, ULV), and thermal fogging. Both types are ingested whenever the mosquitoes seek blood. The use of chemicals was considered necessary for two reasons: (1) to control the spread of disease or in case of an emergency where an

infected patient was found in the area, by spraying 50-100 radial meters around the house where the first patient was found and every house when other infected people were found at the same time. This was a direct approach to eliminating mosquitoes carrying the virus, and it was also very important for reducing the infection cycle; (2) prevention of disease in areas that usually had outbreaks or areas of high risk of disease, and using additional plans together with the main plan that focused on controlling mosquito breeding areas.

2.4 Prevention of infection by mosquitoes

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 Use of a chemical liquid (repellent) to prevent mosquito bite.

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

3. The family health leaders

Family Health Leader

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

The work plans comprised:

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 had taken responsibility in the village, and each volunteer had principal responsibility for 8-15 families, to form networks and mobilize the efforts of the people and their community. However, it had been found that they lacked 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 were 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 would be able to work completely and join in very willingly, as they needed to gain knowledge about health from the newspapers, print and electronic media, or talks with public health staff, village volunteers, and other non-public health staff. So, they might lose partly knowledge that caused by the

sources and listeners, which was 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 (Pensri Pleankam, 1999)

The family health leaders had primary responsibility for:

1. To be family leaders who raised 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 tried to keep close so as to understand the family health leaders; then, they had to consider which one in each family was 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 themselves 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 follow-up, helping and supporting 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:

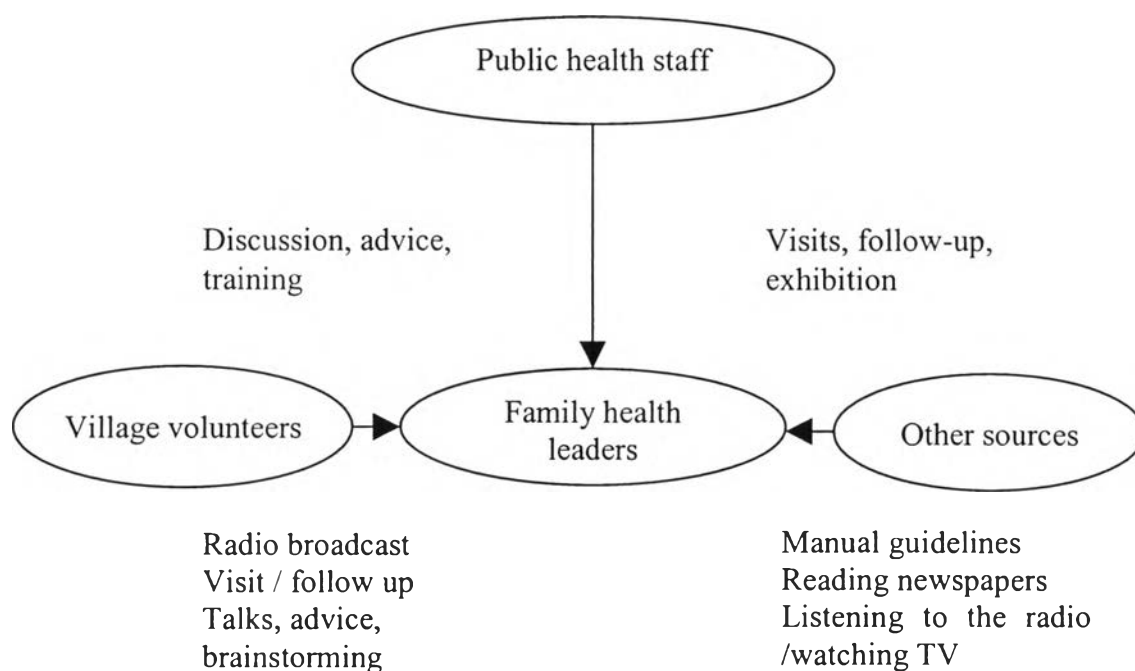


Figure 2. Sources of knowledge and teaching methods for the family health leaders

The family health leaders were trained in basic knowledge about health and the fundamentals of public health in a one-day seminar, which 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 service.
4. Knowledge about prevention and solving public health problems, in which each family needed to collaborate with their community.

