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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

SATISFACTION OF BETEL NUT CHALK FOR AEDES AEGYPTI LARVA CONTROL
PROJECT, CHATURAPHAK PHIMAN DISTRICT,
ROI ET PROVINCE, THAILAND

Mrs. Supit Vorachate

A Thesis Submitted in Partial Fulfillment of the Requirements

for the Degree of Master of Public Health Program in Health Systems Development

College of Public Health Sciences

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Thesis Title SATISFACTION OF BETEL NUT CHALK FOR AEDES AEGYPTI
LARVA CONTROL PROJECT, CHATURAPHAKPHIMAN DISTRICT,
ROI ET PROVINCE, THAILAND.

By Mrs. Supit Vorachate

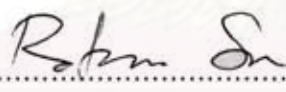
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โดยการใช้ปูนแดง อำเภอ จตุรพักตรพิมาน จังหวัดร้อยเอ็ด ประเทศไทย.


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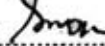
วัตถุประสงค์ของการศึกษาคั้งนี้ เพื่อประเมินระดับความพึงพอใจต่อโครงการ “ความพึงพอใจ
ของประชาชนต่อโครงการรณรงค์กำจัดลูกน้ำยุงลาย โดยการใช้ปูนแดง อำเภอ จตุรพักตรพิมาน จังหวัด
ร้อยเอ็ด และเพื่อศึกษาถึงปัจจัยที่มีผลต่อความพึงพอใจของประชาชนต่อโครงการดังกล่าว การศึกษาคั้ง
นี้เป็นการศึกษาโดยการสุ่มกลุ่มตัวอย่างแบบง่าย (Simple Random Sampling) กับกลุ่มตัวอย่าง 296
คน โดยการวิจัยเชิงพรรณนา และมีกลุ่มตัวอย่างอยู่ในหมู่บ้านเขตรับผิดชอบ สำหรับการเก็บข้อมูลนั้น
เครื่องมือที่ใช้คือแบบสอบถามที่สร้างขึ้นเอง การวิเคราะห์ข้อมูล ใช้สถิติเชิงพรรณนา หาค่าร้อยละ
ค่าเฉลี่ย และส่วนเบี่ยงเบนมาตรฐาน ส่วนสถิติเชิงวิเคราะห์ ใช้แบบเพียร์สัน(Pearson product moment
Correlation) วิเคราะห์หาค่าความสัมพันธ์ของตัวแปร

ผลการศึกษาพบว่าส่วนใหญ่ประชาชนที่เข้าร่วมโครงการเป็นเพศหญิงร้อยละ 66.2 นับถือ
ศาสนาพุทธ อายุอยู่ระหว่าง 35-39 ปี ร้อยละ 42.2 การศึกษาอยู่ระดับประถมศึกษา ร้อยละ 80.4 ระดับ
ความรู้เกี่ยวกับโครงการ อยู่ในระดับสูง ร้อยละ 82.10 ระดับทัศนคติที่มีต่อโครงการอยู่ในระดับดีมาก ร้อย
ละ 80.07 และ ระดับความพึงพอใจอยู่ในระดับดีมากเช่นกัน ร้อยละ 76.35 ตามลำดับ และผลการศึกษา
ยังพบว่าลักษณะส่วนบุคคลเช่น เพศ อายุ ระดับการศึกษา อาชีพ และรายได้ไม่มีความสัมพันธ์ส่งผลใด ๆ
ต่อโครงการ($r = -.068, .035, .027, .015$, และ $-.154$ ตามลำดับ) ส่วนระดับความสัมพันธ์เรื่องของ
ความคุ้นเคยกับเจ้าหน้าที่ของโครงการมีอยู่ในระดับต่ำมาก ($r = 0.156$) และระดับทัศนคติพบว่ามี
ความสัมพันธ์ส่งผลต่อระดับความพึงพอใจต่อโครงการอยู่ในระดับสูง ($r = .577$) ข้อมูลที่ได้จากการศึกษา
ในคั้งนี้ น่าจะเป็นประโยชน์ต่อการให้คำปรึกษาและแนะนำ ในการตัดสินใจที่จะขยายเครือข่ายการ
ควบคุมโรคใช้เลือดอกในชุมชน และควรมีการศึกษาเปรียบเทียบประสิทธิภาพของการใช้ปูนแดงเพื่อ
ป้องกันใช้เลือดอกในชุมชนต่อไปในอนาคต

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RUNGSIHIRUNRAT, Ph.D., 60 pp.

The objectives of this research to evaluate the people's satisfaction levels and identify the factors related to the project "Satisfaction of Betel Nut Chalk for *Aedes Aegypti* Larva Control Project, Chaturaphak Phiman District, Roi Et Province, Thailand." Simple random sampling technique was used to take sample survey in Chaturaphak Phiman district with 296 people enrolled in the village area of responsibility. The data was collected using a questionnaire composed of 5 parts including. Demographic data, knowledge, attitude, factor related to the project and suggestion. Descriptive statistics such as percentage, mean and standard deviation were used to describe the data. Analytical statistics were used to analyze the relationships for variables by person's product moment correlation analysis.

The results showed that all participants were Buddhists and the majority of people participating were women (66.2%) with aged between 35 to 39 years old (42.2%). Primary education level was 80.4%. Knowledge and Attitude related to the project were 82.10% and 80.07%, respectively. Satisfaction level was very good (76.35%). The results showed that all participants were Buddhists and the majority of people participating were women (66.2%) with aged between 35 to 39 years old (42.2%). Primary education level was 80.4%. Knowledge was a high level (82.10%) and attitude was a high level (80.07%) respectively. Satisfaction level was very good (76.35%). The result also found that the correlation coefficients of personal characteristics; gender, age, education, occupation, and income were not associated with the project. ($r = -.068, .035, .027, .015, \text{ and } -.154$, respectively) While the correlation coefficient of familiarity with the project's staff was very low for relation. ($r = .156$) In addition, the correlation coefficient of attitude was related to satisfaction of project. ($r = .577$) It would be useful to measure the public's satisfaction to the project and the information could be used as a guide to expand the network control of Dengue Hemorrhagic Fever and studies should be compared to the effectiveness of using betel nut chalk to prevent Dengue Haemorrhagic Fever (DHF) in the future.

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LIST OF ABBREVIATIONS

DHF	Dengue Haemorrhagic Fever
WHO	World Health Organization
CUP	Contraction Unit for Primary care
HI	House Index
CI	Container Index
CIPP	Context, Input, Process and Product
PBCS	Primary Betel nut Chalk Solution



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CHAPTER I INTRODUCTION

1.1 Background and rationale

Dengue fever is one of the most rapidly expanding diseases, causing hospitalization and death among children in tropical and subtropical regions of the world. It is a mosquito-borne disease caused by the four closely related serotypes of Dengue viruses, which belongs to the genus *Flavivirus* in the family *Flaviviridae* (Ramirez-Ronda, 1994). Dengue virus is transmitted by the female *Aedes mosquito*, i.e. *Aedes aegypti* and *A. albopictus*. The disease is now endemic in more than 100 countries of Asia, Africa, the Americas, the Pacific, and the Caribbean (Figure 1).

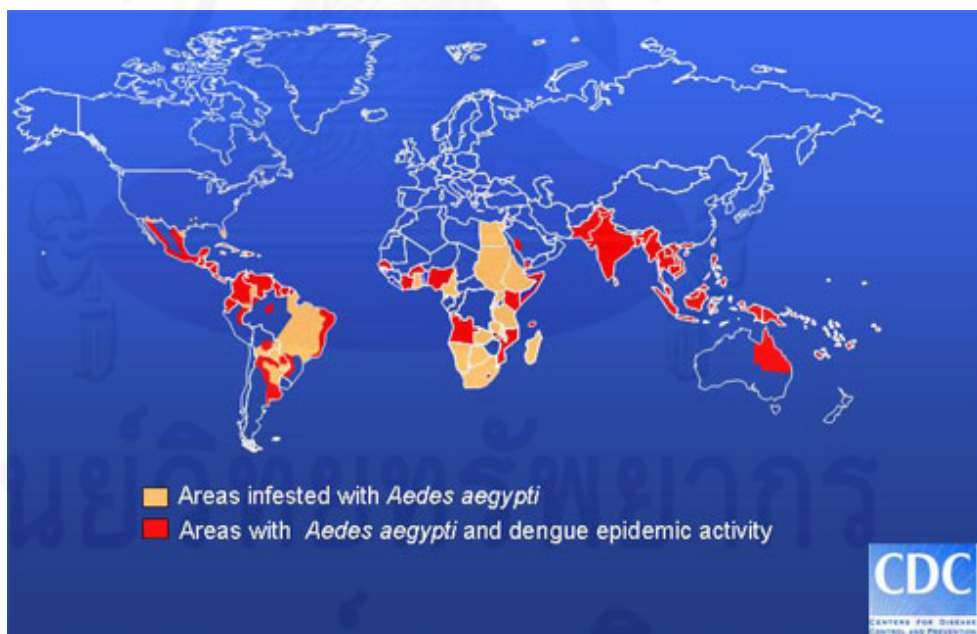


Figure 1: The world distribution of Dengue

Currently, Dengue is one of the major public health problems worldwide, especially in the tropical and sub-tropical region, mostly in urban and semi-urban areas. The incidence of Dengue has grown dramatically around the world in recent decades and the disease mostly affects population in the age group ranging from 6 months old to 15 years old children. Two fifths of the world's populations are now at risk from dengue. The World Health Organization (WHO) estimates that 50 to 100 million dengue infection occur every year. The disease manifests often begins with a sudden onset of severe headache, muscle and joint pains, fever and rash. Dengue Haemorrhagic Fever (DHF) is a potentially deadly complication that is characterized by high fever, often with enlargement of the liver, and in severe cases circulatory failure. There isn't any vaccine to prevent dengue infection and the most effective protection is avoiding mosquito bites. Early recognition and prompt supportive treatment can substantially lower the risk of developing severe disease.

