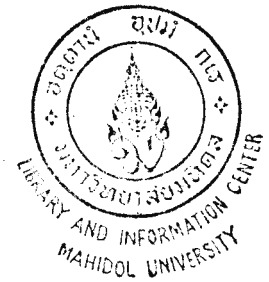

THE EFFECTIVENESS OF PROTECTION MOTIVATION THEORY AND SOCIAL SUPPORT AS APPLIED TO A HEALTH EDUCATION PROGRAM ON DENGUE HAEMORRHAGIC FEVER PREVENTION AMONG GRADE 5 STUDENTS

MANU TALUENGPET

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Dengue Haemorrhagic Fever is presently a major pubic health problem. The highest morbidity rate of people getting this disease is found among primary school students, due to improper preventive health behavior. This classifies these students as the highest risk group. This study was a quasi-experimental research focused on the effectiveness of a health education program on Dengue Haemorrhagic Fever prevention among primary school students by applying Protection Motivation Theory and Social Support. The samples were 91 students, grade 5 in Nakhonsithammarat Province which were divided into two groups: the experimental group of 43 students and comparison group of 48 students. The experimental group participated in a health education program for 8 weeks. The program included various activities related to lectures with video presentations, demonstrations, skill practice, stimulating and reminding by words, praising and guaranteeing the results of these activities. Data were collected through questionnaires and survey forms both before and after the experiment. Statistical methods included percentage, arithmetic mean, standard deviation, student's t-test, and paired samples t-test.

The results of this study showed that after the program, the experimental group had higher perceived severity, perceived vulnerability, self-efficacy, response efficacy for Dengue Haemorrhagic Fever than before and also higher than that of the comparison group. This group also exhibited better prevention behavior at home and at school. These differences were statistically significant at p-value 0.05. Also, the Breteau Index, Container Index at home and at school and House Index of *Aedes aegypti* larva decreased after the experiment. The results of this study showed that the health education program by applying Protection Motivation Theory and Social Support improved preventive behavior for Dengue Haemorrhagic Fever in the experimental group. Thus this program should be applied to students in other primary schools.

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มณู ตลึงเพชร : ประสิทธิผลของโปรแกรมสุขศึกษา โดยประยุกต์ทฤษฎีแรงจูงใจป้องกันโรคร่วมกับแรงสนับสนุนทางสังคมในการป้องกันโรคไข้เลือดออกของนักเรียนชั้นประถมศึกษาปีที่ 5 (THE EFFECTIVENESS OF PROTECTION MOTIVATION THEORY AND SOCIAL SUPPORT AS APPLIED TO A HEALTH EDUCATION PROGRAM ON DENGUE HAEMORRHAGIC FEVER PREVENTION AMONG GRADE 5 STUDENTS). คณะกรรมการควบคุมวิทยานิพนธ์ :รุ่งโรจน์ พุ่มริ้ว, M.P.H., Ph.D., อุษา เล็กอุทัย, วท.ม., ส.ค., ธราดล เก่งการพานิช, พบ.ม., 156 หน้า. ISBN 974-560-663-992-7

ไข้เลือดออกเป็นโรคติดเชื้อที่เป็นปัญหาสาธารณสุขที่สำคัญ ซึ่งเกิดกับเด็กวัยเรียนประถมศึกษาเป็นส่วนใหญ่ เนื่องจากพฤติกรรมการป้องกันที่ไม่ถูกต้องของนักเรียนซึ่งเป็นกลุ่มเสี่ยงต่อการเกิดโรคไข้เลือดออกมากที่สุด การวิจัยครั้งนี้เป็นการวิจัยกึ่งทดลอง มีวัตถุประสงค์เพื่อศึกษาประสิทธิผลของโปรแกรมสุขศึกษา ต่อพฤติกรรมการป้องกันโรคไข้เลือดออกของนักเรียน โดยประยุกต์ทฤษฎีแรงจูงใจป้องกันโรคร่วมกับแรงสนับสนุนทางสังคมมาเป็นแนวทางกำหนดกิจกรรม กลุ่มตัวอย่างเป็นนักเรียนชั้นประถมศึกษาปีที่ 5 ในจังหวัดนครศรีธรรมราช จำนวน 91 คน แบ่งเป็นกลุ่มทดลอง จำนวน 43 คน กลุ่มเปรียบเทียบจำนวน 48 คนโดยจัดกิจกรรมสุขศึกษาให้กับกลุ่มทดลองที่กำหนดไว้ 8 สัปดาห์ประกอบด้วย การบรรยายประกอบวีดิทัศน์ การสาธิต การฝึกปฏิบัติ การกระตุ้นเตือนด้วยวาจา การให้คำชมเชย และการให้คำรับรองผลการปฏิบัติ รวบรวมข้อมูลโดยใช้แบบสอบถาม และแบบสำรวจก่อนและหลังการทดลอง แล้วนำมาวิเคราะห์ ด้วยสถิติ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน Student's t-test และ Paired samples t- test

ผลการวิจัยพบว่า ภายหลังการทดลอง กลุ่มทดลองมีการรับรู้ความรุนแรง การรับรู้โอกาสเสี่ยง การรับรู้ความสามารถของตนเอง ความคาดหวังในประสิทธิผลของการตอบสนองของการป้องกันโรคไข้เลือดออก และมีพฤติกรรมการป้องกันโรคไข้เลือดออกที่บ้านและที่โรงเรียนดีกว่าก่อนการทดลองและดีกว่ากลุ่มเปรียบเทียบอย่างมีนัยสำคัญทางสถิต ส่งผลให้ดัชนีความชุกชุมของลูกน้ำยุงลาย (BI) สัดส่วนของภาชนะที่สำรวจพบลูกน้ำยุงลาย (CI) ที่บ้านและโรงเรียน และดัชนีบ้านที่สำรวจพบลูกน้ำยุงลาย (HI) ในกลุ่มทดลองลดลง จากผลการวิจัยแสดงว่า การจัดโปรแกรมสุขศึกษาโดยประยุกต์ทฤษฎีแรงจูงใจป้องกันโรคร่วมกับแรงสนับสนุนทางสังคม มีประสิทธิผลทำให้เกิดการเปลี่ยนแปลงพฤติกรรมเพื่อป้องกันโรคไข้เลือดออกในกลุ่มทดลองได้ ซึ่งสามารถนำไปประยุกต์เป็นกิจกรรมการเรียนการสอนให้กับนักเรียนเพื่อให้เกิดพฤติกรรมการป้องกันโรคไข้เลือดออกในโรงเรียนอื่นๆ ต่อไป.

CONTENTS

CONTENTS (cont.)

CONTENTS (cont.)

LIST OF TABLES

LIST OF TABLES (cont.)

LIST OF TABLES (cont.)

LIST OF ILLUSTRATION

CHAPTER I

INTRODUCTION

Rationale and Background

Dengue Haemorrhagic Fever is one of the most serious medical problems in the world and particularly in health care in Thailand. This disease first broke out in Bangkok, at that time the number of patients was 2,158. The Case Fatality Rate (C.F.R) was 13.9 % and the majority of patients were aged 2-6 years. In the following period, the disease spread out to the large cities in the northern region. Since 1965, the disease has spread throughout every region of Thailand and the number of patients has continuously increased (Department of Communicable Disease Control, 1996: 2). The year 1987 was the most serious year in the spread of Dengue Haemorrhagic Fever. In that year the number of patients was 174,285. The trend of the spreading of this disease seems to increase every year however the C.F.R. is showing opposing trends. In the past 10 years, the majority of patients were in the 5-14 age group and were students in nursery and primary schools. From 1997-1998, the disease occurred at a steady rate. The number of patients at the time was 127,189: there were 434 deaths, the prevalence rate was 209.14 per 100,000 population, and the cause specific death rate was 0.70 per 100,000 population. The average prevalence rate from 1997-1998 was higher than any year during the preceding 10 years and was found to occur mostly in teenagers and adolescents. It occured not only in the rainy season but also throughout the year (Department of Communicable Disease Control, 1999: 1; Pantana. S, 1999: 1).

Dengue Haemorrhagic Fever is spread by *Aedes aegypti*. This disease could appear as minor symptoms up to severe ones, sometimes shock occurs or even death. Because this disease causes severe effects on children, victims of such an epidemic tend to suffer as a result with terrible complications. Children who have suffered this disease have to stop going to school which reduces the average time for studying. (Department of Communicable Disease Control, 1998: 4). The families of victims of the disease have to spend large sums of money for treatment or sometimes if it is too severe to treat, death could occur. The effects could be problematic to the social and economic development of Thailand in the future.

The situation in Thailand for the year 1998 was that the Province that had the most patients with this disease was Nakhonsithammarat, which had 9,529 patients, the prevalence rate was 634.45 per 100,000 population (Pantana, S. 1999: 3). From the study of the spread of this disease in the Province it was found that the cause specific death rate had increased since 1985. An epidemic of this disease in the Province occurred once every three years (as in 1987 and then 1990). Especially, 1990 was the year that had the most serious epidemic of this disease. After 1990, the trend decreased enormously until 1995 when an epidemic of the disease occurred again and followed by a decrease to the lowest prevalence rate in 1996. The trend then changed and increased in 1997, especially at the end of that year until 1998. The report shows that in the year 1998: there were 28 deaths or a cause specific rate of about 1.86 per 100,000 population. The Case Fatality Rate was 0.29%. The district in Nakhonsithammarat Province that had most patients was Lansaka which had a prevalence rate of 1,354.83 per 100,000 population. The age group that had the highest prevalence rate was 5-14 years old. 64.66% were students. From 1st January

until 13th September 1999, reports showed that in Lansaka District there was 1 death from Dengue Haemorrhagic Fever or 1.22% (Nakornsithammarat Provincial Health Office, 1999: 1). Variation and climatic conditions has a profound effect on the life of a mosquito and on the development of the disease. Hense its influence on the transmission of the disease and on its seasonal incidence during May to January. Excessive rainfall play an important part due to the relative humidity and greater breeding activity of mosquitoes.

Prevention of Dengue Haemorrhagic Fever so far by Nakhonsithammarat Province and Lansaka District has been attempted according to the policy of the Public Health Ministry and co-projects between the Public Health Ministry and the Education Ministry especially the project "People united to prevent and control Dengue Haemorrhagic Fever for the 50th Coronation Anniversary of 1999-2000". The project has plans at all levels from province down to village, has cooperation between various organizations in the community especially in schools that had a high prevalence rate. Good coordination in instigating the projectcaused a drop in the prevalence rate and the Larval index of *Aedes aegypti* decreased at some levels but could not be maintained throughout the year. The working process achieved the goal only for a short period of time due to human factor problems. Some people thought that the responsibility for preventing and controlling the disease lay with health officials and was not the responsibility of the people. Motivating and persuading people to participate in the project is crucial and urgent because if it is neglected the problem can worsen in the future.