4. Concepts of health behavior and prevention and control behaviors

1. Health Behavior

Health behavior has been defined as follows:

Prapapen Suwan (1991) described 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 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.

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

Somsong Rakpao and Songkod Doungkomsawat (1997) felt that health behavior entailed changes in covert and overt behaviors, and included practices that are observable and internal changes that are not observable but can be measured.

Health behavior influenced public health work, and was divided into 2 types (Somsong Rakpao, & Sarongkod Doungkomsawat, 1997), i.e.:

1. Unsatisfactory behavior – it produced health problems for the individual and family or community health problems, such that most public health problems were caused by improper practices that harmed 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, need to be supported by satisfactory health behavior, which can be develop from childhood or at maturity.

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

1. Health-supportive behavior – the practices of people that help to improve their own health and their family’s health.

2. Preventive behavior – the practices of people 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 when sick.

4. Treatment behavior – the practices of people under a doctor advice or the treatment regimen when they are sick.

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

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

Behavior is composed of 3 parts (Prapapen Suwan, 1991):

1. Cognitive behavior – the behavior that involves knowledge, understanding of meaning, and ability, skills and intelligence.
2. Affective behavior – acts and feelings, attitudes, positive thinking about unpleasant things that affect the mind.
3. Psychomotor - the physical behaviors characterized by intention or which would appear in the future.

Behavior modification (Sansanee Nattesri, 1996)

Behavior is modified along with growth throughout the life span. The forms of behavior modification may be classified into 3 types:

1. Modification due to compulsion – laws were used to compel people, so that if they violated them, punishment might take place.
2. Modification due to imitation - to adhere to particular people, such as parents, teacher, superstars, singers, or other influential people.
3. Modification due to trust – modification is straightforward, with the individual's own ideas and attitudes, so they are used in practice because they enable problems to be handled by themselves.

2. Prevention and control behavior

Interest in the prevention and control of disease, self-practices for good health, and health support by the government have increased. It has reduced the incidence of illness or death and also helped to save the money that was used to care for sick people.

Moreover, it affected people's minds, such as easing anguish and eliminating anxiety. Some meanings for the prevention and control of disease follow:

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

3. Prevention motivation

Prevention motivation emphasized evaluation of the information receiving process. Evaluation was undertaken due to the apprehension produced by the media and the degree to which they had motivated people. Roger (1975; 1983), who had evaluated the information receiving process, which was referred to in Mackay (MacKay C. 1992: 25), defined 3 factors that caused people's apprehension, as follows:

1. Noxiousness - it results from the threat of negative results, through the media, if an individual disregards doing something; 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 information that only made people a little afraid. The process of evaluating the information receiving process produces a better understanding of the deadliness of disease.

2. Perceived Probability – use of the media with threats of likely harm to health, in which people are persuaded to think of their health risks; personal beliefs are caused directly 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 disease by preventive practices and keeping themselves healthy. So, 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 to reduce the risk of illness, in which the communication makes people more vigilant, by introducing forms of modification for some negative behaviors and reducing ignorance. The research found that behavior modification increased with greater expectations and higher intention.

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

5. The PRECEDE-PROCEED Model to analyze behaviors

This model is composed of 2 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, then making plans that become practices, and evaluation. This part was 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. The analysis would help make plans and improve the components that resulted in the modification and support for the required behaviors.

The PRECEDE-PROCEED Model was 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 2 basis parts (Prapapen Suwan, 1997):

1. Health risk behaviors resulted from weakness, which had many causes.
2. Since there were many causes of health risk behaviors, anything that would effect behavior modification, and environmental and social changes, needed various methods that were 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 was used in making plans and evaluation. Health promotion could start from the target, which was a determined output that referred to the quality of life or healthy condition. The model was composed of 6 stages, where the sixth stage involved practices that needed to be implemented in the plan, whereas the evaluation stage may be included in the seventh or eighth stages, as follows (Prapapen Suwan, 1997):

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

Stage 2: Epidemiological Diagnosis – this stage involved the particular subject that affected 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 involved the environmental and health-related behavioral factors related to the health problems found in Stage 2. Environmental factors were considered external factors that people are unable to control, but could affect health behavior modification and people's quality of life. The influence of these factors upon people's behavior can indicate that health education that emphasizes personal health behaviors had been introduced incorrectly, and needed other supports that contributed to behavior modification, as well. These supports could be provided at national, regional, community or internal levels.