In Thailand, the first epidemic of dengue occurred in 1958 (Thongcharoen and Jatanasen, 1993). Since the first epidemic outbreak, dengue epidemics have been reported from almost all regions of the country. The Bureau of Epidemiology has reported that there have been several outbreaks in Thailand. The number of cases of dengue in Thailand varies widely from year to year. The spatial-temporal dynamics of dengue has fluctuated over time. The morbidity rates of DHF have increase yearly. The highest number of cases was reported in 1987 when the incidence rate was as high as 325 cases per 100,000 population based on the number of cases reported. The latest epidemic was in 1998 when the incidence rate was as high as 211 cases per 100,000 populations. This was the second highest incidence rate in the 40 year history of DHF outbreaks (Vector Borne Disease, Ministry of Public Health). The number of DHF incidence in Thailand from January-September 2007 was 47,454 cases (75.53 cases per 100,000 populations, mortality rate was 0.13).

In Kalasin, Khonkaen, Mahasarakam, and Roi-Et Province (area 12), the number of DHF cases were 86,670 cases (137.49 cases per 100,000 populations, 101 cases of

patient death, and mortality rate was 0.12). The epidemic pattern of DHF in Roi-Et province from 1987 to 2007 was shown in Figure 2. A number of DHF cases reported in Chaturaphak Phiman district were 57 cases (70.15 cases per 100,000 populations). In 2008, they were assessed to reduce the target line to 50 cases per 100,000.



Figure 2: The epidemic pattern of DHF in Roi-Et province from 1987 to 2007

The disease mostly affects population in the age group ranging from 6 months to 15 years old. Minimum age was three months and maximum age was 62 years. The group of age with the highest rate of patients was 10-14 years, with morbidity rate 613.99 per 100,000 populations. The second group was 5-9 years, 15-24 years, and 0-4 years, with morbidity rates 328.56, 167.31, and 88.66 per 100,000 populations. The ratio of male and female was equal to 1:10. The highest rates of patients were found in 5 districts; Archtsamart, Nonghee, Thawatburi, Phanomprai, and Selaphum, with morbidity rates 226.58, 204.17, 182.51, 158.14, and 142.65 per 100,000 populations.

Both species of dengue vectors: *A. aegypti* and *A. albopictus* are found in Thailand. The main breeding places of *A. aegypti* are mostly man-made water storage containers, such as jars, drums, and cement tanks. *A. albopictus*, on the other hand, is able to breed in a wide range of natural and artificial types of breeding sources, such as leaf axils, tree holes, bamboo stumps, and artificial container found in the domestic environment. Periodic draining or removal of containers is the most effective way of reducing the breeding grounds for mosquitoes. At present, the only method of controlling or preventing dengue virus transmission is to combat the vector mosquitoes.

Vector control is implemented using environmental management, mechanical control, biological control and chemical methods. The initial vector control programs in late 1960s emphasized the application of chemical sprays to control adult mosquitoes, but this intervention had little or no impact on disease transmission, leading to the vector resistance to the chemical substance. As a result, the national policy on vector control was redirected to community-based strategy with emphasis on source reduction employing village health volunteers since 1980s. The current vector control programs for dengue consists of provision of health education to raise public awareness, environmental management, vector surveillance, development of new and safe larvicides, and massive campaign of larva and adult elimination. Satisfactory control has been achieved in some areas, depending on the determination and the strength of local health authorities and community participation. However, the programs have confronted some obstacles, such as difficulty to cooperate in community participation in larval control, inadequate supply of low cost larvicides, lack of good management in vector control program, little use of procedures resulting from operational research on vector control and lack of systematically monitoring larval and adult susceptibility to the insecticides used. The community-based dengue control intervention was developed. Therefore, Chaturaphak Phiman CUP is interested in using betel nut chalk and along with campaigns of volunteers, village committee, and family health leaders in vector control project. Taking betel nut chalk that it is in draft chew, it is available in the area, low cost and non toxic to environment. Betel nut chalk has been brought to trial in the selected area under the name **“Satisfaction of betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi Et province, Thailand.”** The project purpose is to decrease the expenses of using abate and raise awareness of Dengue Hemorrhagic Fever among community members. The project was launched in 2009 but no systematic assessment for project evaluation to determine the outcome of the program was carried out that how could the program be improved or are community member satisfied. As the result, the objective of this evaluation investigation aim to evaluate the satisfaction to the vector control project and identify the factors related to

satisfaction of people to this campaign. Simple Random Sampling technique was used to sample survey in Chaturaphak Phiman district. It would be useful to measure the public's satisfaction to the project and the information could be to guide the decision to expand the network control Dengue Haemorrhagic Fever. In the future, researcher can be assessing this program for studying in areas with similar characteristics.

1.2 Objectives

1. To evaluate the satisfaction to the project “Satisfaction of betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi Et province”?
2. To identify the factors related to satisfaction of people to campaign of betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman, Roi Et province.

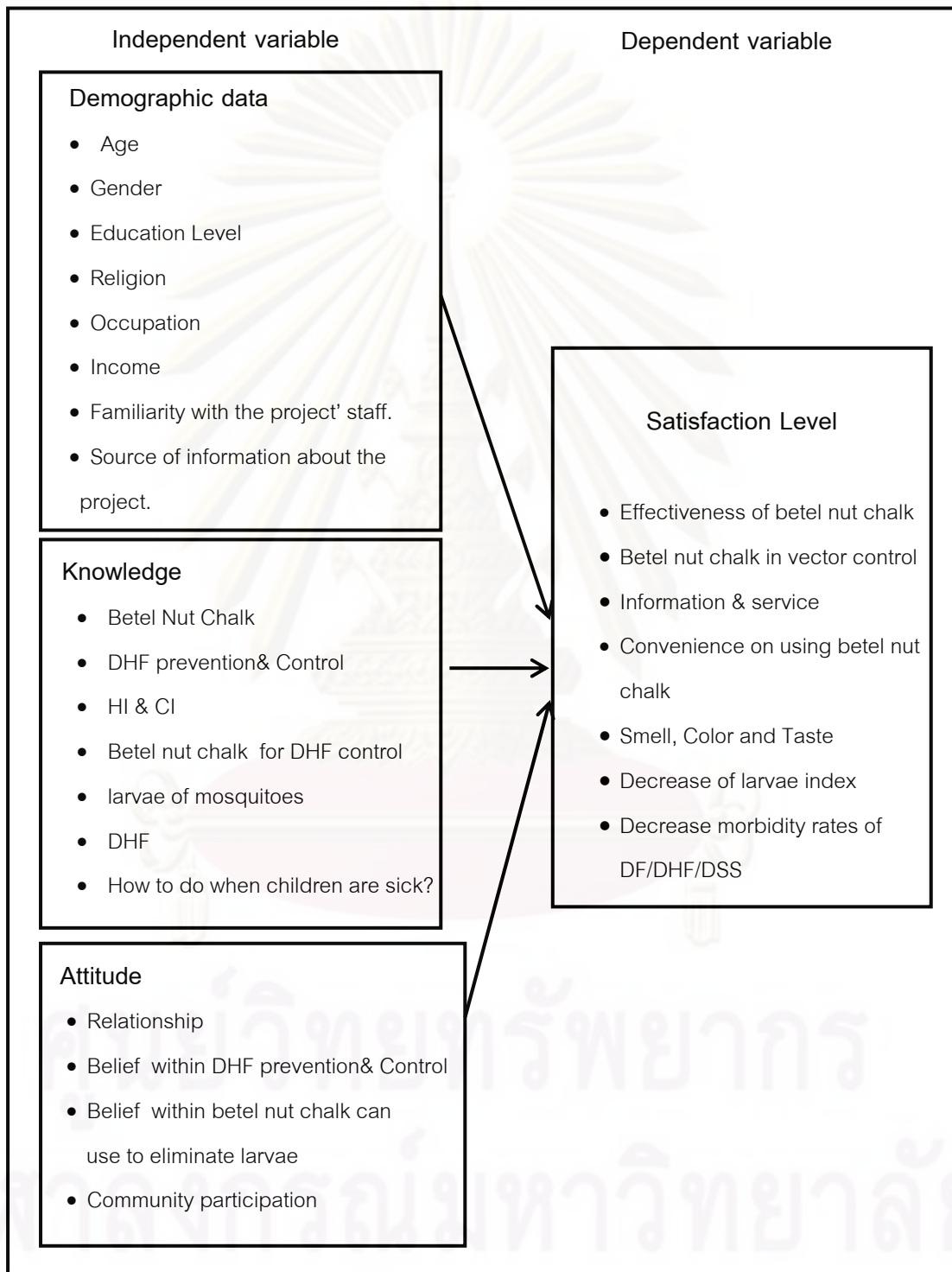
1.3 Research questions

1. What is the level of people’s satisfaction to the project “Satisfaction of betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi Et province”?
2. What are the factors related to people’s satisfaction of people to the project “Satisfaction of betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi Et province”?

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1.3 Conceptual Framework



Figures 3: Conceptual Framework

1.5 Operational Definitions

Betel nut chalk is calcium hydroxide for areca catechu (red lime). It's derived from bringing the limestone to burn until it becomes ash. Then the ash is mixed with turmeric and water producing betel nut chalk.

Project is Satisfaction of betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi-Et province.

Family health leader means individual family health leader which one person in a family is a leader of health.

Chaturaphak Phiman CUP means health service network of Chaturaphak Phiman district, Roi-Et province.

HI (House Index) means the percentage of density index value of *Aedes aegypti* larva that found in the survey houses.

CI (Container Index) means the percentage of density index value of *Aedes aegypti* larva that found in the survey containers.

Project evaluation means conclusion of operations. It causes by the project "betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi-Et province" which this study evaluate satisfaction of people to the project.

Staff in the project means health official regularly of Chaturaphak Phiman CUP, village volunteers of six villages, village committee, and people who involve in the project operations.

Knowledge means knowledge about the project operation including to knowledge of Betel nut chalk, control and prevention Dengue Hemorrhagic Fever, values prevalence index of *Aedes aegypti* larva HI, and CI, and knowledge about *Aedes aegypti* vector.

Population means people who live in the project area including six villages: Ban Nongtor Moo 7, 10, 11, and 12, Ban Nongkung Moo 8, and Ban Tone Moo 9 which Huachang Sub-district, Chaturaphak Phiman, Roi Et province is representative of Chaturaphak Phiman in the project operations.