Since school students are the group with a high prevalence rate, it is a good idea to persuade and encourage these students to participate in the prevention and

elimination of the larva habitats of *Aedes aegypti* both at home and school since students in this age group are capable of looking after themselves as they have developmental readiness in all areas. The purposes for this project were: giving appropriate knowledge, attitude and correct practices in preventing and controlling Dengue Haemorrhagic Fever, beginning to practice it at school and then in the community. Although from basic research data studying the factors that influenced the reaction of subjects to Dengue Haemorrhagic Fever as a guideline in formatting a suitable working pattern for students to practice by using "PRECEDE PROCEED Framework" (Green, et al.1980: 68-76) it was found that students still lacked adequate knowledge about the disease. A questionnaire to 39 students in grade 5 in Lansaka District found that: 48.7% were aged 11. 46.2% or were aged 12, 69.2% had 4-5 family members. 89.7% were living with their family, 51.3% had suffered Dengue Hemorrhagic Fever. 82.1% had a moderate knowledge of how to prevent themselves from the disease. 12.8% knew that this disease can happen in all seasons.5.1% practiced disease prevention such as eliminating or reducing breeding places of *Aedes aegypti* every week. 82.1% practiced disease prevention and control sometimes (some practice but not regular weekly). Perceived severity and perceived vulnerability to the disease was 64.1% and 76.9% respectively. 71.8% thought that Dengue Hemorrhagic Fever can be prevented by a vaccine. 51.3% perceived that those with a healthy body would not get the disease. Self-efficacy and response efficacy toward the disease was 71.8% and 79.5% respectively. Students received more education, incentive, and praise from parents than from teachers, and finally the project found that 79.5% did not get enough support for abate sand granules.

From an analysis of the environmental factors when surveying entomological indices and statistics of *Aedes aegypti* larva with the occurrance of Dengue Haemorrhagic Fever in student subject homes it was found that: Breteau Index (BI) was 210.26, Container Index (CI) at home was 45.57, House Index (HI) was 71.79, Container Index (CI) at school was 54.54 which was higher than the target of the "People United to Prevent and Control Dengue Haemorrhagic Fever for the 50th Coronation Anniversary of 1999-2000" project. After careful considerable, it was found that the environment in the school, including vases for flowers, bowls in the toilet, water reserve tanks, and jars for drinking water were containers likely to encourage the presence of larval of *Aedes aegypti.* The school was also situated in a place that had rain all year round.

From all the data mentioned above, it can be seen that students were still at risk of getting the disease due to: improper, inappropriate or inconsistent preventive health practice. Students still lacked knowledge about the disease, did not know the right way to treat the problem when it occurred and did not get enough social support (praise, stimulation, guarantee on the results of practice) when trying to eliminate the problem.

Factors that influence the behaviour of people are: internal factor such as knowledge, perception and external factor such as social support. From observing the problems stemming from this disease obtained from all the data collected, the researcher was interested in these difficulties and tried to arrange a health education program in preventing the occurrence of the disease in grade 5 students in Lansaka District in Nakhonsithammarat Province for the reason that the students in this 10-12 age group were within the age range of 5-14 years that had the highest risk in getting

the disease. In addition to that, the students in this age group were receptive to knowledge about the disease in order to improve their own health, and form the right attitude about health. And the last factor was that the students in grade 5 still had one more year in school so they could still be the leaders in camps about the disease at school and at home also. Protection Motivation Theory (stressing internal factors) would be applied, in order for students to perceive the severity of and vulnerability to the disease, self-efficacy in preventing the disease, and obtaining appropriate responses efficacy from prevention against the disease. There would be social support (stressing external factors) from the class teacher in order to encourage good behavior in preventing the disease and decreasing the number of *Aedes aegypti* larva which is the carrier of this disease.

Research Problem

Would a health education program applying Protection Motivation Theory and Social Support change the behavior of grade 5 students in preventing Dengue Haemorrhagic Fever?

Objectives of the Study

General Objective

To study the effectiveness of a Health Education Program by applying Protection Motivation Theory and Social Support on Dengue Haemorrhagic Fever preventive behavior among grade 5 students in Lansaka District, Nakhonsithammarat Province.

Specific Objectives

1. To study the changes in Dengue Haemorrhagic Fever prevention behavior by arranging a health education program with the following topics:

1.1 Perceived severity of Dengue Haemorrhagic Fever.

1.2 Perceived vulnerability from Dengue Haemorrhagic Fever.

1.3 Self-efficacy in preventing Dengue Haemorrhagic Fever.

1.4 Response efficacy in preventing Dengue Haemorrhagic Fever.

1.5 Behavior in preventing Dengue Haemorrhagic Fever at home.

1.6 Behavior in preventing Dengue Haemorrhagic Fever at school.

2. To compare the entomological index and the proportion of *Aedes aegypti* larva index correlated with the occurrence of Dengue Haemorrhagic Fever before and after the experiment. These are:

2.1 Breteau Index

2.2 Container Index at home

2.3 Container Index at school

2.4 House Index

Research Hypothesis

1. A Health Education Program produces better behavior in preventing Dengue Haemorrhagic Fever among students in an experimental group in these areas:

1.1 Perceived severity of Dengue Hemorrhagic Fever.

1.2 Perceived vulnerability from Dengue Haemorrhagic Fever.

1.3 Self-efficacy in preventing Dengue Haemorrhagic Fever.

1.4 Response efficacy in preventing Dengue Haemorrhagic Fever.

1.5 Behavior in preventing Dengue Haemorrhagic Fever at home.

1.6 Behavior in preventing Dengue Haemorrhagic Fever at school.

2. After proceeding with a health education program, the entomological index and the proportion of *Aedes aegypti* larva index correlated with the occurrence of Dengue Haemorrhagic Fever should decrease: they are

2.1 Breteau Index

2.2 Container Index at home

2.3 Container Index at school

2.4 House Index

Variables of the Study

1. Independent Variables: health education program such as this consist of:

1.1 Health Education teaching by using video which emphasises the Protection Motivation Theory.

1.2 Use of live media by asking students who have contacted Dengue Haemorrhagic Fever before to narrate to the sample student group how they caught the disease and the treatment. By emphasizing the content, students will obtain the knowledge according to Protection Motivation Theory.

1.3 Giving Manual and leaflet about Dengue Haemorrhagic Fever.

1.4 Verbal stimulation from the researcher once a week in prevention practice for Dengue Haemorrhagic Fever.

1.5 Weekly praise of students who have practiced prevention of Dengue Haemorrhagic Fever.

1.6 Weekly announcement of the results from the practice for Dengue Hemorrhagic Fever prevention.

2. Dependent Variables such as:

2.1 Perceived severity of Dengue Hemorrhagic Fever.

2.2 Perceived vulnerability from Dengue Haemorrhagic Fever.

2.3 Self-efficacy in preventing Dengue Haemorrhagic Fever.

2.4 Response efficacy in preventing Dengue Haemorrhagic Fever.

2.5 Behavior in preventing Dengue Haemorrhagic Fever at home.

2.5.1 Surveying the habitats of *Aedes aegypti* larva.

2.5.2 Closing water containers for consumption as soon as used.

2.5.3 Sleeping under mosquito netting all the time both day and night.

2.5.4 Preventing and eliminating *Aedes aegypti* larva from containers such as plates, under food container cupboard legs, cement tanks or other containers in the bathroom or latrine, bowls, vases, plates supporting plant pots and any vessels that have still water.

2.6 Behavior in preventing Dengue Haemorrhagic Fever at school.

2.6.1 Surveying the habitats of *Aedes aegypti* larva.

2.6.2 Closing water containers for consumption as soon as used.

2.6.3 Preventiing and eliminating *Aedes aegypti* larva from containers such as cement tanks or other containers in the bathroom or latrine, bowls, vases, plates supporting plant pots and any vessels that have still water.

2.7 The entomological index and the proportion of *Aedes aegypti* larva index correlated with the occurrence of Dengue Haemorrhagic Fever.

2.7.1 Breteau Index

2.7.2 Container Index at home

2.7.3 Container Index at school

2.7.4 House Index

Scope of the Study

This research studies only two sample groups, an experimental group and a comparison group, of grade 5 students in primary schools in Lansaka District, Nakhonsithammarat Province. The period of the research is from November 1999 to February 2000.

Definition of Terms

1. **Health Education Program** referred to health activities that were arranged systematically by applying Protection Motivation Theory which involves: teaching by video to change the behavior about the perceived severity of Dengue Haemorrhagic Fever, perceived vulnerability toward getting Dengue Haemorrhagic Fever, self-efficacy in prevention against Dengue Hemorrhagic Fever, response efficacy against Dengue Haemorrhagic Fever and Social Support such as verbal motivation, praising students, guaranteeing the results of the practice against Dengue Haemorrhagic Fever both at home and school.

2. **Grade 5 students** referred to children who were studying in grade 5 in schools under the Department of Primary Education, Lansaka District, Nakhonsithammarat Province.

3. Perceived severity of Dengue Haemorrhagic Fever referred to the perception of severity of the disease on one's body, whether death could occur, amount of time and money lost in treatment and time lost for studying in grade 5.

4. Perceived vulnerability from Dengue Haemorrhagic Fever referred to the perception of grade 5 students about they risk to the Dangue infection.

5. Self-efficacy in preventing Dengue Haemorrhagic Fever referred to the belief of grade 5 students in their own ability to combat the disease.

6. Response efficacy in preventing Dengue Haemorrhagic Fever referred to the belief of grade 5 students that preventive behavior against the disease would make them immune from it.

7. Behavior in preventing Dengue Haemorrhagic Fever referred to the practice or actions of students to prevent the disease including preventing the spread of *Aedes aegypti* and agents by emphasising practical methods for students alone or as a group such as:

7.1 Behavior in preventing Dengue Haemorrhagic Fever at home such as:

7.1.1 Surveying the habitats of *Aedes aegypti* larva every week.

7.1.2 Closing water containers for consumption as soon as used.

7.1.3 Sleeping under mosquito netting all the time both day and night.

7.1.4 Preventing and eliminating *Aedes aegypti* larva in containers such as:

- Plates under food container cupboard legs, by putting any chemical such as washing powder, sodium chloride or vinegar in the water plate beneath cupboard legs or putting in used engine oil instead of water every month.

- Cement tanks or other water containers in the bathroom or latrine by putting abate sand granules and add to them every 1-3 months or changing the water every week.

- Vases or containers for decorative plants or fresh flowers by changing the water every week.

- Plates supporting plant pots by changing the water every week or putting in ordinary sand.

- Pieces of objects such as cans, fruit shells, coconut shells by turning them over or burning them every week.

7.2 Behavior in preventing Dengue Haemorrhagic Fever at school such as:

7.2.1 Surveying the habitats of *Aedes aegypti* larva every week.

7.2.2 Closing water container for consumption as soon as used.

7.2.3 Preventing and eliminating *Aedes aegypti* larva in containers such as:

- Cement tanks or other water containers in the bathroom or latrine by putting abate sand granules and adding to them every 1-3 months or changing the water every week.

- Vases or containers for decorative plants or fresh flowers by changing the water every week.

- Plates supporting plant pots by changing the water every week or putting in ordinary sand.

- Pieces of objects such as cans, fruit shells, coconut shells by turning them over or burning them every week.

8. Larva of *Aedes aegypti* referred to *Aedes aegypti* larva stages including pupa, especially the *Aedes aegypti* larva stage 4.

9. Breteau Index referred to the percentage of containers with one or more habitats positive for *Aedes aegypti* or related species per total of houses. It is calculated as follow:

$$\text{Breteau Index} = \frac{\text{No. of infested containers}}{\text{No. of inspected houses}} \times 100$$

10. Container Index referred to the percentage of containers with one or more habitats positive for *Aedes aegypti* or related species. It is calculated as follows:

$$\text{Container Index} = \frac{\text{No. of infested containers}}{\text{No. of inspected containers}} \times 100$$

In examining the containers, only those which have water in them are counted.