Stage 4: Educational and Organizational Diagnosis – basic behavioral knowledge indicated that many factors influenced health behavior. This model divided these factors into 3 groups--predisposing, reinforcing, and enabling factors. Predisposing factors comprised knowledge, attitudes, beliefs, social customs and information from data that influenced behavior modification. Enabling factors comprised skills, resources or any obstruction that affected behavior modification, and also environmental changes. These factors may produce positive aspects (supports for behavior) and negative aspects (barriers to behavior), such as by stresses in society, insufficient facilities, and personal resources or internal resources, such as income, laws. Status may have both positive and negative aspects, while the skills used to express behaviors may be enabling factors. Enabling factors included all of the factors

that contribute to supporting/facilitating behavior modification or environmental change. Finally, reinforcing factors include personal satisfaction or feedback from other people after they have done something, which may support or obstruct any practice.

Analysis of these 4 stages could help to 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 were found that interfered with the plan and practices, such as the limited resources, lack of planning, inappropriate policies, inadequate time, etc. Nevertheless, these problems could be solved by support from the local office or provincial unit. Moreover, this stage also involved the strategies and methods that would apply 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 showed in stages 6, 7, 8, and 9, while stages 7, 8 and 9 also involved evaluation as considered necessary and appropriate. In fact, evaluation was an additional section that had 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 was well suited to analyzing the causes of behavior, and it enabled the analysis of both internal and external individual factors, in which the strategic plan covered most problems. It emphasized either knowledge to solve the predisposing factors, or the skills to use with the environment and resources that would benefit practice. Moreover, it also arranged for enabling factors that supported and motivated people to conduct systematic, multidisciplinary analysis. However, as many factors were used for analysis, there were some problems with the database (Somsong Rakpao & Sarongkod Doungkomsawas, 1997). Like this research, the researcher used 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 3 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 disease, prevention and control of dengue and information sources, adequacy of resources for the prevention and control of dengue, and the enabling factors, such as advice, follow-up on 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 disease.