Population sample means representative group of the population which is selected by the process to select sample statistics, and to create research to represent the information by answering the questions in the interviewing form.

Attitude means sentiment in the positive and negative of population to the staff, trust and faith to the staff and project, along with participation of citizens in the project area.

Satisfaction means feeling good and willingness of project operation results, which this study will evaluate levels of satisfaction against mosquito larvae efficiency by betel nut chalk, receiving information about the project, staff's service, convenience of use of betel nut chalk, smell, color, and taste of water when using betel nut chalk against mosquito larvae. It will decrease mosquito larvae and reduce Dengue Hemorrhagic Fever in the project area.

CHAPTER II

LITERATURE REVIEW

2.1 Definition of Satisfaction

Satisfaction is the contentment one feels when one has fulfilled a desire, need, or expectation.

2.2 Concepts and theories associated with satisfaction

2.2.1 Satisfaction meaning

Mullin (Mullin, 1985, p.280) said that satisfaction refers to expressions of the positive things that have been met human needs.

Loudon and Bitta (Loudon&Bitta, 1993, P.579) had the meaning of satisfaction that satisfaction is a key element in the evaluation process satisfaction which results in sensation. Sensation causes comparison with those experienced in the past has been.

Chittanun Dechakoop (1995, p.23) said that service satisfaction means emotional conditions or positive feelings of people which a result of comparative evaluation that people receive and expect. Satisfaction is important to service providers and recipients. Services that meet the needs of service recipients; it will cause satisfaction and use the following service.

2.2.2 Satisfaction measurement\

It is feelings of like or dislike, or attitude of people who have something to look any one style. Likert technique can be applied to widely different situations including creating sentences or statements about issues that require evaluation. Many researches have used measurements Likert to evaluate satisfaction. They measure satisfaction of

various issues then take the score in each issue to find the average of satisfaction value. Likert technique can widely measure more than another. It can measure satisfaction virtually every issue and it can measure high validity.

Likert scale or Likert's method of summated rating means the method of attitude measurement and satisfaction of people on any of the things which discovered by Rensis Likert. In 1932, Likert measurement was feeling evaluation of people to any of things. It defined the measurement attitude continuous that it was the direction and amount of any intensity level. There are two important characteristics.

1. It defines a list of text comments related to the satisfaction measurement. Respondents to assess themselves on a range of measures are defined as five level measurements. They are the most agree, agree, unsure, disagree, and the most disagree. (If you use strongly instead of most it looks nice)

2. The value of a performance evaluation each text is positive, the value of satisfaction levels are 5, 4, 3, 2, and 1. Negative text is the value levels of satisfaction 1, 2, 3, 4, and 5 which the criteria score interpretation are as follows.

Interpretation of total score by the implementation of the response to each text is combined total scores using Likert measurement. It has 10 opinion texts and highest score is five. Therefore, total score is 50. It was divided into five levels of satisfaction and attitude.

Score 41-50 means very good attitude and satisfaction.

Score 31-40 means good attitude and satisfaction.

Score 21-30 means fair attitude and satisfaction.

Score 11-20 means worse attitude and satisfaction.

Score 1-10 means the worst attitude and satisfaction.

2.3 Knowledge related project

Chaturaphak Phiman CUP is interested to solve the problem of Dengue Hemorrhagic Fever in the area by using betel nut chalk to control *Aedes aegypti* larva. Which betel nut chalk is used to control *Aedes aegypti* larva by Thai wisdom. However, it does not widely disseminate. Chaturaphak Phiman CUP carries betel nut chalk to control larva under the project "Satisfaction of betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi Et province, Thailand. Village volunteers, village committee, and family health leader are a leader in the project operations including to clean container every week. There is knowledge of betel nut chalk, production methods, and betel nut chalks for *Aedes aegypti* larva control.

2.3.1 Knowledge of Betel nut chalk

Betel nut chalk derives from bringing the limestone to burn until it becomes ash. Then the ash is mixed with turmeric and water. Betel nut chalk qualities are acerbity, to heal a wound, the ulcer treatment, knife cut wound treatment, and wound healing fire. Furthermore, it can use for diarrhea treatment. Thai wisdom can use betel nut chalk to control *Aedes aegypti* larva. Besides, betel nut chalk can eliminate *Aedes aegypti* larva (Sanon laohaboot: 2002).

2.3.2 Betel nut chalk production methods

1. Taking limestone into the full kiln then waits around two days. After that, taking the brick and clay make the kiln doors. Limestone from kiln fire is good quality when it becomes dark.

2. Burning fire, the combustion process is used with blowers to help throughout the burn which it takes about 6 days and 6 nights. In the past, from a small kiln could notice the flame to observe that the rock was finished or not. If it was finished, the flame would become blond from the rock.

3. When limestone finished. It allows the stone to cool down approximately one day then it will become a cement cube. The cement may be issued at the cost about

13,000 baht per a ton. The customers include sugar factories to purchase cement to bleach sugar.

4. After taking out of kiln, then spray water around the cement to break it into small cubes and soften so that it is easy to grind. You then have to leave it out of heat. When limestone is burnt and it gets the water, it will have the heat reaction.

5. Take limestone leads to the grinder to triturate it again. It will make high quality and ready to pack for dispensing which a kiln will get calcium hydroxide approximately 50-80 tons.

6. Take calcium hydroxide puts to percolate in the pond.

7. Mix turmeric powder compounds with calcium hydroxide, salt, and water. Turmeric and calcium hydroxide will react chemically to make lime turn red. The aggregate ratio is lime 300 buckets to turmeric powder 5-7 bags (one bag is 30 kilogram.)

8. Betel nut chalk will be percolated through the white cloth to clarify, and then left to lower the water for about 3-5 days. After that, it is packed into the buckets or bags to dispense. The price is based on the amount of turmeric mixture. The more turmeric mixture, the redder the calcium hydroxide, which means higher quality of lime. The higher quality lime can reduce the acidity in the soil, which can be used in various agriculture and shrimp aquaculture operations. These operations that use betel nut chalk have shown increased productivity because it can eat areca catechu and eliminate fungi in the plants.

2.3.3 Model and methods used for vector controlling

Project operational campaigns to eliminate *Aedes aegypti* larva by using betel nut chalk for *Aedes aegypti* larva control, Chaturaphak Phiman district, Roi-Et province is pattern to have meeting with village volunteers, village committee, and family health leader to acknowledge the policy of the project and provide knowledge on how to eliminate *Aedes aegypti* larva to them. So they have understand about operational methods to use betel nut chalk, board meeting has to approve. Then procurement and supply betel nut chalk and have to teach methods to be divided into betel nut chalk scale required. After that, you have to expose it to the sun till it is desiccant. When you get desiccant betel nut chalk each mass 35 grams, village volunteers and family health leader have a campaign to use betel nut chalk to put it in village simultaneously. They have operations to put the two masses weight 70 grams per water 200 liters of water in the catchments containers once a month in the rainy season when *Aedes aegypti* larva is epidemic. Village volunteers, village committee, and family health leader have to clean the containers and migration water in catchment every week, and put in betel nut chalk for *Aedes aegypti* larva control. The betel nut chalk will eliminate *Aedes aegypti* in approximately two to four hours.

2.3.4 Dengue Hemorrhagic Fever

Dengue Haemorrhagic fever is one of the most important mosquito-borne infection diseases and epidemics have led to extensive illness, death and economic lost. Dengue is found in tropical and sub-tropical regions, mostly in urban and semi-urban areas. It causes a severe flu-like illness. There are four distinct, but closely related viruses that cause dengue. Dengue Haemorrhagic Fever (DHF), a potentially lethal complication, was first recognized in the 1950s during dengue epidemics in the Philippines and Thailand. Today DHF affects most Asian countries and has become a leading cause of hospitalization and death among children in the region. Dengue

Haemorrhagic Fever is a leading cause of serious illness and death among children in some Asian countries.

2.3.5 Global dengue distribution

The incidence of dengue has grown dramatically around the world in recent decades. Dengue infection is a leading cause of illness and death in the tropics and subtropics. Two fifths of the world's populations are now at risk from dengue. The disease is now endemic in more than 100 countries in the tropics, including northern Argentina, northern Australia, the entirety of Bangladesh, Barbados, Bolivia, Brazil, Cambodia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Honduras, India, Indonesia, Jamaica, Laos, Malaysia, Mexico, Micronesia, Panama, Paraguay, Philippines, Puerto Rico, Samoa, Singapore, Sri Lanka, Suriname, Taiwan, Thailand, Trinidad, Venezuela and Vietnam, and increasingly in southern China. The World Health Organization (WHO) estimates that 50 to 100 million dengue infection occur every year. Dengue viruses are transmitted to humans through the bites of infective female *Aedes* mosquitoes. Some 2.5 billion people two fifths of the world's population are now at risk from dengue. WHO currently estimates there may be 50 million dengue infections worldwide every year.

2.3.6 Signs and symptoms

Dengue fever is a severe, flu-like illness that affects infants, young children and adults. The disease manifests as a sudden onset of severe headache, muscle and joint pains, fever, and rash. The dengue rash is characteristically bright red petechiae and usually appears first on the lower limbs and the chest; in some patients, it spreads to cover most of the body. Symptoms of infection usually begin 4 - 7 days after the mosquito bite and typically last 3 - 10 days. After entering the mosquito in the blood meal, the virus requires an additional 8-12 days of incubation before it can then be transmitted to another human. Infants and young children may have a fever with rash. Older children and adults may have either a mild fever. There is no specific treatment for

dengue fever. Maintenance of the patient's circulating fluid volume is the central feature of DHF care.

2.3.7 Prevention and control

Primary prevention of dengue mainly resides in mosquito control. There are two primary methods: larval control and adult mosquito control. In urban areas, *Aedes* mosquitos breed on water collections in artificial containers such as plastic cups, used tires, broken bottles, flower pots, etc. Periodic draining or removal of containers is the most effective way of reducing the breeding grounds for mosquitos. Larvicide treatment is another effective way to control the vector larvae, but the larvicide chosen should be long-lasting and preferably have World Health Organization clearance for use in drinking water. To reduce the adult mosquito load, fogging with insecticide is somewhat effective. Prevention of mosquito bites is another way of preventing disease. This can be achieved by using insect repellent, mosquito traps or mosquito nets.