11. House or premises Index referred to the percentage of houses or premises with one or more habitats positive for *Aedes aegypti* or related species. It was calculated as follow:

$$\text{House or premises Index} = \frac{\text{No. of infested houses}}{\text{No. of inspected houses}} \times 100$$

CHAPTER II

LITERATURE REVIEW

This research aimed to study the effectiveness of a health education program applying Protection Motivation Theory and Social Support to prevent Dengue Haemorrahagic Fever in elementary students in grade 5. The concepts, theories and research involved were applied as a guideline to arrange the activities in the research as follow:

Part 1: The knowledge of Dengue Haemorrhagic Fever

Part 2: Plans and methods of prevention and control of Dengue Haemorrhagic Fever at Lansaka District

Part 3: Dengue Haemorrhagic Fever curriculum in the elementary level

Part 4: Related theories

4.1 The Protection Motivation Theory

4.2 Social Support

Part 5: Related researchs

5.1 Dengue Haemorrhagic Fever

5.2 The Protection Motivation Theory

5.3 Social Support

Part 1. Dengue Haemorrhagic Fever (Jatanasen, S.& Thongcharoen, P. 1993: 28)

Before the first large outbreak of DHF/DSS in 1958, approximately 50 to 100 cases diagnosed as "influenza with haemorrhagic" were included in the hospital records of Siriraj Hospital in Bangkok. After the 1958 outbreak in Bangkok and its

suburbs, the disease spread to adjacent provinces in the Central region in 1961. In 1964, a major outbreak occurred in big cities in northern and north-eastern Thailand. The highest record of DHF/ DSS (5,403 cases with 216 deaths) was reported in 1964 in Bangkok. Since 1968, there have been reports of the disease from almost every province of the country. During the first ten-year period (1958-1967), epidemics occurred in alternate years with peaks during the rainy seasons. Even in low epidemic years, the number of patients increased yearly except in 1986. The number of cases recorded was 69,597 in 1984, 80,076 in 1985, 27,837 in 1986 and 147,285 (with 1,007 deaths) in 1987, of which the latter was the highest figure ever reported in the WHO South region. The case fatality rate was approximately 10% in 1958, but fell gradually to below one percent by 1980.

After 1968, the epidemic pattern of alternate years changed and became irregular for the whole country. Case records in Bangkok remained high but did not exceed the 1964 number and followed the country-wide pattern. Since 1973, the number of patients in the north-eastern part of the country has increased significantly every year, and now comprises almost 50% of the cases for the whole country. In the early epidemic years the number of cases in the dry seasons (November to March) was very low (below100 cases per month), with most reported cases occurring in Bangkok. In other provinces the number of cases was less than ten per month during the dry-cool season (November to February). However, in a recent epidemic in Thailand, the disease was not only epidemic in the rainy season, but epidemics have occurred throughout the year.

Clinical Course (Nimmannitya, J. 1993: 50-53)

Typical DHF is an acute illness of children characterized by four major clinical manifestations: high fever, haemorrhagic phenomena, hepatomegaly, and often circulatory failure. The major pathophysiologic changes that determine the severity of disease in DHF and differentiate it from DF are plasma leakage and abnormal haemostasis, as manifested by a rising haematocrit value and moderate to marked thrombocytopenia. These two clinical laboratory changes are distinctive and constant findings in DHF.

Following an incubation period of four to six days (thought to be the same as in DF), the illness commonly begins abruptly with high fever accompanied by facial flushing and headache. Anorexia, vomiting, epigastric discomfort, tenderness at the right costal margin and generalized abdominal pain are common. During the first few days the illness resembles classical DF, but maculopapular rash, usually rubelliform type, is less common. it may appear early or late in the course of the illness. Occasionally, the temperature may be 40 °C - 41 °C and febrile convulsion may occur particularly in infants.

A haemorrhagic diathesis is commonly demonstrated by fine petechiae on the extremities, axillae, trunk and face in the early febrile phase. A positive tourniquet test and a tendency to bruise at venepuncture sites are always present. Bleeding from nose, gum and gastro-intestinal tract are less common but can be severe. Massive gastro-intestinal bleeding is often associated with prolonged shock. Gross haematuria is extremely rare.

The critical stage is reached after two to seven days when the fever subsides. Accompanying or shortly after a rapid drop in body temperature, varying degrees of circulatory disturbance occur. The child is commonly sweating, restless and has cool extremities.

In less severe cases, the changes in vital signs are minimal and transient and the patient recovers spontaneously or after a brief period of therapy.

In more severe cases, the patient's condition rapidly deteriorates as shock ensues. Acute abdominal pain is a frequent complaint shortly before onset of shock. The patient becomes restless and circumoral cyanosis is more prominent. The skin is cold, clammy, purplish and blotchy. The pulse is rapid and feeble, while a narrowing pulse pressure of less than 20 mmHg (e.g. 100/80, 100/90 mmHg) is usually observed in the early stages of shock. Shock progresses rapidly into profound shock, with unobtainable blood pressure and/or pulse, and the patient may die within 24 hours. Prolonged shock is often complicated by metabolic acidosis and severe bleeding, which indicates a poor prognosis. If the patient is appropriately treated, however, before irreversible shock has developed, rapid recovery is the norm.

Encephalitic signs associated with intracranial haemorrhage, and metabolic and electrolyte disturbances may occur but are uncommon; they indicate a grave prognosis.

Course: convalescence is commonly short and uneventful, and may be accompanied by sinus bradycardia and a characteristic confluent petechial rash with scattered round areas of pale skin as described in DF. The duration of DHF is between seven and ten days in most cases.

Grading of Severity of DHF

The severity of DHF has been classified into four grades according to two pathophysiological hallmarks - shock and bleeding.

Grade I

Fever accompanied by non-specific constitutional symptoms. The only haemorrhagic manifestation is a positive tourniquet test.

Grade II

Patient with spontaneous bleeding usually in the form of skin and/or other haemorrhages in addition to the manifestations in grade I.

Grade III

Circulatory failure manifested by rapid and weak pulse, narrowing of pulse pressure (20 mmHg or less) or hypotension with the presence of cold clammy skin and restlessness.

Grade IV

Profound shock with undetectable blood pressure and pulse.

The presence of thrombocytopenia with concurrent haemoconcentration differentiates grade I and grade II DHF and other diseases.

Early in the febrile phase, the differential diagnosis includes a wide spectrum of viral and bacterial infections. By the third or fourth days, usually before shock occurs, a drop in platelet count and a rise in the haematocrit value help in establishing the diagnosis. When shock develops with other manifestations and two essential laboratory findings, thrombocytopenia with concurrent haemoconcentration, the diagnosis of DHF(DSS) is most certain. Other evidence of plasma leakage,

including pleural effusion, ascites, and hypoproteinaemia, differentiates dengue shock syndrome (DSS) from endotoxic shock.

Treatment regimen (Nimmannitya, J. 1993: 55-56)

The management of dengue haemorrhagic fever (DHF) is symptomatic and supportive

- Bed rest advisable during the acute febrile phase.
- Antipyrectics or sponging are required to keep the body temperature below 40°C. Aspirin should be avoided since they may cause bleeding and acidosis.
- Analgesics or mild sedatives may be required for those with severe pain.
- Oral electrolyte solution (as used in diarrhea) or fluid juice is recommended during the febrile phase.

A rise in haematocrit value of more than 20 % from baseline indicates significant plasma loss and a need for parenteral fluid therapy. In mild and moderate cases (Grades I and II), volume replacement can be given in an out-patient department dehydration until for a period of 12-24 hours.

The Need for Hospitalization

Patients who are restless and who have cool extremities, acute abdominal pain and oliguria should be admitted to hospital. Patients with any signs of bleeding and persistently high haematicrit values, despite being given volume replacement, should be promptly admitted to hospitals.

Vector Ecology and Bionomics (Pant & Self, 1993 : 121,123-126,129-130)

Aedes aegypti is the principal vector of dengue and dengue haemorrhagic fever in the world. It is widely distributed in the South-East Asian, Western Pacific, african Regions between isotherms 10 °C January$^{(N)}$ and 10 °C July $^{(S)}$. In Africa and Central and South America, this vector has also been known as the principal vector of urban yellow fever.

Eggs and oviposition

The eggs are approximately 1 mm long and pale white, turning to an intensely black color within a short time. They are elongate/oval in shape and under the microscope appear somewhat cigar shaped, with one end rather thicker and more abruptly tapered than the other. Fertilized eggs are deposited singly on the moist walls of the containers and the embryo develops within two or five days. The eggs are capable of withstanding desiccation for weeks or months, and possibly much longer. Eventually, when flooding occurs (once or several times), the eggs hatch. Lowered oxygen tension in the flood water provides a stimulus to hatching.

The ability to withstand desiccation enables *Aedes aegypti* to be transported over long distances in dried receptacles or containers. This phenomenon also hinders control because eggs from dried receptacles can introduce infestation when water is added, thus continuing to present difficulties for control operations. The specific habits of egg laying have been exploited for detecting the presence of *Aedes aegypti* in an area by using ovitraps and for devising control methods by using autocidal traps.

Among eight test materials, including filter paper, aluminium plates, glass plates, aluminium foil, wooden strips, car tyres, cement plates and plastic plates, the most attractive surface is that of car tyres. Females prefer to lay eggs on a surface

with a high degree of dark color, roughness and water absorption. The highest percentage of *Aedes aegypti* in Thailand is usually found in containers made from cement and in car tyres. Based on the oviposition habits and the colour attraction of *Aedes aegypti* females for egg laying, an ovitrap or oviposition trap was developed and used as a surveillance device for detecting the presence of *Aedes aegypti* in low densities. The trap was very successfully used as a supplementary control measure in Singapore Airport. Sub-sequently, an autocidal ovitrap for the control and possible eradication of *Aedes aegypti* was developed, although this method needs to be well supervised and organized, with frequent change of trap.

Differential responses to oviposition site by feral and domestic populations of *Aedes aegypti* have been studied. Results indicate that variations in response act as selective mechanisms separating gene pools of *Aedes aegypti*. The studies involved the use of water and plant infusions to compare the fecundity of populations. The percentage of females ovipositing in the infusion was higher than that of females ovipositing in water, by three percent for the domestic strain and by 66 % for the feral strain.

Larva and pupae

Larvae hang almost vertically at the water surface and swim with a distinct looping movement. When disturbed they swim to the bottom of the container. The larvae feed on particles of organic matter present on the bottoms or sides of containers by pharyngeal filtration of minute particles using fan-like brushes. The larvae also browse on the bottoms or sides of the containers, detaching matter from the surface over which they are gliding.

Aedes larva can be distinguished by the naked eye from most other genera. The siphon is shorter than in most other culicines (it is lacking in anopheliner). After hatching from the eggs, the larva undergoes three successive moults. The fourth ecdysis or population gives rise to the pupa, which does feed but actively swims and floats.

Field investigations in Bangkok between August and November 1987 showed the duration of different larval instars to be 17-20 days, in contrast to laboratory data which show this duration to be about 10 days at 28 °C. Factors governing the duration of larval development are temperature, food availability and larval density in the receptacles.