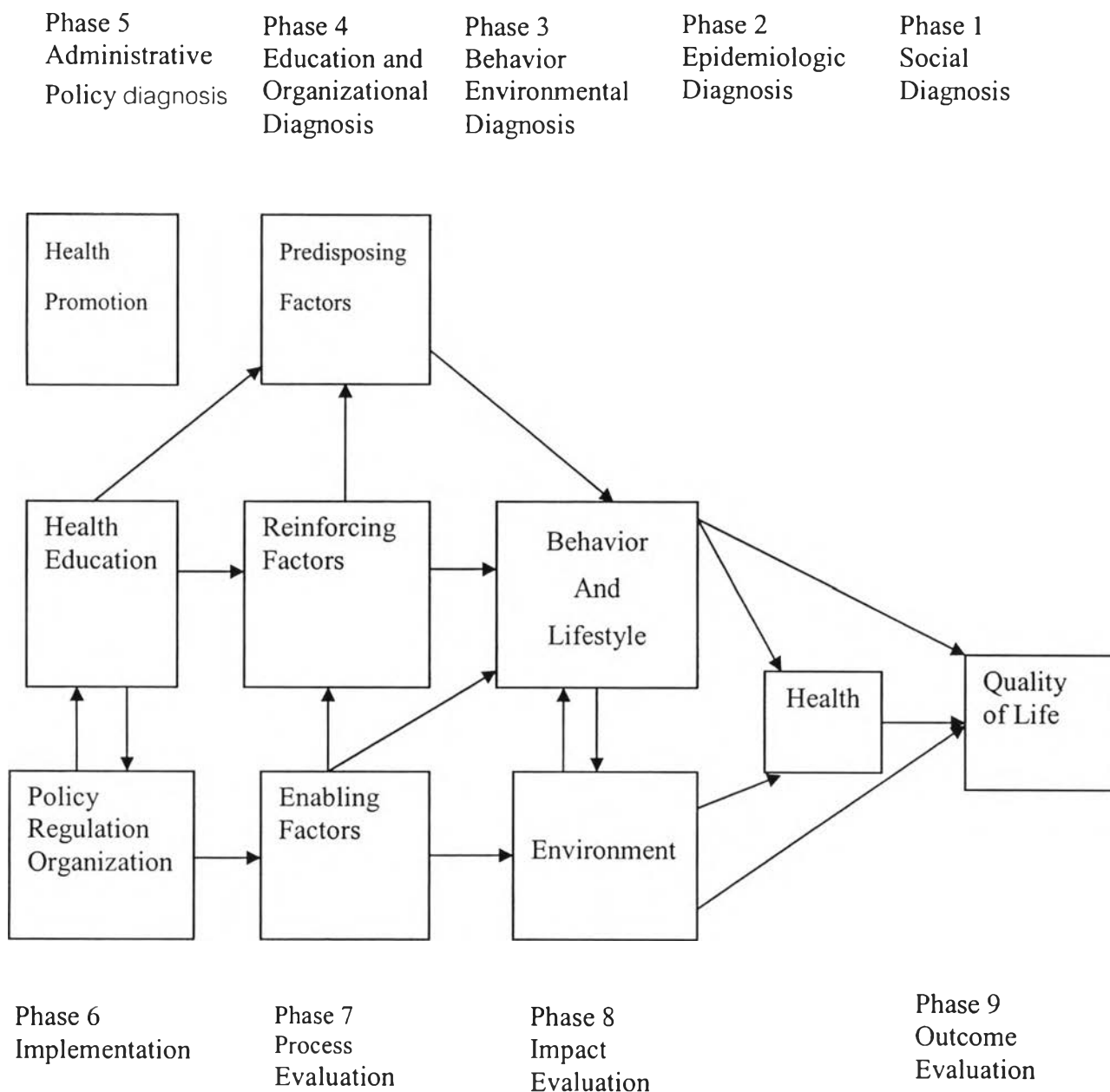


Figure 3. PRECEDE Diagram 2 THE PRECEDE-PROCEED MODEL (Green & Kruter, 1991: 150)

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

Knowledge about disease and the prevention and control of disease and its meaning.

6.1 Knowledge – it has been defined in many ways, as follows:

Paisan Wangpanit (1983) the facts or details of the circumstance, experiences of people, transferred to other generations.

Prapapen Suwan (1991): a fundamental behavior in which learners can gain by training, looking, listening, and recognition. Knowledge comprised definition, meaning, methods, theory, structure, solution and standard.

Viparat Kittisupompan (1992) a type of behavior that originated from learning. The results of learning produced 3 types of behavior, i.e. knowledge, understanding and the ability to perform activities skillfully, correctly, and quickly. Knowledge stimulated 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 people gain over a long time by listening, looking or recognition and then represented by their expression

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

Attitude was intangible and psychologists defined it with many different meanings. Many methods were used to explain the structure of attitudes, and it had been attributed as meaning the attitudes related to people's behaviors.

Theppanom Muangman and Sawing Suwan (1986) felt that attitude was the fully prepared situation of the mind of each person who had integrated ideas and beliefs that might be motivated by emotions and feelings. Furthermore, it was prepared to let people perform what they really need to do, or it influenced people's behavior, to respond with pleasure or displeasure.

Kamolrat Larsuwong (1981) referred to attitude as follows:

1. It was gained from learning or experience, and was not innate
2. It was a characteristic of behavior. If people had a good attitude, they tended to have good behavior. In contrast, if they had a bad attitude, they tended 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 their learning or behaviors changed, it might result in changes of behavior, as well.

In conclusion, the meaning of attitude related to disease and the prevention and control of disease used by researcher means the beliefs, attitudes, opinions, expressions or practices related to disease and the prevention and control of dengue.

The components of attitude (Prapapen Suwan, 1983; Boontham Kitpredaborisuit, 1992):

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

2. Feeling (affective component) – this is a component about the emotions, feelings that motivate knowledge, the understandings and opinions of people. The influence of feeling about anything depended 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. The appropriate motivation may result in a certain action being taken.

Generating and modifying attitudes

Kelman CH (referred by Prapai Kunnajak ,1973), explained attitude modification and the social environment by the following behaviors:

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

2. Imitation – means copying someone else's actions, in order to be accepted.

3. Internalization – means making something, such as a belief or a set of values, become part of your attitudes or ways of thinking.