2.4 *Aedes aegypti* life cycle

Aedes aegypti usually spawn as the water level increases above the container surface. *Aedes aegypti* female spawn about 100 eggs at a time, in more or less a period of 24 hours based on light stroke reduction in the evening. A study in the laboratory found that most *Aedes aegypti* will spawn before sunset. The factor that caused this activity is darkness. Embryos grow in the egg until they hatch into larva within 2 days. However, if the environment is not appropriate such as lack of humidity, the number of *Aedes aegypti* larva will be reduced. Eggs with embryos that are mature can tolerant drought conditions for months, but when exposed to humidity, the eggs will suddenly hatch into larva in 20-60 minutes.

Aedes aegypti embryo is called larva. Larva stage is a long time about six to eight days. Larva may be more or less depending on the temperature and density of the food within containers. Larva splits four times from stage I, stage II, stage III, and stage IV. Each separate and distinct stages of its life cycle are as follows: egg, larva, pupa,

and adult. The larva lives in the water and come to the surface to breathe. They shed their skin four times growing larger after each molting. Most larvae have siphon tubes for breathing and hang from the water surface. *Anopheles* larvae do not have a siphon and they lay parallel to the water surface. The larva feed on micro-organisms and organic matter in the water. On the fourth molt the larva changes into a pupa. The pupal stage is a resting, non-feeding stage. This is the time the pupa turns into an adult, which takes about two days before the adult is fully developed. When development is complete, the pupal skin splits and the *Aedes* emerges as an adult. *Aedes aegypti*'s life cycle in each area is unequal, and dependent is on temperature, humidity, amount of food, and the short length of the day to night. Male *Aedes aegypti* have a short life expectancy of approximately six to seven days only. The female *Aedes aegypti* life expectancy is longer if it gets a complete food, temperature, and appropriate humidity. Female *Aedes aegypti* life expectancy may be about 30-45 days long.

The newly emerged adult rests on the surface of the water for one to two hours to allow itself to dry and all its parts to harden. Its wings have to spread out and dry properly before it can fly.

When it can fly, it will begin feeding and breeding. Typically, male *Aedes aegypti* will molt few days before female *Aedes* (the same generation of pupa.), because male *Aedes aegypti* take about 24 hours to rotate the reproductive organs to complete 180 degrees before it will be ready for breeding. *Aedes aegypti* female will breed only once, not can spawn throughout life. After the female breeds, it will need to take blood. Typically, it will need a blood after it molts from pupa.

Males have short proboscises designed to feed on plant nectar, while females have long proboscises and feed on humans and other animals. Females must feed before laying eggs, which they do several times over their lifespan, which varies from days to weeks. Males die a few days after mating.

Aedes aegypti feed in daylight, but it sometimes feeds in the evening as well, if the room or area that is lights enough. You can find most *Aedes aegypti* two times: in the morning and in the afternoon to evening. Some reports indicate that *Aedes aegypti*

feed around 09.00-11.00 a.m. and 1.00-2.30 p.m. However, some reports have different such as 06.00-07.00 a.m. and 5.00-6.00 p.m. It depends on the study and the indicated season. A study of *Aedes aegypti* biting behavior in Bangkok found that it bites most in the daytime from 09.00 a.m. to 10.00 a.m. and 4.00 p.m. to 5.00 p.m. We found that *Aedes aegypti* bites people in the home, but *Aedes albopictus* bite people outdoors. Minority *Aedes albopictus* bite people in the home. *Aedes aegypti* do not like sunlight and windy conditions, thus, it does not find feeding faraway from its breeding source. It will not fly more than 50 meters. In addition, we will find that it is ample in the rainy season because *Aedes aegypti* can generate more after raining, which provides suitable temperature, and humidity for generating in rainy season more than any other season. Sources of *Aedes aegypti* to living in homes find 90 percent prefer to grab on the wall and hanging things in the home, while only 10 percent to hang on the house wall. In 1986, a study of Somkiat Boonyabancha and Banyong martkam on the *Aedes aegypti* sources found to hang in the home of Rayong province found that *Aedes aegypti* hung on the hanging clothes 66.5 percent, grabbing on mosquito net and rope of the net 15.7 percent, and wall hanging other things 15.3 percent. It was only 2.5 percent on the wall hanging.

2.5 Vector control

Vector control is any method to limit or eradicate the mammals, birds, insects or other arthropods which transmit disease pathogens. The most frequent type of vector control is mosquito control using a variety of strategies. Vector control strategies may be classified as follows:

2.5.1 Environmental Management: To alternate breeding sites by draining or filling sites, regular disposal of refuse, maintain clean shelters, and personal hygiene.

The environmental methods to manage *Aedes aegypti* larva are management of larva's habitat, close container lids, eliminate water in unused containers, using water

conditioning salt or betel nut chalk, putting a small dish of vinegar in cabinets to prevent ants, always cleaning water containers.

The environmental methods to manage *Aedes aegypti* are management without *Aedes aegypti*' habitat such as organizing home environment to successfully avoid messy piles of materials, draw a mosquito curtain or mosquito wire screen, Pyrethroid spraying chemicals or Pyrethroid painting mosquito wire screens.

2.5.2 Mechanical Control: The use of screens, bed nets, traps, food covers, lids and polystyrene beads in latrines.

2.5.2.1. Larva controls such as keeping water away from larva.

2.5.2.2. *Aedes aegypti* adult controls are the swing grab, the electric mosquito bat, and hit with hands.

2.5.3 Biological Control: The use of living organisms or products against vector larvae, such as fish that eat larvae (e.g., tilapia, carp, guppies), bacteria (*Bacillus thuringiensis israelensis*) that produce toxins against larvae, and free-floating ferns that prevent breeding.

2.5.3.1. Larva controls using toxorhynchites larva, poecilia reticulata, fish, microorganism, and aquatic insects.

2.5.3.2 *Aedes aegypti* adult controls using lizard, gecko, and dragonfly.

2.5.4 Chemical and Physical control: The use of chemicals for personal and household protection and treatment for environmental control. There are many forms including repellents, insecticides for residual spraying, adulticides, and larvicides that minimise risk of infections. Previous data on resistance to insecticides will be useful in helping to ensure the best one is chosen.

2.5.4.1. Larva control by use of abate, Juvenile hormone, and oil surfactant.

2.5.4.2 *Aedes aegypti* adult control by use of canister chemical product, detergent such as dishwashing liquid and natural extracts such as Pyrethrins, Nicotine, and Derris elliptical.

2.6 Entomological indices

The best surveillance to potential hazards of Dengue Fever and epidemic prevention are *Aedes aegypti* larva exploration and index value density HI and CI. Which is used to measure and evaluate the risk of Dengue Hemorrhagic Fever in the community? Village volunteers are assigned responsibility for household exploration every week during the epidemic of Dengue Fever and once a month during non-epidemic. Calculations are as follows:

1. HI (House Index) = $\frac{\text{Number of households that found } \textit{Aedes aegypti} \text{ larva}}{\text{Total number of households' exploration}} \times 100$
2. CI (Container Index) = $\frac{\text{Number of container of the larva found}}{\text{Total containers exploration}} \times 100$

In 2009, Roi-Et Provincial Health Offices have a policy to prevent Dengue Hemorrhagic Fever by index value density assignment. They are HI of village less than 10 and CI less than 5. In school and public service place need without larvae.

2.7 Concepts and knowledge measurement

2.7.1 Concepts

Good (1973 p.325) said that knowledge refers to facts, truth, rules and other information that people have been collecting and gathering.

In this research the researcher will focus on knowledge-related projects which ask the meaning of knowledge. "It means that people in the community, knowing the facts of the projects and educational related programs, can convey existing knowledge to work properly with projects and daily life."

2.7.2 Knowledge measurement

Measurement of knowledge has several methods which each is appropriate under different features for what is being measured.

Phaisarn (1983) had divided the knowledge into three test characteristics: Interviewing, writing an essay, and a definition. Definition measurement has five characteristics: True or false test, filling in the blank, matching, multiple choices, and practicing which the last one focused on behavior to conduct with real action.

In this research the researcher selects to test the knowledge of sample by a definition test which will allow respondents to select the answer to 10 questions. The level of knowledge will be measured. If samples can answer true, they will get one point. If samples answer false, they will get zero point. There is a total of 10 choices by 10 points.

Evaluation criteria of knowledge

High knowledge means $> \bar{x} + 1 \text{ S.D.}$

Medium knowledge means $\bar{x} + 1 \text{ S.D.}$

Low knowledge means $< \bar{x} - 1 \text{ S.D.}$

2.8 Attitudes related to concepts and attitudes measurement

2.8.1 Attitudes related to concepts

In this research the researcher refers to the meaning of attitudes as it means to the positive and negative feelings of the population about trust in faith in reference to staff and project, along with publics participation within the project area.

2.8.2 Attitudes measurement

In the study, the researcher will take attitude measurement by the same principles to measure satisfaction using Likert Type Scale.

Score interpretation from total score uses the answer of each text altogether, such as 10 opinions that it is five points in the highest of each. Therefore a total score of 50 points can be divided into five satisfaction levels.

Score 41-50 means very good attitude.

Score 31-40 means good attitude.

Score 21-30 means fair attitude.

Score 11-20 means worse attitude.

Score 1-10 means worst attitude.

2.9 Project evaluation and concepts

2.9.1 Introduction of project

2.9.1.1 Meaning

What does project mean? There are several the definitions of the project meaning by educators, marketing professionals, and lawyers which have similar meaning.

Project is an activity or plans which are independent units. Projects can analyze planning and implementation by clearly of the beginning and at the end. Plans or activities are identified by term objectives.

Project means the advance systematic planning that consists of several sub-activities, which require resources to operate and expects to return a value. Each project purposes to produce or provide service to enhance the performance plan. Therefore, a project is an important part of planning to achieve objectives.

2.9.1.2 Project evaluation

What does project evaluation mean?

Project evaluation means the process resulting in improvements to information and how it influenced the decision to achievement of project (Somwhang Piriyauwat, 2001).