Larva habitats

The breeding places of *Aedes aegypti* in Asia are usually located in or near houses in relatively clean water which is stored in containers and used for drinking and bathing. Metal drums or cisterns and ceramic or cement jars, both indoors and outdoors and used for water storage, as well as miscellaneous containers such as plastic pails, flower vases, flower pot plates, ant traps, discarded tins and bottles serve as breeding sites.

In Thailand and Indonesia, many studies have been carried out on the breeding habitats of *Aedes aegypti*. The total number of water containers per house in one of the suburbs of Bangkok was 9.0-14.0 (mean 11.0). Water jars, miscellaneous containers and ant traps were the most common habitats, and 44-gallon drums, cement baths, cement tanks and discarded tyres were also found to be common breeding sites. In urban Jakarta, immature stages were found in or near houses in containers with relatively clean water used for drinking or bathing. An average of 185 containers was

found per 100 houses, of which 60 were positive for *Aedes* immatures. The mean potential water storage capacity per house was 17.3 litres. Water jars were the most common containers found but "Bak Mandi" (cubodial or oblong concrete reservoirs) held more water. In Singapore, natural and domestic habitats, including rubber tyres, building equipment, machinery parts and boats are the common breeding habitats for *Aedes* spp. To give the complete list and importance of these habitats, a table form the latter publication has been reproduced, in which *Aedes aegypti* and *Aedes aibopictus* have been grouped together.

The relative importance of these habitats may vary from country to country. As stated earlier, *Aedes aegypti* is an introduced species in Asian cities whereas *Aedes albopictus* has both a natural and suburban distribution where rich vegetable, high altitude or poor accessibility and communications exist. Some observations have shown *Aedes aegypti* to be replacing *Aedes albopictus,* although the observation made and methods used have been inconclusive. Sharing of habitats is uncommon in both urban and rural areas, however *Aedes aegypti* takes a slightly shorter time to complete its development form egg hatching to adult emergence. It is probable that the pattern of distribution of the to species is not the result of competitive displacement, but may result from factors that favour the rapid increase of *Aedes aegypti* populations. In Bantal (Central Java), a densely populated area, outbreaks of DHF have occurred in recent years and larval habitats of *Aedes aegypti* and *Aedes albopictus* have been studied. It has been found that both species are common in the villages, but *Aedes aegypti* is found primarily in "Bak Mandis" indoors and outdoors, and also in clay pots. *Aedes albopictus,* on the other hand, is found primarily in cut bamboo stumps

outdoors and also in tree holes, coconut shells, clay pots and "Bak Mandis". There is considerable overlap in the breeding habitats of the two species in Bantul.

The reasons for water storage vary in different regions. In some areas of Thailand people prefer rain water for drinking, particularly on the coast where the sub-soil water may be salty. In addition, where a piped water supply is not available and labour is involved in drawing water, people prefer to store water. Even when piped water is available, disruptions in the supply may lead to the practice of extensive water storage. In forest areas there may be a lack of water, especially during the summer. In Thailand, most of the houses are wooden and, since people are afraid of fire outbreaks, they prefer to have copious quantities of stored water available. Water storage practices assume cultural patterns in warm and humid climates where frequent bathing and washing of clothes is necessary.

The adult mosquito

The adult mosquito, after emergence, rests on the walls of the breeding site for a few hours to allow the exoskeleton and wings to harden. Approximately 24 hours after emergence both sexes can mate and females can take a blood meal. These two activities often take place simultaneously since both males and females are attracted towards vertebrate hosts. Wing beat frequency of the unfed females and the sound generated may also be attractive to the males. Generally, once inseminated, the females do not mate again.

The biting habits of mosquitoes have been used not only to estimate mosquito population densities but also to determine the possible relationship of these densities to epidemics of mosquito-borne disease.

Aedes aegypti is highly anthropophilic in Asia. The diurnal periodicity of attraction of *Aedes aegypti* to human bait was studied in Jakarta. Although biting seems to occur throughout the whole day, there are two distinct peak periods of diurnal activity of females, which are similar throughout the year. The mid-morning peak occurs between 08.00 and 13.00 hours and the mid-afternoon peak between 15.00 and 17.00 hours. The mean parous rate for females collected in the area is higher during the rainy season than in the dry season. In a study in Bangkok it was shown that during the month of January, in the middle of the cool-dry season, a statistically significant reduction in the biting rate occurs (1.48 as compared to 4.77 in September) this finding is somewhat at variance with earlier studies which found that the absolute populations of mosquitoes did not fluctuate seasonally. Studies were therefore carried out to ascertain the feeding frequencies and gonotrophic cycle of *Aedes aegypti* in Bangkok throughout the year. During the cool-dry season, a delay in feeding for the first time, of one to two days, was found to occur, thus reducing the feeding rate.

Methods of survey

Surveillance of vectors is an essential step in the planning of control measures and their evaluations, and in studies to determine the risk of outbreak of dengue/DHF. Surveys are also necessary for studying the ecology and distribution of vectors.

Surveys enable information concerning the presence of vectors, their frequency of occurrence, their abundance and distribution in time and space, their movements including migration, and their establishment in other areas to be obtained. These surveys also assist in stratification of areas where outbreaks of dengue fever

can occur. Vector surveillance should be routine and epidemiological parameters from both the virological and entomological points of view. The objectives of these surveys have been summarized as follows:

- to pin-point high risk areas (areas with high vector density and high disease endemicity) through the plotting of vector distribution and DHF case on maps, so that these areas can serve as priority areas for control during both normal and epidemic conditions;

- to detect, through routine surveillance, any changes in vector density, distribution, or other epidemiological parameters relating to the vectorial capacity of the vectors;

- to determine the seasonal population fluctuations of the vectors so that special emphasis can be given to the maintenance of control and alertness during periods, and

- to determine the major breeding places in domestic environments so that source reduction or elimination, with public participation, can be carried out through health education campaigns and low enforcement.

Larva surveys

Due to the nature of the larval habitats and the ease with which larvae can be collected, larva surveys are commonly used for *Aedes* species, and involve the collection of larvae or pupae. The immature stages are collected from water-holding containers found both inside and outside houses. Information concerning the locality, date of survey, precise location and classification of the container or source is carefully recorded. Receptacles which are negative for immature stages on examination are also recorded. The exact format of such records will vary from place

to place depending on the type of breeding site and the purpose of the surveys may be of three types:

- those concerned with all larva, or a number of larva, from all positive containers
- those concerned with a single larva from each positive container, and
- visual

In order to carry out the above, which results in a saving of time for field workers, detailed information about the composition of the *Aedes* species breeding in the containers should be available. Visual larval surveys, and the one larva per container survey are only accurate when one species, e.g. *Aedes aegypti*, is found, as is the case in some urban areas. In the urban areas of Bangkok, Thailand, one larva per container surveys were found most suitable for comparison of *Aedes aegypti* populations between localities and seasons.

Larva Indices

The commonly used larva indices are as follows:

House or premises Index

This is the percentage of houses or premises with one or more habitats positive for of *Aedes aegypti* or related species. It is calculated as follow:

$$\textit{House or premises index} = \frac{\text{No. of infested houses}}{\text{No. of inspected houses}} \times 100$$

Container Index

$$\text{Percentage of containers infested} = \frac{\text{No. of infested containers}}{\text{No. of inspected containers}} \times 100$$

In examining the containers, only those which have water in them are counted.

Breteau Index

Originally this index was used in connection with *Aedes aegypti*.

$$= \frac{\text{No. of infested containers}}{\text{No. of inspected houses}} \times 100$$

The ***Breteau Index*** is generally considered the best of the commonly used indices (such as the House or premise Index and the Container Index) since it combines dwellings and contains and is more qualitative and of more epidemiological significance.

The ***House Index*** is most frequently used and understood. It also involves less labour because, when the first positive container is located in a house, there is no need to proceed further. This index does not take into account the number of positive containers in an infested house. The House Index gives an idea of the percentage of houses positive for vector breeding and hence the percentage of the population at risk. If the index is high, transmission occurs easily to neighbouring houses, and if the index is low transmission occurs less rapidly.

The ***Container Index*** although not so useful from the epidemiological point of view, is a useful comparative figure, especially when evaluation of control measures is being carried out.

Epidemiological Interpretation of Surveillance Data

It is not possible to give a precise density figure for *Aedes aegypti* or *Aedes albopictus* at which no transmission will occur. However, the usefulness and significance of an estimated threshold density cannot be over-emphasized.

Entomologists and health officers should try to work out, in their own localities, possible threshold vector densities required for transmission of Dengue

Haemorrhagic Fever. Constant monitoring of this index through routine surveillance enables epidemiologists to predict the trend of disease and vector control efforts when the suspected critical level is reached. In actual practice there are, unfortunately, many situations where low vector indices are not maintained and the disease remains endemic on a year round basis.

As general guide, indices are interpreted as follows:

- Breteau index more than 50 : high risk of transmission
- Breteau index less than 5 : low risk of transmission
- House index more than 10 %: high risk of transmission
- House index less than 1 % : low risk of transmission

Strategies for control of Dengue Haemorrhagic Fever vectors (Bang & Ton, 1993 : 140-145)

Aedes aegypti control measures may be used for routine control or during emergencies. For control of adults, space control equipment is used for rapid killing of flying insects. However, if not complemented with larval control activities, the adult population may soon return to pre-control levels. The World Health Organization (WHO) Technical Advisory Committee on DHF identified different approaches for the control of DHF vectors in countries in tropical Asia: the long-term or routine and emergency control. Vector control strategies need to be developed before the actual operations are carried out to ensure that the proper equipment and pesticides are available and that staffs are adequately trained. Any strategy requires knowledge of the vector, disease transmission and control operation conditions.

Control of larval dengue haemorrhagic fever vectors

Larviciding, source reduction, and in some cases the use of bio-control agents, are excellent measures to suppress *Aedes aegypti* population. They are valuable in routine control operations, pre-epidemic conditions and as a measure to enhance adult control activities during epidemics. Of these measures, larviciding continues to be the method of choice.

If the various tools available for larval control are used properly, adult populations can be maintained at a level where virus transmission is drastically reduced. Furthermore, larval control is more applicable to community action than is control of adult mosquitoes. Unfortunately, continuous health education and other tools are required to motivate the people. Some cities have successfully used legal measures to promote community involvement. Larval control requires less equipment and expertise than adult control measures. During epidemics, larval control can be used to support adulticiding and allows people to become involved.

The major obstacle in larval control is the high cost of larvicide, especially when applied routinely to all receptacles which are potential breeding sites for mosquitoes. Field supervision is important to ensure complete coverage of containers. After intensive health education and training, larviciding has been carried out by village volunteers in Thailand, where they have succeeded in reducing the Breteau index by 63-73% with a house coverage of 50 % in urban centres and 86 % in rural communities. Frequently, because of operational difficulties in treatment of containers, sound management of control resources is as important as the efficacy of control techniques. This is especially true when two different control methods are applied in an integrated vector control approach. In East Africa, a "block system" was

tested where a community was divided into zones, containing eight to ten blocks of about 50 houses each. Two-week treatment cycles were made by having one control man treat one block per working day. Any control failure or success in the zone was monitored by the evaluation team assigned to the study.