Suchart Somprayoon referred to the causes of attitude, as follows:

1. It was caused by the accumulation of both tangible and intangible experiences.
2. It was caused by short-term experiences, which were intense, exciting, strong and quick.
3. It was caused by other people's influences, like teaching, motivation, in which it affected the way people think or act, or what happens.
4. It was realized from the past experiences of the person.
5. Good attitudes towards health derived from good examples or a hygienic environment.

7. Related research

The review of the related research into dengue found many studies, as follows:

7.1 Knowledge

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

Pornpimol POUNGNGAN (1994) studied the dengue situation in a slum in Huakwang, 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 Huakwang. The samples (family leaders or other family members) were selected from each family, with a total of 712 people from 629 families.

Data were collected by interview in September-December, 1994. The study found that almost half of the samples had very poor levels of knowledge about dengue. Moreover, knowledge was significantly related to dengue prevention and control practices, at P value < 0.05.

Nounlaor Wiwatwarapong (1994) evaluated the dengue prevention and control program in primary schools in Muang District, Nakhon Ratchasima Province. The samples were 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 samples were 1,100 primary school students in grades 3-6 from 11 schools, who were evaluated for their knowledge, attitudes and the practices for dengue prevention and control. Data were collected using questionnaires. The study results showed that only 4 schools had responded properly, while most students had an medium level for average knowledge.

It was found that knowledge about health and disease, and the prevention and control of disease, was related to the prevention and control behavior, or health behavior. The sample group had medium-level knowledge.

7.2 Attitude

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

Nalinee Makornsarn (1995) studied the influences affecting the health behavior as declared in the national health practice for primary students. The samples were 517 grade 6 students (252 boys and 265 girls) in Suphanburi Province. The study results showed that health attitudes were positively related to health behavior as declared in the national health practice, with a significant P value < 0.001 .

Banyat Jantharasa and colleagues (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.

Kannika Suwanna (1998) studied 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 Srithammirat Province. Data were collected by questionnaire. The study result showed that attitude was significantly positively related to the health behaviors of the students, at P value < 0.01 .

From the research into attitude, it was found that attitude towards disease and attitude to prevention and control behavior were both positively and negatively related to disease prevention and control behavior. However, the researcher believed that attitude might be positively related to disease prevention and control behavior.

7.3 Information method

Vittaya Sawaddiwudhipong and colleagues (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 questionnaire. 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 with at 47.7 and 46% respectively, while 7.2% had never been given information about dengue. This study showed that regular visiting and information providing was very important for every public health staff to distribute information.

Patom 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 not influenced their salt consumption behaviors.

Wannapa Yanviroj (1991) studied 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) had appeared. 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 Abate sand had caused the disease prevention problem.

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

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

Apichart Makmasin (1994) 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.

Kanokporn Sangwaree (1994) studied the expenditure of the Ministry of Public Health for controlling the mosquito population. It was concluded 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 were adequate, the numbers of patients might be able to be reduced.

Sujitara 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

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

Nipa Likitprasert (1989) studied 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 showed that people who accepted the use of Abate 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.

Vipa 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 disease.

In conclusion, 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 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

PongChan Nantawong and Manu 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. It aimed to study the adequacy of a

health education program for the prevention and control of dengue at a primary school by applying methods, and 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 8-week course, which comprised tutorial classes by video, demonstration, encouragement, praise and certified practices. The study result 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, in which they had been significantly better than 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.

Chalas Klinubon (2000) studied the factors affecting the dengue prevention and control behaviors of 400 primary school students (grade 6) in Petchaburi Province using questionnaires. The 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 3 factors positively influenced the dengue prevention and control

behavior, and could predict 20.4% of dengue prevention and control behavior among this group.

Boonlert Sakchainanon and Juree Usaha (1999) studied knowledge for the community as promoting 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 1 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 learnt 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 ($p>0.05$).

Sriamporn 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 were 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 .

Suporn 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.

Conclusions regarding the related research:

The dengue prevention and control behaviors among the family health leaders had not yet been studied by anyone. 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, praise and reward. They had also produced good outcomes for dengue prevention and control and test results 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 educating the community in many forms. The results were used to evaluate education, 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 disease. According to the studies which had employed two study methodologies, most people possessed medium-level knowledge about the prevention and control of disease, and people had been unwilling and lacking in cooperation for preventing and controlling 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 trained about dengue. So, 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 a 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 prevent and control dengue in the future.