Project evaluation means collecting and analyzing information, then processing given to conclude that projects have achieved its objectives and how effective (Yaowadi Rangchaikun wiboonsri, 2003).

2.9.1.3 Type of project evaluation is divided into 4 types.

Preliminary Evaluation is a feasibility study conducted before starting any projects. The study may educate the appropriate efficiency factors of the process that is expected to be used in project management, problem solution, risk, expecting result or effectiveness, and the expecting educational impact to occur in the project areas.

Formative evaluation is an important to evaluate improvement often during the planning or the development of the projects. Formative evaluation results from the objectives of the project to help reach the actual project target. In addition, Formative evaluation may be used during the project to help verify that the project is operating to the intended plan, which is sometimes called Implementation evaluation or Formative evaluation. It can verify that the project is proceeding according to the plan, called progress evaluation.

Summative evaluation is an evaluation. Usually conducted after the project has ended. A project with long-term may use of Summative evaluation of the brief summary at various phases of the project. Data from the different phases will allow aggregate the evaluation. Most of the collection for formative evaluation is Summative evaluation which is a summary that reports the project's goals, as well as the status of

project achievement or failure, and any problems or obstacles that need to be revised. This information will help the project management's decision if the project should proceed or cancel.

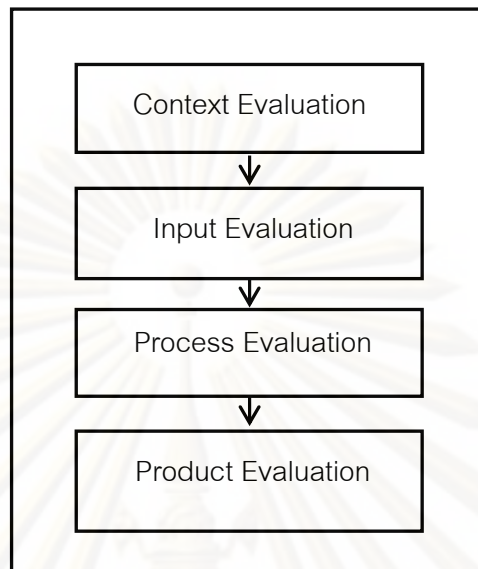
Efficiency evaluation is a general project assessment. Thailand, In the past, limited evaluation to productivity, and only focused on achievement or failure of the project. The decision to expand efficiency evaluation of the provider gave information to project management and deciding to terminate or expanded capital projects. However, current project management professionals have realized the importance of evaluation on their projects; have deemed it a necessary assessment to enhance the general project services. These programs can be implemented consistently with the social situation. It provides particular projects for local development, and determines project criteria for a large national insurance projects that it do not lose their limited resources unnecessarily. Social service projects will not focus only an achievement of the project, but must provide a value in terms of efficiency.

2.10 Concept and Strufflebeam's CIPP Model

In 1971, Strufflebeam's assessment team had written a book named "Educational Evaluation and decision making." That was widely accepted in Thai educational and measurement. Strufflebeam had also written books on evaluation and assessment modeling. Therefore, he was an important position in the development of evaluation theory accepted today called the "CIPP Model."

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Figures 4: CIPP Model.

CIPP Model is the project evaluation of context, input, process and product. It utilizes this approach to benchmark the efficiency of the project by either an overview or importance of factors.

Context evaluation is a fundamental factor study into the developmental goals of the project, consisting of the context of the environment, policies, visions, problems, source of investment funds, fluctuations in social conditions, economic, and political, may be obstacles to the project.

Input evaluation is an efficiency component search for entering factors, which may be classified as a person, facilities, equipments, durable goods, and capacity management. Each factor recognizes another, such as a person you will consider characteristics of gender, age, social status, economic, satisfaction, expectation, attitude, potential, ability, experience, knowledge, education, location.

Process evaluation studies the context and input of the planned process. This study finds defect, weakness, or strength of the project management process and how to achieve the project objectives to evaluation efficiently of the process.

Product evaluation examines the effectiveness of the project and its consistency between the objective results to determine, a criteria may be created manually or based on persons or sectors.

The researcher has selected the project evaluation by satisfaction evaluation of people in the project area in this study that will be evaluated at the end of project in 2009.

2.11 Related literatures

Sanon Laohaboot (2002) studied the effectiveness of betel-nut chalk solution in ruining larvae and pupa of *Aedes* spp. The results of these experiments found that optimizing concentration Primary Betel nut Chalk Solution (PBCS). Results of the experimentation were summarized as follows: the optimum PBCS concentration that could ruin larva of *Aedes* spp. (91.50 - 100%) was between 1,281-4,485 mg/L.

Nuttaphorn Mesuk (2001) studied community participation of *Aedes aegypti* larva control, Muang district, Chonburi province. The study was about the effect of health education programs used to modify the behavioral pattern of *Aedes aegypti* larva control by applying guidance and community participation on activities. The study sample was representative a household, which found that the effect of health education programs to modify behavioral pattern of *Aedes aegypti* larva control by applying the concept of community participation produced better results.

Boonchoo Chowchiangkhwang (1999) studied worker satisfaction about received at health services of Chaopraya Yommaratch Hospital, Supanburi province and found that satisfaction of workers, to the expenses for health service adequacy was 71.1 percent. In the process was the moderate 50.9 percent, and the staff was high 57.0 percent.

Wanchanok Chantachoom (1997) found that community participation would occur by government officials' participation actively. They would be actively involved in encouraging a view shared problems and shared the way solution. They should be obvious to people to let them know all details every step about participation the activities in prevention.

Samroeng Yhangkratoke (2002) studied the result of abate to use in *Aedes aegypti* larva control and found that it could decrease morbidity rate in the area without using abate by volunteers in Nongkhai. We found that community participated in eliminating mosquitoes and prevention mosquitoes from the community. They accepted abate in *Aedes aegypti* larva control all household which it was better than in the past and more different before operating.

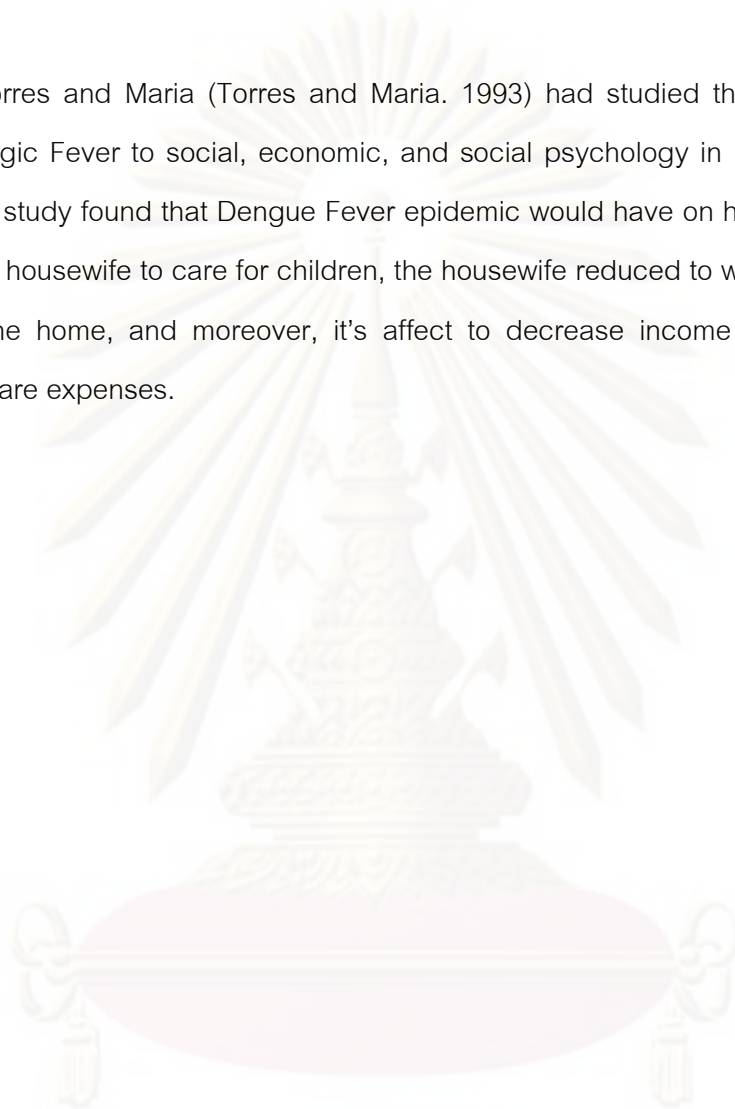
Clark (Clark.1995: 5-11) studied Dengue Hemorrhagic Fever epidemic of countries in the America and found that the epidemic of the disease was increasingly severe. To control Dengue Fever would require laboratories, medical staff very well trained on the control and prevention of the disease. Dengue Hemorrhagic Fever required good strategy combining high operational efficiency of officials and community participation.

Lloyd (Wimonrat Duewtrakul. 1999: 35; reference Lloyd.1994) studied *Aedes aegypti* control by Merida City, Ukatan State, Mexico. Using the public health of all households, he found that people could describe the *Aedes aegypti*. They knew *Aedes aegypti* breeding source and how to eliminate the *Aedes aegypti* breeding source.

Narrobles and Gomexdantes (Wilairut Deawtrakul. 1999: 35; reference Narrobles and Gomexdantes. 1995) studied the problem of Dengue Hemorrhagic Fever in Mexico that the epidemic was increasing and threatening public health. Dengue Hemorrhagic

Fever prevention and control requires rigorous disease surveillance measures and analysis of local issues that caused the disease epidemic.

Torres and Maria (Torres and Maria. 1993) had studied the effect of Dengue Hemorrhagic Fever to social, economic, and social psychology in rural area of Puerto Rico. The study found that Dengue Fever epidemic would have on housewives ability to strain in a housewife to care for children, the housewife reduced to work both inside and outside the home, and moreover, it's affect to decrease income and also increase medical care expenses.



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CHAPTER III

METHADODOLOGY

This study aims to assess the satisfaction of people using betel nut chalk in *Aedes aegypti* larva control project and identify factors relating the satisfaction in Chaturaphak Phiman district, Roi Et province, Thailand. The researcher studies the various stages of the following: selection of research population and research sample, development of research tools, collection of data, and analysis of the data.