1. Chemical Methods

During the earlier years of DHF epidemics in Asia, control was accomplished through larviciding domestic water jars by treatment with a DDT suspension as a dose of one mg/1, together with five percent DDT residual spray at two gm/m^2 in premises in the immediate vicinity of DHF case. Some spraying and fogging were employed around schools and other public buildings. DDT resistance in *Aedes aegypti* was first reported in Asia from Bangkok in 1966. As DHF continued to spread in Thailand, A WHO research unit was established in Bangkok in 1966 with the objective of developing appropriate control methods against DHF vectors. Many larva control agents and methods were tested in different larval habitats as complementary measures to maintain low *Aedes* densities specially in areas highly endemic for DHF. From 1966 to 1970, various formulations of temephos were evaluated against *Aedes aegypti* larvae in domestic water containers to determine the residual effectiveness of these formulations in different types of water containers and the effect that different water usage practices have on the residual life of temephos. Among all the pesticides examined temephos was found to be the most suitable for use in drinking water due to its residual effectiveness and lower mammalian toxicity [with an oral lethal dose (LD-50) of 8600 mg/kg.]

Treatment with 1% temephos sand granules (SG) was highly effective when added to water jars at a target dosage of 1.0 ppm (one mg of temephos 1), and a single

mass treatment gave good control of *Aedes aegypti* for 6 to 24 weeks, depending upon environmental and cultural factors which appeared to influence recovery of the mosquito density. Temephos was shown to be liberated rapidly from the sand granules, but its toxic properties remained due to a strong affinity of the larvicide for the walls of the containers. Thus, in contrast to the earlier belief, the residual effectiveness of SG is not only due to its slow-release action but also to the nature of the containers themselves, which play a vital role in retaining the larvicide and gradually releasing it. It is effective because the toxicant is liberated from the inner walls of the containers where newly-hatched young larvae browse, even after the container has been frequently emptied and refilled. Therefore, its residual effectiveness is equally good when water containers are treated with emulsifiable concentrate. However, because of absorption, temephos concentrations in water jars are consistently below the treatment dosage. This mechanism may be less visible in metal and plastic containers, whose absorption is usually low. Mass application of temephos SG is easily made by using a calibrated plastic spoon to give dosage at the rate of one gm per ten litre volume of container, whether full of water or not. The sand granules can be pre-packaged to provide controlled treatment by members of a community. Retreatment (as determined in a large-scale field trial in Bangkok in 1970) is required at two-three months intervals or four times a year, depending upon local conditions. Temephos is also highly effective against *Aedes samoanus* when a five percent emulsifiable concentrate id directly sprayed on to leaf axils the *Pandanus* plant using Fontan R-11 mistblowers.

2. Biological Methods

Biocontrol agents are potentially useful for control of *Aedes aegypti*, especially *Bacillus thuringiensis* H14 (a spore-forming bacteria) and larvivorous fish. *B. thuringiensis* H-14 was used routinely in about 20% of the total Onchocerciasis Control Programme in Africa, where *Simulium damnosum* resistance to temephos and other OP compounds had occurred. However, the operational use of biological methods for the control of *Aedes aegypti* in Asia has not yet been considered because of the high operational costs due to the frequent treatments (weekly) which are necessary. Another microbial larvicide, *B. sphaericus* (a complex of aerobic spore-forming strains of bacteria) has some recycling potential. Some of the species in the complex have been isolated from India, Indonesia and Sri Lanka. Unfortunately, compared to *B. thuringiensis* H-14, this microbial agent is less active against *Aedes aegypti.*

The potential of fish for controlling mosquito vectors seem greater than that of other biological control agents so far studied. Fish were used at the turn of the century in *Aedes aegypti* control operations in the Americas. Individuals still use them in cisterns and other large water holding containers in the Caribbean. In an isolated village of 3000 inhabitants in China, two omnivorous fish species, *Claris fuscus* and *Tilopia nilotica,* were successfully used in domestic water jars, and in less than two months of the campaign the Breteau index had declined from 123 to 20, and subsequently declined even further. In Male, the capital island of the Maldives, the main *Aedes* breeding sources are wells, rain water tanks and cisterns, in that order. Before chlorination took place in 1978, due to a cholera outbreak, almost all the wells (over 4300) were stocked with larvivorous sea fish of the species *Kuhlia taeniurus*,

know locally as "cattafulhi". Larval indices for the wells increased from 1.4% to 38.1% soon after chlorination killed all the fish.

3. Autocidal Methods

The autocidal ovitrap designed by Chan *et al.* In Singapore, developed from ovitraps used originally for surveillance of *Aedes aegypti*, was successfully used as a control device in the eradication of *Aedes aegypti* from Singapore Paya Lebra International Airport. The effectiveness of autocidal ovitraps was also demonstrated in the control of *Aedes aegypti* in semi-rural enclave within the city of Houston (Texas) USA, Where the Breteau index at the end of one year of operation had declined by 36%, in comparison to an increase of nearly 500% in the control area where the traps were not used. In Thailand, this autocidal trap was further modified as an auto-larva trap using plastic material available locally, for routine use by Bangkok health authorities. Unfortunately, under the local conditions of water storage practices in Thailand, the technique was not very efficient in reducing natural populations of *Aedes aegypti.* It appears that the successful application of autocidal ovitraps/larva traps depends on their ratio to existing water receptacles in the area under control and hence their attractiveness to females of *Aedes aegypti.* Better results can be expected if the number of existing potential larva habitats is reduced or more autocidal traps are placed in the area under control, or both activities are carried out simultaneously. It is believed that under certain conditions this technique could be an economical and rapid means of reducing the natural density of adult females as well as serving as a device for monitoring infestations in areas where some reduction in population densities of the vector have already taken place.

4. Environmental Methods

The environmental approach to source reduction is labour intensive, but if well planned can reduce *Aedes aegypti* population. It may be promoted as a community clean-up campaign or as and anti- *Aedes aegypti* programme. It is important that the activities are well organized and promoted. Since most artificial breeding sites are soon replaced, there is a need for constant source reduction. One method of accomplishing greater involvement on a continual basis is through legal means.

Source reduction in permanent drinking water containers can be achieved through using proper fitting lids and screening all opening into the containers through which female mosquitoes might enter. Mosquito breeding surveys should be carried out first to identify the principal sites, and environmental management activities should be designed to control breeding in these sites. Proper sanitation and the success of the 'Water Decade" could do much to reduce *Aedes aegypti* populations.

PART 2: Plan and the way of prevention and control Dengue Haemorrhagic Fever at Lansaka District.

The method of prevention and control of Dengue Haemorrhagic Fever in Lansaka District followed the policy of Nakhonsithamarat Public Health Office monitored continuously by a health officer at first. The method emphasized the elimination of the *Aedes aegypti* and the larva more than of the breeding places. The project which was a collaboration between the Ministry of Education and the Ministry of Public Health started in 1993 and emphasized cooperation from school children who had contracted Dengue Haemorrhagic fever most as the target group. The students who participated the project would know the danger of the disease and the

prevention of Dengue Haemorrhagic Fever and with teachers in class could practice in real situations in order to get knowledge and correct skill. The prevention would start at schools and carry on to their houses and communities. The public and leaders of other organizations were also persuaded to participate in the prevention and control of the disease. The operation had a good result at one level and only over a short term. The problems and the obstacles were that the project did not cover everything or operate continuously. Some people were not interested in or aware of the danger. Some public officials and teachers lacked the correct knowledge, understanding and appropriate cooperation.

From 1998, the project "House-Communities and Schools without *Aedes aegypti*" was promoted to encourage school children who were still the target. This project was clearer and more concrete. A committee on the prevention and control of Dengue Haemorrhagic Fever was established at district level. The public health office and others participated in conceiving the plan and procedure.

The public health officers were the main coordinators who helped houses, communities and schools to protect and control Dengue Haemorrhagic Fever. Furthermore, they provided and administered resources such as abate sand granules which were distributed to each area.

Part 3: Dengue Haemorrhagic Fever curriculum in the Elementary Level

As Dengue Haemorrhagic Fever is a serious problem for school children, the Ministry of Education and the Ministry of Public Health collaborated to conduct a project in which every school had to operate extra-curricula activities about Dengue Haemorrhagic Fever and methods to control larva, including trying to eliminate *Aedes aegypti* and breeding places in schools and extending the results to communities: the

aim of the project was to reduce the prevalence of Dengue Haemorrhagic Fever and to support teachers and students to be aware of and to understand the danger of Dengue Haemorrhagic Fever. Furthermore, they should know how to prevent and control the disease. This project started in 1992 and has operated continuously until now.

Whangrungsup,Y.(1996: 247-258) evaluated the attitudes of public health officers and academic officials towards the 'prevention and control of Dengue Haemorrhagic Fever project' in schools from September to November, 1994. Data was collected by interviewing 371 public health and academic officers. It was found that 90-95% agreed that Dengue Haemorrhagic Fever was a serious public health problem for elementary students. Most of them intended to participate in this project, and they would also persuade others to do so. They also agreed that the elementary students would play an important role in the prevention and control of the disease. Moreover, it was important that the prevalence of Dengue Haemorrhagic Fever should be reduced quickly and continuously.

3.1 The Curriculum on Dengue Haemorrhagic Fever

The curriculum promotes teaching and learning activities to help students acquire knowledge and understanding about Dengue Haemorrhagic Fever and be aware of the danger. They can also protect themselves from it. Teachers can arrange the activities both directly and can add them to other subjects 'Supplementary Life Experiences' and 'Supplementary Characteristics' which are laid out in the handbook in order to prevent Dengue Haemorrhagic Fever in schools as shown in figure 1. Schools are considered to be academic institutions which can support and enhance ideas and understanding to prevent the disease. However, houses, communities and schools as well as other organizations should participate together in order to reach this

aim. In addition, every person in all departments or levels in schools should participate and follow up and evaluate continuously. Only some examples for elementary grade 5-6 students from the guideline of teaching and learning management will be presented.

Unit 3: Things around us

Sub Unit: The Impact of the Natural Environment on the Society

For the example: - Ecological System

- Environmental Planning
- Surveying Larva and Breeding Places
- Eliminating Larva and Breeding Places

3.2 Activities and Roles of Students in Control of Dengue Haemorrhagic Fever

According to the study of the pilot project in many provinces that operated prevention and control activities, it was found that *Aedes aegypti* and breeding places in schools and surrounding communities could be controlled and eliminated effectively. The activities which were arranged in schools would help students have correct and suitable knowledge, attitudes and behavior. Furthermore, students could take care of themselves when contracting Dengue Haemorrhagic Fever. The evaluation of the 'implementation of the prevention and control of Dengue Haemorrhagic Fever in elementary schools' programme found that 93.7% of schools were participating in the project and 94.4% of the children practiced the activities. The combined project between the Ministry Education and the Public Health was able to initiate the protection and the control Dengue Haemorrhagic Fever. So teachers had

just as an important role as the public health officials or other participants in the communities.

The key roles of the students comprised of:

- Surveying and eliminating larva in breeding places at school, in houses and communities and following up with records of the prevention and control of *Aedes aegypti* breeding both in schools and houses as well as other activities which had been assigned.

- Participating in arranging campaign activities around communities to support the prevention and the control of Dengue Haemorrhagic Fever in class and at suitable opportunities regularly and continuously.

The Elementary Curriculum on Dengue Haemorrhagic Fever

'Supplementary Life Experience' (grade 1–6)* 'Supplementary Characteristics' (grade 1-6)**

Direct Teaching	Additional Teaching	Additional Teaching
Unit 1 : Living Things - About ourselves - Having good habits - Health Promotion - Disease Prevention - Using Household Medicine and Others - The Principal of Behaving Oneself	Unit : Things Around Us - Human Beings & Natural Environment - The Impact on the quality of Life of Communities from the changing of the Natural Environment Unit : Events, News and National Holidays	Activities: - Boy Scouts, Girl Guides and Junior Red Cross - Other activities - Free Activities

* Dengue Haemorrhagic Fever can be added to 'Supplementary Life Experience' every day.

** Dengue Haemorrhagic Fever can be added to 'Supplementary Characteristics' where suitable

Figure 1: Shows the Elementary Curriculum on Dengue Haemorrhagic Fever

Part 4: Related Theories

4.1 The Protection Motivation Theory (Rogers & Prentice-Dunn,1986: 153-161; Egger, et al.,1990: 25-27)

Originally proposed to provide conceptual clarity to the understanding of fear appeals, Protection Motivation Theory (PMT) shares the HBM' s emphasis on the cognitive processes mediating attitudinal and behavioral change. Although the theory was initially formulated in 1975, it is the revised version that will be discussed in the present article. The reader is referred to the above sources for the fuller discussion of the theoretical foundation and mechanisms of PMT.

As can be seen in Figure1. Environmental or interpersonal sources of information about a health threat initiates two cognitive processes, threat appraisal and coping threat appraisal. The *threat appraisal* process evaluates the factors that increase or decrease the probability of making the maladaptive response. The maladaptive action can be a behavior that could be enacted, such as beginning to smoke, or it could be a current behavior such as wearing a seat-belt. Variables that increase the likelihood of the maladaptive response are intrinsic rewards (e.g. bodily pleasure) and extrinsic rewards (e.g. social approval). Factors reducing the probability of the maladaptive response are the assessed severity of the threat and perceived vulnerability to the threat. Fear arousal influences perceived severity but has only an indirect effect on the eventual behavior enacted. The total threat appraisal is an algebraic sum of the variables that increase and decrease the maladaptive behavior likelihood.

In addition to the evaluating threat, the individual also makes a *coping appraisal.* This consists partially of judgements about the efficacy of a preventive

response that will avert the perceived threat (response efficacy) plus the assessment of one's ability to successfully initiate and complete the adaptive response (self-efficacy) component is crucial to the successful avoidance of the threatening situation. An important feature of PMT, the explicit role of personal mastery has been neglected in virtually all expectancy-value theories. Thus, the implication is that the existence of the effective alternative to the maladaptive health behavior is not sufficient; one must also believe himself or herself capable of carrying out the preventive regimen. It should be noted that an individual' sense of self-efficacy is conceptually independent of the 'barrier' referred to in the HBM. Thus, a person with a strong sense of self-efficacy might easily overcome any barriers (e.g. inconvenience, expense), while a person with a weak sense of self-efficacy might be overwhelmed by the same barriers. Self-efficacy influences not only the initiation of the coping response, but also the amount of energy expended and the person's persistence in the face of obstacles.

Response efficacy and self-efficacy evaluations are actors increasing the probability of making the adaptive response. Decreasing that likelihood are response costs. Response costs may consist of 'inconvenience, expense, unpleasantness, difficulty, complexity, side effects, disruption of daily life, and overcoming habit strength. Coping appraisal is totaled from a sum of the efficacy components minus any costs with the adaptive response.

Figure 2 indicates that threat appraisal and coping appraisal are combined to form protection motivation. As an intervention variable, protection motivation initiates, sustains and directs behavior. A coping response produced by protection motivation may be an explicit behavior (e.g. beginning an aerobic exercise program) or the inhibition of and action (e.g. ceasing to smoke).

As an intervention variable, protection motivation may be measured by a variety of methods. However, an assumption of PMT is that it is most appropriately assessed by behavioral intentions. PMT developed from theory and research on fear-arousing communications and attitude change. Traditionally, attitudes have directional and dynamic (i.e. motivation) influences on behavior. Furthermore, the traditional dependent measure in this area has been attitude change, the internalized acceptance of the communicators 's recommendation. The current concept that best retains these characteristics is behavioral intentions. Although we are not arguing that intentions are a completely satisfactory substitute for single-act, repeated-acts, or multiple-acts of behavioral criteria, we agree with Fishbein and his colleagues that intentions accurately predict behavior if: (i) they are measured at the same level of the specificity; (ii) the intentions remain stable; and (iii) the behavior in question is under volitional control. For example, Harrison *et al.* (1985) found that intentions not only predicted college attendance among high school students some 2 - 3 years after initial measurements were taken, but also successfully predicted the ultimate educational level attained 15 years later. Such results should allay concerns about the choice of behavioral intentions as the appropriate tool for evaluating the impact of protection motivation.

In sum. PMT assumes that protection motivation is maximized when: (i) the treat to health is severe: (ii) the individual feels vulnerable: (iii) the adaptive response is believed to be an effective means for averting the threat: (iv) the person is confident in his or her abilities to complete successfully the adaptive response: (v) the rewards associated with the maladaptive behavior are small: (vi) the costs associated with the

adaptive response are small. Such factors produce protection motivation and, subsequently, the enactment of the adaptive, or coping, response.

An additive model holds *within* each appraisal process. When combining components occur *between* the protection and coping appraisal processes, interaction effects will occur. It is assumed that if response efficacy and/or self-efficacy are high, then increases in severity and/or vulnerability will produce a positive main effect on intentions; on the other hand, if response efficacy and/or self-efficacy are low, increases in severity and/or vulnerability will either have no effect or a boomerang effect, actually reducing intentions to comply with the health recommendation. Thus, the theory predicts outcomes that violate a completely rational decision-making process. There are at least two conditions in which individuals feel incapable of protecting themselves: (i) if the only available coping response is ineffective (i.e. low response efficacy); and (ii) if they believe they cannot perform the necessary coping response (i.e. low efficacy). Research has confirmed this predicted interaction effect between vulnerability and response efficacy. If the recommended coping response was a highly effective preventive response, then increasing belief in vulnerability to the danger increased intentions to adopt that practice; but, if the response was believed to be ineffective, increasing feelings of vulnerability *decreased* intentions to adopt the response, producing a boomerang effect (i.e. smokers actually intended to increase their cigarette consumption, Roger and Mewborn, 1976; and social drinkers to increase their alcohol consumption, Kleinot and Rogers, 1982).

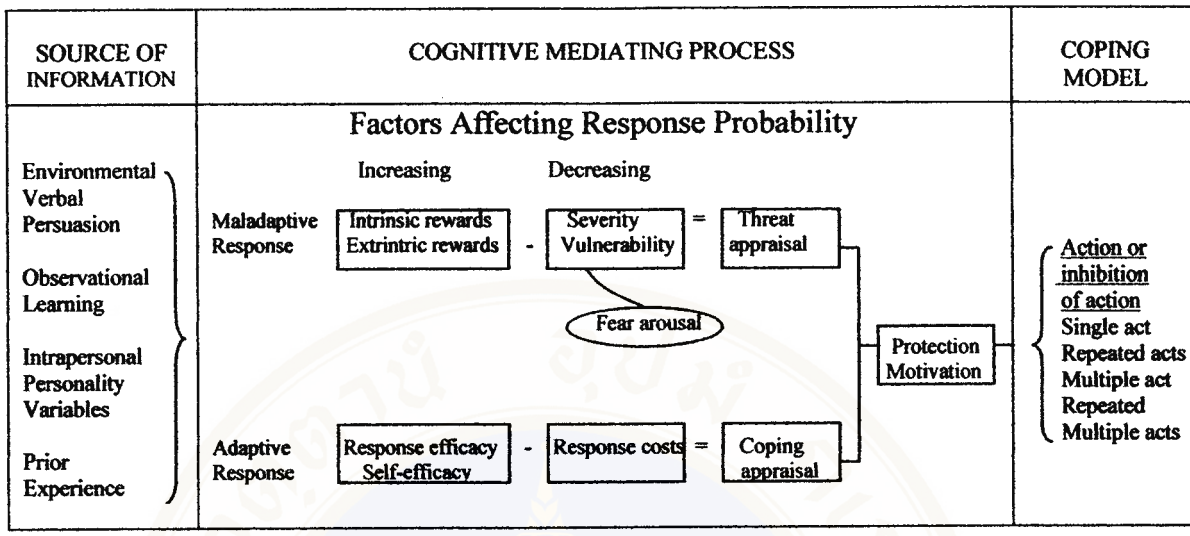

Figure 2: Scheme of Protection Motivation Theory (Rogers, 1983)

Rogers, (1983) revised Protection Motivation Theory (PMT) is a major theory in health psychology which attempts to explain the cognitive mediation process of behavioral change in terms of threat and coping appraisal. The PMT model's threat appraisal component depends on: (1) the person's estimate of the threat of the disease (perceived severity); and, (2) his or her estimate of the chance of contracting the disease (perceived vulnerability). The model's coping appraisal consists of (1) the individual's expectancy that carrying out recommendations can remove the threat (response efficacy); and, (2) belief in one's capability to execute the recommended course of action successfully (self-efficacy).

PMT assumes that the motivation to protect oneself from danger is a positive linear function of the four cognitive beliefs where the individual perceives: (1) the threat is severe; (2) one is personally vulnerable to the threat; (3) the coping response is effective in averting the threat; and (4) one has the ability to perform the coping response. According to the theory, the emotional state of fear influences attitudes and

behavior change indirectly through the appraisal of the severity of danger as shown in Figure 3. (Plotnikoff & Higginbotham, 1995 : 399)

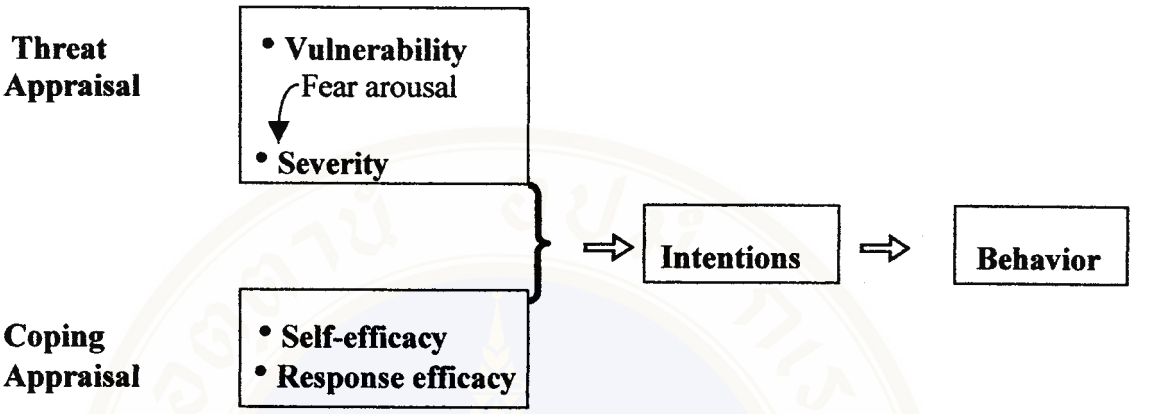

Figure 3: Protection Motivation Theory

The strength of Protection Motivation is estimated through measuring intentions to adopt the recommended behavior. Thus, the cognitive mediators (severity, vulnerability, response efficacy and self-efficacy) should have significant associations with the intentions to perform the desired behavior. However, recent studies (e.g. Wurtele and Maddux, 1987; Mulilis and Lippa,1990; Seydel, Taal and Weigman, 1990; Aspinwall, Kemeny, Taylor, Schneider and Dudley, 1991; Axelrod and Newton, 1991) have measured self-reported and/or actual behavior as the outcome variable of Protection Motivation. Justification of measuring behavior as PMT's outcome variable appears to have developed from Ajzen and Fishbein's (1980) Theory of Reasoned Action (e.g. Wurtele and Maddux, 1987). A main concept of Ajzen and Fishbein's model is that intentions predict behavior, of which there is supporting empirical evidence.