3.1 Research Design

This study was the descriptive research.

3.2 Study Area

This study was conducted in the area of Chaturaphak Phiman district, Roi Et province.

3.3 Study Population

Population in this study was the people who lived in the village area of the Chaturaphak Phiman district, consisting of six selected villages in the Hua Chang district, where epidemic of Dengue Fever occurs every year. A total of 821 households participated in the project.

3.4 Sampling Technique

The simple random sampling was used to select the research sample by writing the house number, and then randomly selected the research sample.

3.5 Sample and Sample size

Formula of TARO YAMANE
$$n = \frac{N}{1+Nd^2}$$

By n = Target sample size of unit

N = Total population

d = Significant level

When N = 821

d = 0.05

Therefore
$$n = \frac{821}{1+821(0.05)^2} = 268.95$$

By using the TARO YAMANE formula, 269 research samples were selected. Total samples in the research are 296 samples (increasing the number of sample loss reserve 10 per cent).

Proportion of samples in each village

Sample in each village	Number of households	Number of samples (1 household : 1 person)
Ban Nongtor Moo 7, Hua Chang District	169	59
Ban Nongkung Moo 8, Hua Chang District	160	58
Ban Thone Moo 9, Hua Chang District	87	31
Ban Nongtor Moo 10, Hua Chang District	124	45
Ban Nongtor Moo 11, Hua Chang District	140	51
Ban Nongtor Moo 12, Hua Chang District	145	52
Total	821	296

3.6 Measurement Tools

The study interview is divided into four parts including;

Part 1 Socio-demographic characteristics of respondents

Part 2 Knowledge related project

Part 3 Attitude to the project and related project

Part 4 Satisfaction level of people to the project and relationships

3.7 Criteria for Evaluating the Quality Monitoring of Tools

The quality of research tool was verified through the content validity and reliability. Researcher creates concepts, theories, documents, and related research, then verified the content according to the suggestion of advisors, co-advisors and technical officers.

3.8 Data Collection

3.8.1 The researcher trained the 10 assistants who got their high school certificate and do not live in the project area to collect the data by interview. Researcher has chosen from the village volunteers in the village that is not in the project area. Selecting standard is people who are performing well past the threshold, literacy well, the ability to communicate well, and education no less than high school level.

3.8.2 Data was collected by the assistants who have passed the training. The questionnaire was collected by interviewing.

3.8.3 Verified the completion of questionnaire collected from people who participate in the project.

3.8.4 Collecting additional data in case of incomplete information or without appointing criteria from family health leader. The data can be collected from people who

use betel nut chalk for *Aedes aegypti* larva. Researcher will collect data until reach the number of target groups.

3.8.5 To save the data in the SPSS version 17 software.

3.9 Data Analysis

3.9.1 Descriptive Statistics

Personal characteristics were presented by Percentage, Mean and Standard Deviation

3.9.2 Analytical Statistics

Pearson's Product-moment Correlation was uses to analyze the relationship the satisfaction of betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi Et province, Thailand.

3.10 Ethical Consideration

This study has been approved by the Ethics Review Committee for research Involving Human Research Subjects, Health Sciences group, Chulalongkorn University.

3.11 Limitation

The project operates in specific areas and has limited budgets.

3.12 Expected Benefit and Application

1. To understands the satisfaction of people to the project.
2. To understands the problems and obstacles of the project.
3. To provide a guideline in the development of better and can be used in other areas with similar context.

3.13 Obstacles and Strategies to solve the problems

3.13.1 Obstacles

3.13.1.1 The data may be incorrect resulting from reality because of the bias and thoughtfulness response the reality of people because of the staff in the research familiarity with people.

3.13.1.2. People do not trust the project.

3.13.2 Strategies to solve the problems

The training of a person to be knowledgeable in storage to collect data. They are outside the project area.



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CHAPTER IV

RESULTS

This study was a descriptive cross sectional research for evaluation of people satisfaction to betel nut chalk for *Aedes aegypti* larva control project, Chaturaphak Phiman district, Roi-Et province, Thailand. There were 821 households in the project area. The study used simple random sampling from a list of all households. One person per household was interviewed. A total number of 296 participants were enrolled in the project. The data were collected using a questionnaire compose of 4 parts as follow.

Part 1: Socio-demographic characteristics of respondents

Part 2: Knowledge-related the projects of betel nut chalk for
Aedes aegypti larva control.

Part 3: Attitudes of people to the project, staff, and service.

Part 4: Satisfaction levels of people to the project and Relationships.

4.1 Part 1: Socio-demographic characteristics of respondents

The researcher trained the 10 assistants who finish their high school certificate to collect the data by interview. Data was collected from 296 people using self administrated questionnaire at Chaturaphak Phiman district, Roi-Et province during April 2009 to October 2009. Personal characteristics of the respondents that indicates; Gender, Religion, Age, Education levels, Occupation, Monthly income, Familiarity with the project' staff, and Source of information about the project was showed in table 4.1

Table 4.1 Number and percentage of respondents by socio-demographic characteristics. (n = 296)

Demographic characteristics	Frequency	Percentage
Samples	296	100.00
Gender		
Male	100	33.80
Female	196	66.20
Religion		
Buddhism	296	100.00
Age		
18-34	27	9.30
35-49	125	42.20
50-64	107	36.20
65-84	37	12.30
Education levels		
Uneducated	1	0.30
Primary school	238	80.04
Lower secondary school	33	11.10
High school	19	6.40
University certificate	2	0.70
Bachelor's Degree	2	0.70
Higher than Bachelor's Degree	1	0.30
Occupation		
Agriculture	239	80.70
Student	6	2.00
Government official	5	1.70
Trade/Own business	27	9.10
Hire	19	6.40

Demographic characteristics	Frequency	Percentage
Personal monthly income		
Less than 2,000 baht	129	43.60
2,000-3,999 baht	98	33.10
4,000-6,000 baht	45	15.20
More than 6,000 baht	24	8.10
Familiarity with the project' staff.		
Unfamiliar	115	38.90
Familiar	181	61.10
Source of information about the project.		
Village volunteers	261	88.20
Public health officials	207	69.90
Village committee	80	77.00
Broadcast tower village	136	45.90

Table 4.1 shows the general demographic characteristics of the 296 subjects. The results revealed that all the subjects were Buddhists and the majority of the subject were females (66.20%) while 33.8% were male, About 79% of the subjects age ranged from 35 to 64 years ($\bar{x} = 49$ Min=18 Max=84 years). Most of the subjects (80%) completed primary education except one subject had finished higher education and one subject had no education. As the study was conducted in a rural area, agriculture was the major occupation (80.7%), 9% had trade business, 7% worked on daily wages, and 4% were government officials and students. About 44% of the subjects had monthly income less than 2000 baht, 33% had income between 2000-3999 baht, 15% had income between 4000-6000 baht, and only 8% of the subjects were earning more than 6000 baht. Regarding familiarity of the project staff, about 61% of the subjects were familiar to the project and 88% of the subjects received information from the village volunteers, along with 70% of the subjects got information from public health officials and 77% of the information was provided by the village committee as well.

4.2 Part 2: Knowledge related to the project

Table 4.2 Knowledge level of people about the project.(n=296)

Knowledge Level	Scores	Number	Percentage
Low	0-8	18	6.10
Medium	9	35	11.80
High	10	243	82.10
	Total	296	100.00

Table 4.2 shows that people have high knowledge level (82.10%), medium level (11.80%) and low level (6.10%) to the project.

Table 4.3 General knowledge of people to the project by item classification.(n=296)

Knowledge of people about the project.	Correct answer	
	Number	%
1. What is betel nut chalk made from?	295	99.70
2. How many grams of betel nut chalk were recommend putting into 200 liters of water or a standard jar?	274	92.60
3. What is the vector of Dengue Hemorrhagic Fever?	294	99.30
4. What is the proper initial care if a child gets sick?	291	98.30
5. Why does the container need to be clean every week?	290	98.00
6. Is larva explored in your village is over the criteria of standard larvae index?	296	100.00
7. Did you find larvae in temple or school or not?	293	99.00
9. Who is responsible for controlling Dengue Hemorrhagic Fever?	290	98.00
10. What is an indication of Dengue Hemorrhagic Fever when children are sick?	278	93.90

$\bar{x} = 9.7$, S.D. = 0.65

Table 4.3 shows knowledge of the subjects about the project. The result revealed that 99.70% of the subjects answered correctly for the question that of what betel nut chalk is made of, and 92.60% of the people knew that how of much amount of the betel nut chalk is need to mix in 200 liters of water. Ninety-nine percent of the subjects knew about vector of dengue Hemorrhagic fever and 98.30% of the subjects knew about initial care of the disease and 93% of the subjects knew about the symptoms of the Dengue Hemorrhagic Fever. Regarding to the questions of prevention, 98% of the subjects knew about different methods to eliminate *Aedes aegypti* larva. Regarding to the controlling responsibility of the disease, 98% knew about the responsibility of the public health management team.

4.3 Part 3: Attitude of people to the project, authority, and service

Table 4.4 Attitude level of people about the project.(n = 296)

Attitudes Level	Scores	Number	Percentage
Worst	0-10	0	0.00
Worse	11-12	0	0.00
Fair	21-30	0	0.00
Good	31-40	59	19.93
Very good	41-50	237	80.07
Total		296	100.00

Table 4.4 The result indicated that 80.07% of people have very good attitude level and 19.93% have good attitude level to the project campaign of betel nut chalk for *Aedes aegypti* control.