PMT and Health Enhancement

At times we engage in preventive health behaviors not because of fear, but due to anticipation of positive consequences. For example, many people report that

their participation in regimens of aerobic exercise is motivated most by the concomitant increases in self-esteem and conditioning. Stanley and Maddux have noted the emphasis in theories of health decision making on disease prevention rather than health enhancement. Indeed, most attempts to change health attitudes are premised on negative appeals rather than on messages emphasizing the beneficial consequences of accepting the adaptive recommendation.

Robberson and Rogers used the PMT framework to investigate the effects of three message valences (positive versus negative versus a combination of the two) and two appeal targets (health versus self-esteem) on intentions of a regular exercise program. Although no main effect for valence or appeal target was found, significant interaction was discovered. Negative appeals were more effective than positive appeals, compared with a control group, when the message targeted health. As noted by the authors "Apparently the allure of obtaining the benefits of health enhancement does not have the persuasive appeal for avoiding the negative consequences". When the appeal was directed toward self-esteem, positive appeals were more effective than negativeness in strengthening intentions to exercise.

Results of their investigation led Robberson and Rogers to advocate attention to three issues in constructing preventive health messages. First, when the emphasis is placed on health enhancement, positive appeals can be used. In contrast, a disease prevention emphasis should be accompanied by negative appeals. Third, because people are motivated to protect themselves from danger, whether the danger is physical, psychological or social, people may be persuaded to adopt healthy lifestyles for reasons other than health (e.g. self-esteem).

The aforementioned study indicates that values such as self-esteem can be instrumental in persuading people to pursue good health. PMT provides a convenient framework for understanding both illness avoidance and health enhancement. Indeed the results corroborate Beck's assertion that PMT has "utility for explaining protective decisions in areas other than just personal health issues".

In conclusion, preventive health psychology is based on two crucial assumptions: (i) behaviors increase the risk of certain chronic diseases: and (ii) changes in behaviors can reduce the probability of risk of certain diseases. Kaplan cogently reminds us that such premises do not always hold. While keeping such caution in mind, health researchers and educators have persistently sought models of self-protective behavior that may be applied to the vast numbers of human lives in which the above assumptions are true. PMT offers a very promising vehicle for that application.

4.2 Social Support (Birch,1998:159-161; Isael & Schurman,1990:187-215)

Social Support has been identified as a motivating factor for positive health behaviors and linked to improved health status.

Social Support involves people or groups of people – organization – who provide assistance to others. Social Support might be helpful information, listening, encouragrment, money, equipment, and assessment. Social Support can help individuals begin or continue healthy behaviors, and it can help them feel better about themselves and their lives.

Types of Social Support

1. **Emotional support:** which involves providing empathy, caring, love, and trust seems to be the most important. Emotional support is included in one form or another in all the schemes reviewed, and its impact on stress and health is clearly documented in succeeding chapters. When individuals think of people being "supportive" toward them, they think mainly of emotional support.

2. **Instrumental support:** is the most clearly distinguished from emotional support, at least in theory, involving instrumental behaviors that directly help the person in need. Individuals give instrumental support when they help other people do their work, take care of them, or help them pay their bills. It is important to recognize, however, that a purely instrumental act also has psychological consequences. Thus, giving a person money can be a sign of caring or a source of information and appraisal(very possibly of a negative variety, communicating to persons that they are in need of money and dependent on others for it).

3. **Informational support:** means providing a person with information that the person can use in coping with personal and environmental problems. In contrast to instrumental support, such information is not in and of itself helpful, rather it helps people to help themselves. For example, informing an unemployed person of job opportunities or more generally teaching them how to find a job is informational support. Obviously, providing information may imply emotional support and may, at times, constitute instrumental support (for example, if the person's major need is information) as in the case of tutoring or coaching vocational or academic knowledge.

4. **Appraisal support:** involves the provision of information that is useful for self-evaluating purposes, that is, feed back, affirmation, and social comparison

like informational support, involves only transmissions of information, rather than the affect involved in emotional support or the aid involved in instrumental support. However, the information involved in appraisal support is relevant to self-evaluation - what social psychologists have termed social comparison . This is where other people are sources of information that individuals use in evaluating themselves. Such information can be implicitly or explicitly evaluative. Work supervisors, for example, may tell workers that they are doing good (or poor) work, or they may tell workers what constitutes the performance of an average worker and let them decide for themselves whether they are above or below average.

In addition to these types of support, it is important to consider the sources of support (such as family, friends, co-workers) and the quantity versus the quality of support. In the occupational stress literature, emotional and instrumental support from co-workers and supervisors was more significant in alleviating work stress and buffering its effect on health than was support from friends and relatives. Research evidence suggests that the quality of supportive relationships is a better predictor of health than the quantity of such relationships. The concept is further differentiated by whether the support provided is general or problem-specific and whether it is perceived (subjective) or actually received (objective). Thus, there are multiple dimensions of social support that need to be examined in the context of the stress process.

Part 5. Related Researches

5.1 Dangue Haemorrhagic Fever

Asarath, C. (1994: 52-54) studied health behavior including knowledge, attitudes and practices concerning the Dengue Haemorrhagic Fever of elementary students in education region nine. Results of the study showed that students' knowledge and preventive behavior for Dengue Haemorrhagic Fever were at a moderate level and there was no significant difference at 0.05 level between male and female students.

Makemog, S. (1999: 133-137) studied factors associated with preventive and control behavior toward Dengue Haemorrhagic Fever among school age children in Burirum Province. The sample consisted of three hundred and fifty students of grade 5 in the school of the Department of Primary Education, Plubplachai District, Burirum Province. The results showed that 67.2% of eligible children had moderate levels of preventive and control behavior toward Dengue Haemorrhagic Fever. The common proper practices were avoiding mosquito bites and closing containers after use. The less common practice was eliminating breeding places (vases, dishes). Most subjects performed these actions with a frequency of 'sometimes'. The factors which statistically and positively correlated with preventive and control behavior ($p < 0.05$) were advice from parents, teacher and health personnel and information from media. The sufficiency of resources was significantly related to preventive and control behavior ($p < 0.05$). Advice from parents, the sufficiency of resources, children's knowledge and information from media could predict the level of preventive and control behavior toward Dengue Haemorrhagic Fever (17.5%).

Wiwatworaphan, N. (1994: 201-207) evaluated the coverage, continuation and problems of the teachers who were involved in the program of prevention and control of Dengue Haemorrhagic Fever, evaluated the knowledge, attitude and practice of the students in grades 3-6 and performed the larval survey in 11 primary schools in Muang District, Nakhonratchasima Province. The results showed that the coverage of prevention and control of Dengue Haemorrhagic Fever in primary schools was 27.1%, the continuation rate was 21%. There were 4 schools (36.3%) which met the standard criteria of coverage, and continuation was higher than 80%. The KAP survey of students was statistically significantly different ($p < 0.05$) to the level of knowledge and practice between students in 4 schools with good coverage and continuation and the students in the other 7 schools. The majority of *Aedes aegypti* breeding places were vases and water containers in the toilet. The average of Container Index (CI) of the 4 schools with good coverage and continuation was 14.3, much lower than that of the other schools (CI = 29.3) and there were statistically significantly different ($p < 0.05$).

Whangrungsup, Y.(1994: 401-408) had evaluated the protection and the control of Dengue Haemorrhagic Fever in the elementary schools by interviewing nursing teachers as a sample who were selected from 90 schools all over the country and found that the frequency of teachers' suggestions or support was as follows:

- Giving some suggestions but not regularly	38.9 %
- Giving once every month	22.2 %
- Giving twice or three times every month	21.1 %
- Giving yearly	6.7 %

Butarach, S.(1983: 114) had studied about giving abate sand granuales to 765 elementary students in grade 4-6 to control *Aedes aegypti* in three small communities in the municipal area in Phuket Province in 1983. The students were taught about the Dengue Haemorrhagic Fever and how to control *Aedes aegypti.* Besides this, they were allowed to put abate sand granules in utensils like vases, jugs etc. at their home. It was found that after the experiment, the Breteau Index was reduced to more than before the experiment with statistical significant ($p < 0.05$). The mean score of the knowledge, the attitudes and practice of the students increased (13%). But that of the parents did not.

Phan - Urai, et al.,(1983: 217) surveyed the prevalence of *Aedes aegypti* by using elementary students in grade 6 – 7 of 38 provinces in every part of Thailand . The students used questionnaires to survey larva in containers. They were also recommended to eliminate larva by themselves. It was found that there were 74,932 puddles which were breeding places, and 36,797 puddles with larva (49%). The survey indicated that there was a high prevalence of larva in every part. So Dengue Haemorrhagic Fever could spread continuously. After the experiment which had been conducted in Khonkaen and in Kalasin, it was found that Dengue Haemorrhagic Fever had reduced greatly.

5.2 Social Support

Konputhorn, S.(1998: 86-91) studied the application of the Health Belief Model and Social Support on the improvement of preventive dental caries behavior of Grade 6 students in Piboonmangsaharn District, Ubonrachatani Province. The results of the study showed that the experimental group had higher knowledge, perceived susceptibility, severity about dental caries, perceived benefit in complying with the

teacher, parents and peer group advice, as well as the preventive dental caries behavior after the intervention period, than before, and also better than that of the comparison group. Their average plaque index had also significantly decreased.

Lamaisri, S. (1993: 97-102) studied the effectiveness of a student training program with support of mothers and teachers on opisthorchiasis preventive behavior among middle school year 5 students in Khao Wong District, Kalasin Province. The Health Belief Model, Social Support, and Connectionism Theory were modified for this study. Results from this study revealed that after the experiment the mean scores regarding perception of susceptibility, severity, benefit, barriers for practice in preventing opisthorchiasis and practice in preventing opisthorchiasis of the experimental group were significantly higher than before the experiment and higher than that of the comparison groups.

Puvanant, M. (1991: 79-81) studied the effectiveness of a health education program on hookworm disease preventive behavior among primary school students in Hatyai District of Songkhla Province. The Health Belief Model, Social Learning Theory, and Social Support were modified for this study. The finding revealed that perceived susceptibility, perceived severity, perceived benefit and perceived barriers of taking action of the experimental group were significantly more positive than prior to participating in health education program while practice in preventive behavior among them was more appropriate than before launching the program.