Table 4.5 Attitude of people to the project campaign of betel nut chalk for *Aedes aegypti* control by item classification. (n = 296)

Attitude	Number / Percentage (N=296)					Scores	
	Strongly agree	Most agree	Fair agree	Lower agree	Lowest agree	\bar{X}	S.D.
1. Do Public health officials, village, and village committee interest the community services?	217 (73.3%)	69 (23.4%)	9 (3.0%)	1 (0.3%)	0 (0.0%)	4.70	.542
2. Do you think that public health officials, village volunteers, and village committee take the project to use in the community by familiarity?	178 (60.1%)	97 (32.9%)	19 (6.4%)	1 (0.3%)	1 (0.3%)	4.52	.664
3. Do you appropriate to public health officials, village volunteers, and village committee?	186 (62.8%)	69 (23.4%)	40 (13.5%)	1 (0.3%)	0 (0.0%)	4.49	.736
4. Do you not believe that betel nut chalk can use to eliminate larvae and disbelieve in the project?	27 (9.1%)	23 (7.8%)	113 (38.2%)	51 (17.2%)	82 (27.7%)	3.47	1.229
5. Do you think larvae are an important problem to corroborate control?	245 (82.8%)	44 (14.8%)	4 (1.4%)	3 (1.0%)	0 (0.0%)	4.79	.502
6. Do you think that <i>Aedes aegypti</i> larva control is difficult and hard to eliminate?	19 (6.4%)	8 (2.7%)	57 (19.3%)	70 (23.6%)	142 (48.0%)	4.04	1.167
7. Do you think that Dengue Hemorrhagic Fever is a matter of density and it cannot prevent?	140 (47.3%)	42 (14.2%)	12 (4.1%)	17 (5.7%)	85 (28.7%)	3.46	1.744
8. Do you think that community is more power when they have all to collaborate on?	222 (75.0%)	59 (19.9%)	12 (4.1%)	0 (0.0%)	3 (1.0%)	4.68	.650
9. Do you always think about <i>Aedes aegypti</i> larva control?	214 (72.3%)	72 (24.3%)	10 (3.4%)	0 (0.0%)	0 (0.0%)	4.69	.532
10. Do you think that public health village committee are well?	210 (70.9%)	75 (25.3%)	11 (3.7%)	0 (0.0%)	0 (0.0%)	4.67	.544

Table 4.5 Attitude of people to the project campaign of betel nut chalk for *Aedes aegypti* control by item classification. The result indicated that public health officials, village health volunteers and village committee were interested in the community service

(73.3%), familiar with most of people (60.1%), appropriated for the campaign (62.8%), and most of the people would believe that betel nut chalk could eliminate larva (38.2%). 82.8% of the people strongly agreed that mosquitoes and larvae were an important problem to corroborate control, 48.0% thought that larva control was very difficult, 19.3% moderate difficult and 6.4% easily. 47.3% of people thought that DHF couldn't be prevented, and 75% thought that the power of larva control was from the community collaboration. 72.3% always participated in larva control and 70.9% strongly agreed that public health officials, village health volunteers and village committees were good.

4.4 Part 4: Satisfaction of people to the project and Relationships.

4.4.1 Satisfaction of people to the project

Table 4.6 Satisfaction of people to the project campaign of betel nut chalk for *Aedes aegypti* control by item classification. (n = 296)

Satisfaction Level	Scores	Number	Percentage
Worst	0-10	0	0.00
Worse	11-12	0	0.00
Fair	21-30	1	0.34
Good	31-40	69	23.31
Very good	41-50	226	76.35
Total		296	100.00

Table 4.6 shows the results of the satisfaction of the subjects for the project. The result indicated that 76.35% of the subjects have very good satisfaction level, 23.31% had good level of satisfaction and level 0.34% of the subjects had fair satisfaction to the project.

Table 4.7 Public's satisfaction to the project campaign of betel nut chalk for *Aedes aegypti* control by item classification. (n = 296)

Satisfaction	Number /Percentage (N=296)					Scores	
	Strongly agree	Most agree	Fair agree	Lower agree	Lowest agree	\bar{x}	S.D.
1. Betel nut chalk can eliminate <i>Aedes aegypti</i> larva.	167 (56.4%)	101 (34.1%)	26 (8.8%)	1 (0.3%)	1 (0.3%)	4.46	.697
2. What is your satisfaction of the public health officials' service in the area?	208 (70.3%)	63 (21.3%)	25 (8.4%)	0 (0.0%)	0 (0.0%)	4.62	.637
3. What is your satisfaction of village health volunteers' service in the area?	200 (67.6%)	83 (28.0%)	13 (4.4%)	0 (0.0%)	0 (0.0%)	4.63	.567
4. What is your satisfaction of village committee's service?	176 (59.5%)	72 (24.3%)	47 (15.9%)	1 (0.3%)	0 (0.0%)	4.43	.765
5. Is betel nut chalk easy to use?	191 (64.5%)	80 (27.0%)	24 (8.1%)	1 (0.3%)	0 (0.0%)	4.56	.656
6. What is your satisfaction with savor, color, and taste of betel nut chalk when put into water for <i>Aedes aegypti</i> larva control?	134 (45.3%)	90 (30.4%)	65 (22.0%)	3 (1.0%)	4 (1.4%)	4.17	.898
7. What do you think is a good alternative of the use of Thai wisdom and knowledge for <i>Aedes aegypti</i> larva control?	167 (56.4%)	101 (34.1%)	26 (8.8%)	1 (0.3%)	1 (0.3%)	4.46	.697
8. Do you have any negative feelings for using betel nut chalk for <i>Aedes aegypti</i> larva control?	30 (10.1%)	11 (3.7%)	78 (26.4%)	74 (25.0%)	103 (34.8%)	3.73	1.261
9. What is your satisfaction about receiving information on betel nut chalk for <i>Aedes aegypti</i> larva control?	175 (59.1%)	100 (33.8%)	20 (6.8%)	1 (0.3%)	0 (0.0%)	4.52	.638
10. What is your satisfaction to recommend to other people and neighborhoods to use betel nut chalk as well.	209 (70.6%)	69 (23.3%)	17 (5.7%)	1 (0.3%)	0 (0.0%)	4.64	.605

Table 4.7 Public's satisfaction to the project campaign of betel nut chalk for *Aedes aegypti* control by item classification found that 56.4% of the people strongly agreed that Betel nut chalk can eliminate *Aedes aegypti* larva, 70.6% strongly agreed a with the project and would recommend to other people and neighborhoods to use betel nut chalk. 70.3% were satisfied with the public health officials' service in the area. 64.5% of people strongly agreed that betel nut chalk was easy to use and 45.3% were satisfied with the savor, color and taste of betel nut chalk.



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4.4.2 Relationships

Table 4. 8 Relationships between independent variable and satisfaction of betel nut chalk for *Aedes aegypti* larva control project. (n = 296)

Independent variable	Satisfaction of betel nut chalk for <i>Aedes aegypti</i> larva control project.
	r
Gender	-.068
Religious	.a
Age	.035
Education level	.027
Occupation	.015
Personal income per monthly	-.154
Familiarity with the project's staff.	.156
Knowledge	.068
Attitude	.577

Table 4.8 The result indicated that the correlation coefficients of personal characteristics: gender, age, education, occupation, and income, were not associated with the betel nut chalk for *Aedes aegypti* larva control project. ($r = -.068, .035, .027, .015,$ and $-.154,$ respectively) The correlation coefficient ($r = .156$) of familiarity with the project's staff was very low. The correlation coefficient ($r = .068$) of knowledge did not correlate with the project, and the correlation coefficient ($r = .577$) of attitude was related to the satisfaction of betel nut chalk for the *Aedes aegypti* larva control project.

CHAPTER V

DISCUSSION, SUMMARY AND SUGGESTION

The study was a descriptive research, in the area of Chaturaphak Phiman Contraction Unit for Primary care (CUP), Roi Et province. The study population consisted of the people who lived in six villages of Chaturaphak Phiman where there are DHF epidemics almost every year. There were 821 households in the project area. The study used simple random sampling from a list of all households. One person per household was interviewed. The number 296 samples were reached. The researcher trained the 10 assistants with high school certificate who help to collect the data by interview. The data were collected using a questionnaire compose of 4 parts. Descriptive statistics such as percentage and mean were used to describe the data and analytical statistics were used to analyze the relationships of the satisfaction with the project and independent variable by person's product moment correlation analysis. The ethical consideration was approved by the ethical review Committee for research Involving Human Research Subjects, Health Science Group, Chulalongkorn University.

5.1 Discussion

The project for the control of the *Aedes* mosquito involved local population with intervention of betel nut chalk. This study aims to assess the knowledge, attitude and satisfaction of the local population to the dengue control project. This study was the descriptive research to evaluate the satisfaction of people to the project "Satisfaction of Betel Nut Chalk for *Aedes Aegypti* Larva Control Project, Chaturaphak Phiman District, Roi Et Province, Thailand. The results indicated that 66.2% of participating people were women and 79% aged between 35 to 64 years old and this shows that the target population of the project was the age group that is more responsible and hard working. They were all Buddhists. About 80.4% complete primary education but the still subjects

had good knowledge and attitude and this may be probably because of severity of the problem that general population interested and they had good knowledge (82.1%) have general knowledge about the project, and very good attitudes (80.07%). Community-based vector control programs should also investigate local perceptions of disease and health, disease transmission, the control and prevention of diseases, and behavior related to the use of health services. This information is then incorporated into a control project that is specific for community needs and the population knew about procedure to use. The savor, color, and taste of betel nut chalk were easily used. Sanon Laohaboot (2002), found that the concentration of the substance Primary Betel nut Chalk solution (PBCS) could eliminate *Aedes aegypti* larvae 91.50-100% at the concentration between 1,281-4,485 milligrams per liter. When the 74.90-100% pupa stage, the concentration used in eliminate the pupa was 1,993-4,485 milligrams per liter of PBCS and the effectiveness of the betel nut chalk most of them (76.35%) were satisfied.

Dengue control programmes must include surveillance of mosquito populations to assess the effectiveness of source reduction campaigns, and targeted mosquito control measures. The success of any prevention programme depends on either convincing individuals to change their behavior or changing the environment to remove factors that place individuals at risk of disease and in my study attitude of people to the project campaign, found that 82.8% of people strongly agreed that larvae is an important problem to corroborate control, while 73.3% agreed public health officials, village, and village committee interest the community services, and 72.3% agreed they always participate in *Aedes aegypti* larva control, and 70.6% of people strongly agreed about the satisfaction and recommend to other people and neighborhoods to use betel nut chalk as well, while 70.3% have the satisfaction of the public health officials' service in the area, and 67.6% have the satisfaction of village health volunteers' servicing in their area. The correlation coefficient of the attitude was high related to the satisfaction of using betel nut chalk for the *Aedes aegypti* larva control project. This research result conformed to the research of Nuttaphorn Mesuk (2001),5) and found that community participation could help to adjust behavior of *Aedes aegypti* control better in

representative households. The result was similar to Wanchanok Chantachoom and collage (1997). They found that community participation would occur when the government officials actively shared opinions of the problems. While analysis of satisfaction levels of the people within the project found that betel nut chalk could be use for *Aedes aegypti* larva control.

For dengue control activities, community education programmes may not be sufficient to generate sustainable behavioural change, unless other factors are taken into consideration as part of the overall strategy and this study proved that the project was covering all the aspects involving community leaders, volunteers and public health officials.

5.2 Summary

The objectives of this research was to assess the people's satisfaction levels and identify the factors related to the project. Simple random sampling technique was used to sample survey in Chaturaphak Phiman district with 296 people enrolled in the village area of responsibility. The data were collected using a questionnaire compose of 4 parts including, demographic data, knowledge, attitude, and factor related to the project. Descriptive statistics such as percentage, mean and standard deviation were used to describe the data. Analytical statistics were used to analyze the relationships of the reasons for variable by person's product moment correlation analysis. The results showed that all participants were Buddhists and the majority of people participating were women (66.2%) with aged between 35 to 39 years old (42.2%). Primary education level was 80.4%. Knowledge was a high level (82.10%) and attitude was a high level (80.07%) respectively. Satisfaction level was very good (76.35%). The result also found that the correlation coefficients of personal characteristics; gender, age, education, occupation, and income were not associated with the betel nut chalk for *Aedes aegypti* larva control project. ($r = -.068, .035, .027, .015, \text{ and } -.154$, respectively) The correlation coefficient of familiarity with the project's staff was very low for relation. ($r = .156$). In

addition, the correlation coefficient of attitude was related to satisfaction of betel nut chalk for *Aedes aegypti* larva control project ($r = .577$). In addition, the results found that the proposals from the respondents the questionnaires after collected data found that the suggestion for the project, they said “the wisdom was very good to use material in local area and the most agreement. Betel nut chalk was not dangerous to human, environment. It was very good. Using betel nut chalk was not poison to people and no savor, no color. It was not the same another. Villager strongly agreed to use betel nut chalk”.

5.3 Suggestion

It would be useful to measure the public's satisfaction to the project and the information could be used as a guideline to expand the network control of Dengue Hemorrhagic Fever and studies should be compared to the effectiveness of using betel nut chalk to prevent Dengue Haemorrhagic Fever (DHF) in the future.

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APPENDICES

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APPENDIX A

Questionnaire Number

Questionnaire

Satisfaction of betel nut chalk for *Aedes aegypti* larva control project,
Chaturaphak Phiman District, Roi Et Province, Thailand

Explanation

This study was used to interview the samples population It was divided into five parts.

Part 1: Socio-demographic characteristics of respondents

Part 2: Knowledge-related the projects

Part 3: Attitudes of people to the project, staff, and service

Part 4: Satisfaction level of people to the project

Part 5: Problems and solutions

Part 1: Socio-demographic characteristics of respondents

Please mark ✓ into or fill the content that it is true in the blank.

1. Gender (D1)

1. Male

2. Female

2. Religious (D2)

1. Buddhism

2. Islam

3. Christianity

3. Age (D3)year-old (completely)

4. Education (D4)

1. Uneducated 2. Primary school 3. Lower secondary school
 4. Upper secondary school 5. Diploma
 6. Bachelor degree 7. Higher education

5. Occupation (D5)

1. Agriculture 2. Student 3. Government official
 4. Trade / Own business 5. Employee 6. Priest

6. Monthly Incomes (D6)

1. Less than 2,000 baht 2. 2,000 – 3,999 baht
 3. 4,000 - 6,000 baht 4. More than 6,000 baht

7. Do you have familiarity with the project's staff? (D7)

1. Unfamiliar 2. Familiar

8. How do you know about the project of betel nut chalk for *Aedes aegypti* larva control? (More than an answer) (D8)

1. Village health volunteers (KF1)
 2. Public health officials (KF2)
 3. Village committee (KF3)
 4. Family leader health (KF4)
 5. Broadcast tower village (KF5)

6. Other.....

Part 2: Knowledge-related the projects

Choose the best answer

1. What is betel nut chalk made from? (K1)

- 1) Water and turmeric mixed with shell burning.
- 2) Cement mixed with red color.
- 3) Clay mixed with red color.
- 4) Rouge mixed with red color

2. How many grams of betel nut chalk to put in the water 200 liters or a standard jar? (K2)

- | | |
|-------------|-------------|
| 1) 20 grams | 2) 30 grams |
| 3) 50 grams | 4) 70 grams |

3. What is the cause of Dengue Hemorrhagic Fever? (K3)

- | | |
|--------------|-------------------------|
| 1) Culex | 2) <i>Aedes aegypti</i> |
| 3) Anopheles | 4) Mansonia |

4. What does properly care initially in a child? (K4)

- 1) To give an aspirin and observe. If feel no better, you path them to the doctor.
- 2) To give an aspirin, rub the body when a high fever and observe then path to the doctor if they are not better.
- 3) To give Paracetamal syrup, rub the body when a high fever and observe then path to the doctor if they are not better.
- 4) All of above

5. There are many methods to eliminate *Aedes aegypti* larva, why does container clean every week? (K5)

- 1) Because *Aedes aegypti* have an egg every a week.
- 2) Because *Aedes aegypti* life cycle from an egg to adult are about a week.
- 3) Because authority help to manage its.
- 4) Not all above

6. Is larva explored by your village volunteers that it is over the criteria standard of larvae? (K6)

- 1) Do nothing, you only tell to the village health volunteer.
- 2) Must eliminate the source of *Aedes aegypti* breeding especially in your house.
- 3) To notify of public health officials in the area and municipalities for *Aedes aegypti* larva control.
- 4) To complain for village health volunteers because they do not work in good. They work in the communities at risk to Dengue Hemorrhagic Fever.

7. Will temple or school allow larvae or not? (K7)

- 1) Yes, they will. If monks, teachers or students do not look after, it will depend on the temple and school.
- 2) No, they will not. If they find larvae, they will suddenly help to eliminate its.
- 3) Depending on whether the community will be agreed to or not.
- 4) All of above

8. How often to use betel nut chalk to eliminate *Aedes aegypti* larva by the project? (K8)

- | | |
|------------------|----------------|
| 1) Every day | 2) Every week |
| 3) Every 15 days | 4) Every month |

9. Who is responsible for controlling Dengue Hemorrhagic Fever? (K9)

- 1) Only public health officials
- 2) Public health official and municipalities
- 3) Village health volunteer and village committee
- 4) A duty of everyone together

10. What is an indication of Dengue Hemorrhagic Fever when children are sick?
(K10)

- 1) High fever, listlessly, and bored food
- 2) A rash on the skin
- 3) Abdominal pain, liver pain-minded press
- 4) All of above



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จุฬาลงกรณ์มหาวิทยาลัย

Part 3: Attitude Level

Please mark a ✓ following the question by a sense of your.

Attitude Authority and Service	Attitude Level				
	Strongly agree	Most agree	Medium agree	Lower agree	Lowest agree
1. Do Public health officials, village, and village committee interest the community services? (A1)	5	4	3	2	1
2. Do you think that public health officials, village volunteers, and village committee take the project to use in the community by familiarity? (A2)	5	4	3	2	1
3. Do you appropriate to public health officials, village volunteers, and village committee??(A3)	5	4	3	2	1
4. Do you not believe that betel nut chalk can use to eliminate larvae and disbelieve in the project??(A4)	1	2	3	4	5
5. Do you think larvae are an important problem to corroborate control??(A5)	5	4	3	2	1
6. Do you think that <i>Aedes aegypti</i> larva control is difficult and hard to eliminate??(A6)	1	2	3	4	5
7. Do you think that Dengue Hemorrhagic Fever is a matter of density and it cannot prevent??(A7)	5	4	3	2	1
8. Do you think that community is more power when they have all to collaborate on??(A8)	5	4	3	2	1
9. Do you always think about <i>Aedes aegypti</i> larva control??(A9)	5	4	3	2	1
10. Do you think that public health village committee are well??(A10)	5	4	3	2	1

Part 4: Satisfaction level

Please mark a ✓ following the question by a sense of your.

Satisfaction of betel nut chalk for <i>Aedes aegypti</i> larva control project	Satisfaction Level				
	Strongly agree	Most agree	Medium agree	Lower agree	Lowest agree
1. Betel nut chalk can eliminate <i>Aedes aegypti</i> larva. (S1)	5	4	3	2	1
2. What is your satisfaction of the public health officials' service in the area? (S2)	5	4	3	2	1
3. What is your satisfaction of village health volunteers' service in the area? (S3)	5	4	3	2	1
4. What is your satisfaction of village committee's service? (S4)	5	4	3	2	1
5. Is betel nut chalk easy to use? (S5)	5	4	3	2	1
6. What is your satisfaction with savor, color, and taste of betel nut chalk when put into water for <i>Aedes aegypti</i> larva control? (S6)	5	4	3	2	1
7. What do you think is a good alternative of the use of Thai wisdom and knowledge for <i>Aedes aegypti</i> larva control? (S7)	5	4	3	2	1
8. Do you have any negative feelings for using betel nut chalk for <i>Aedes aegypti</i> larva control? (S8)	1	2	3	4	5
9. What is your satisfaction about receiving information on betel nut chalk for <i>Aedes aegypti</i> larva control? (S9)	5	4	3	2	1
10. What is your satisfaction to recommend to other people and neighborhoods to use betel nut chalk as well. (S10)	5	4	3	2	1

Part 5: Problems and solutions (OT)

Do you have any suggestions to use of betel nut chalk for *Aedes aegypti* larva control?

Yes. / Please specify.....

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No

Thank you for your attention to the questionnaire.



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APPENDIX B

Betel Nut Chalk



Betel nut chalk 70 grams to put into 200 liters of water every 2 weeks.



Village Health Volunteers with Betel Nut Chalk

BIOGRAPHY

Name : Mrs. Supit Vorachate
Age : 49 years old
Date of Birth : 16 June 1960
Place of Birth : Surin, Thailand
Educational Achievement : Bachelor degree of Public Health,
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