5.3 The Protection Motivation Theory and Social Support

Phohomsiri, S. (1999: 113-115) studied the effectiveness of a health education program with application Protection Motivation Theory and Social Support to reduce deficient anemia behavior of primary school students in Sainoy District,

Nonthaburi Province. Results from the study revealed that after the experiment the experimental group had significantly more knowledge, threat appraisal (which consists of noxiousness) and perceived probability, (which consists of self-efficacy and response efficacy), and reduced iron deficient anemia behavior than prior to the experiment and when compared to the comparison group. ($p < 0.001$)

Salawongluk, T. (1998: 143-145) studied the effectiveness of the application of the Protection Motivation Theory and Social Support to promote oral health among grade 3 students in Muang District, Nakhonratchasima Province. The results of the analysis indicated that there was a significant different ($p < 0.001$) on all sub-variables of oral health promoting behaviors, before and after intervention, within and between groups.

5.4 Dengue Haemorrhagic Fever and Social Support

Saeunk, P. (1992: 82-89) studied the effectiveness of a Health Education Program with a modification of the Health Belief Model and Social Support through teachers and fathers or mothers for preventive behavior of Dengue Haemorrhagic Fever among grade 6 students in Muang District, Nonthaburi Province. The result showed that after the experiment, the sample in an experimental group statistically gained more perceptions regarding susceptibility, severity and benefit as well as in preventing Dengue Haemorrhagic Fever than prior to participating in this program. and statistically achieved a lower proportion of containers with larva of *Aedes aegypti*, Breteau Index (BI) in the experimental group decreased from 1,418 to 816. There was a relationship between social support from teachers and fathers or mothers and practice in preventing Dengue Haemorrhagic Fever.

5.5 Dengue Haemorrhagic Fever and The Protection Motivation Theory

Koonawoot, S. (1997: 91-94) studied on the effectiveness of health education program, using the Protection Motivation Theory and group process to improve preventive Dengue Haemorrhagic Fever behaviors among primary school students in Sawangha District, Ang Thong Province. Results of the study showed that, after the experiment, the experimental group gained significantly more perceived susceptibility and severity, self-efficacy, response efficacy and preventive behavior than prior to experiment and than comparison group. It was found that perceived severity and susceptibility, self-efficacy, response efficacy correlated significantly with preventive behaviors. In addition, the Breteau Index and Container Index decreased after the experiment.

5.6 Dengue Haemorrhagic Fever, the Protection Motivation Theory and Social Support

Thiarawiboon, S (1999: 128-130) studied the effectiveness of a health education program to develop preventive behavior for Dengue Haemorrhagic Fever by applying the Protection Motivation Theory with Social Support, group discussion, campaign, temporary exhibition and prompting by letter and mobile public announcement vehicle among the housewife group who had children under 14 years of age in Muang District, Pathumthani Province. Results from the study showed that the experimental group had higher perceived severity, perceived susceptibility, self-efficacy, response efficacy, intention to act and preventive behavior for Dengue Haemorrhagic Fever after the intervention period than before, and also better than that of the comparison group.This difference was statistically significant at p-value < 0.05. It was also found that perceived severity, self-efficacy and response efficacy were

significantly correlated with preventive behavior, but age, education and family income were not correlated with preventive behavior.

According to the study of the concept, theories and research involving, it can be concluded that the Protection Motivation Theory is a personal internal factor consisting partially of judgement about the efficacy of prevention and expectation. Whereas, getting feedback from the community is an external factor that effects behavior and also relates to the disease prevention. So a health education program was conducted by the researcher as follows: Imparting knowledge, Observing a subject who had contacted Dengue Haemorrhagic Fever, Activating awareness of the danger of Dengue Haemorrhagic Fever, Persuading by praising, demonstration and skill practice.

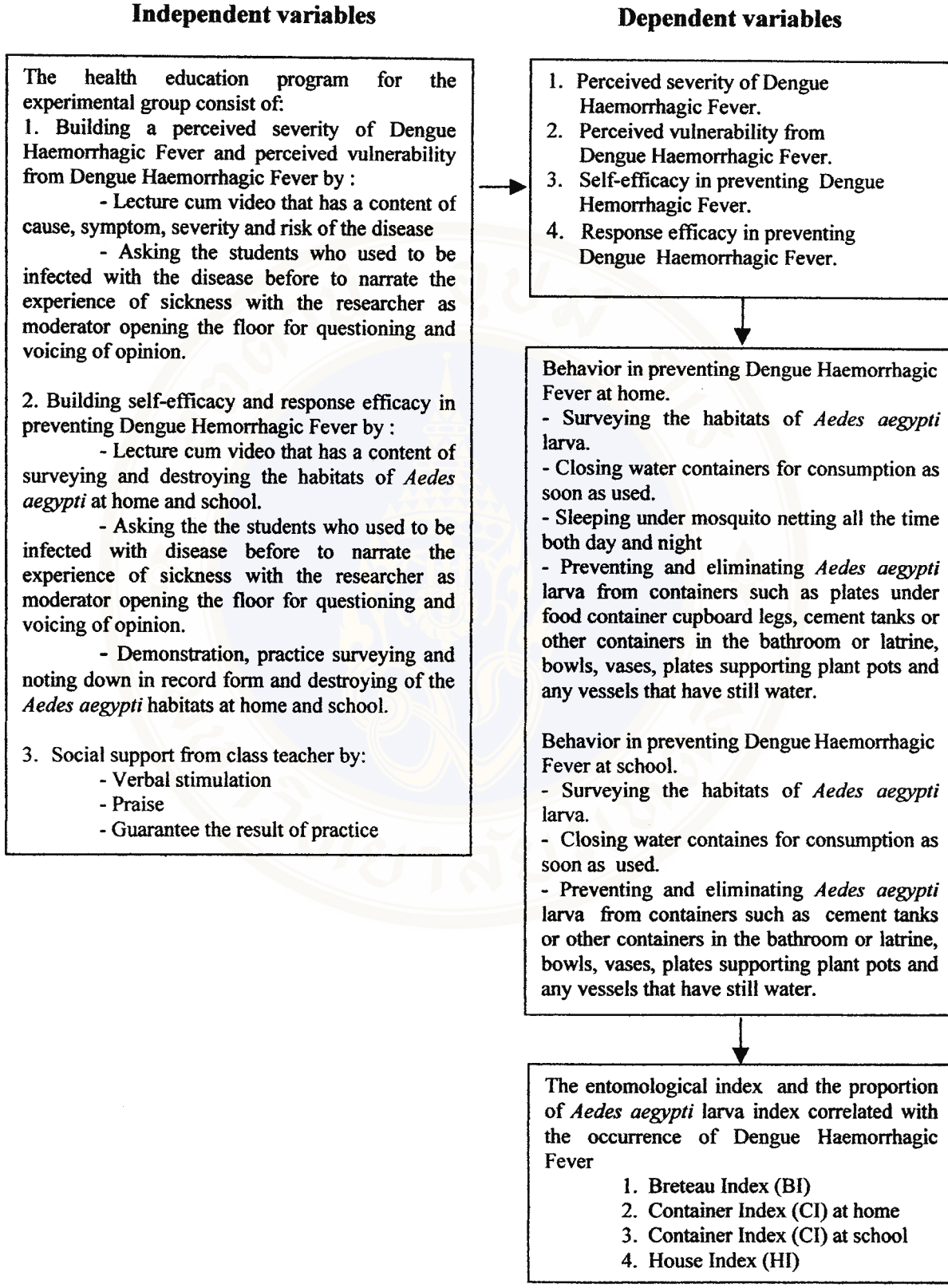

Figure 4: Conceptual Framework of the Study

CHAPTER III

MATERIALS AND METHODS

This research was a study on the effectiveness of Health Education Program by applying Protection Motivation Theory and Social Support in preventing Dengue Haemorrhagic Fever in grade 5 students. There were 5 steps for the operational plan as follow:

1. Research Design
2. Demography and Sample Groups
3. Research Instrument
4. Planning Steps in Data Collection and Research Operation
5. Data Analysis

1. Research Design

This research was a quasi-experimental research design comparing an experimental and a comparison groups following an arranged Health Education Program for the experimental group. There would be data collection from both groups at pre-test and post-test according to the following research pattern and experimental chart.

1.1 Research Pattern

The experimental group O_1 ..... X ..... O_2

The comparison group O_3 ..... O_4

O_1 , O_3 referred to data collection at pre-test

O_2 , O_4 referred to data collection at post-test

X referred to Health Education activities arranged in the experimental group

1.1 Experimental Chart

Experimental Group	O_1 S_1	X_1 X_2	X_3 X_4	MO	MO	MO	MO	O_2 S_2
Week	1	2	3	4	5	6	7	8

Comparison Group	O_3 S_3							O_4 S_4
Week	1	2	3	4	5	6	7	8

O_1 , O_3 referred to data collection at pre-test

O_2 , O_4 referred to data collection at post-test

X_1 referred to the first Health Education activity which was an activity to arouse perception on the severity from *Aedes aegypti* which caused Dengue Haemorrhagic Fever. The effects of the disease could cause death. The activity was done by using a lecture cum video show and live media with a student who had contacted Dengue Haemorrhagic Fever.

X_2 referred to the second Health Education activity which was an activity to arouse perception on vulnerability from Dengue Haemorrhagic Fever. It was done by using a lecture cum video show and live media with a student who had contacted Dengue Haemorrhagic Fever. There was also the distribution of leaflets.

X_3 referred to the third Health Education activity which was an activity in imparting knowledge on methods of destroying breeding places of *Aedes aegypti* in various containers both at home and at school. It was a step to create self-efficacy and response efficacy in the practice of preventing Dengue Haemorrhagic Fever. This was done by using a lecture cum video show and live media with a student who had contacted Dengue Haemorrhagic Fever.

X_4 referred to the fourth Health Education activity which was an activity for revising knowledge on methods of destroying breeding places of *Aedes aegypti* in various containers both at home and at school. This was a continuation from the third activity. Demonstration on the use of abate sand granules was also given. There was practice on surveying and eliminating breeding places of *Aedes aegypti* larva at school including recording the practice in a record form.

MO referred to social support from the teacher which was done by guaranteeing the result of practice, praising and verbal stimulation once a week.

S_1, S_3 referred to data collection on the surveying of larva at pre-test.

S_2, S_4 referred to data collection on the surveying of larva at post-test.

2. Demography of Sample Groups

2.1 Demographic Characteristic

Demography in this study was grade 5 students studying at primary schools in Lansaka District, Nakhonsithammarat. The demographic characters were set as follow:

2.1.1 Students were in a school where there was the spread of Dengue Haemorrhagic Fever in the past year.

2.1.2 Students resided in the locality of the school.

2.1.3 There was no transfer between schools during the research .

2.1.4 The number of students was large enough for a research study.

2.2 Selection of Sample Groups

Steps in selecting sample group were as follow:

2.2.1 Selection of district for study. The district with the highest prevalence rate of Dengue Haemorrhagic Fever in the year 1998 in Nakhonsi-thammarat Province was selected. The 23 districts with high to low prevalence rate of patients from high to low were as follow (Nakhonsithammarat Provincial Health Office, 1999: 5).

No.	District	Prevalence per 100,000 pop.	No.	District	Prevalence per 100,000 pop.
1.	Lansaka	1,354.83	13.	Nopitum	463.97
2.	Nabon	1,223.54	14.	Chulaporn	462.58
3.	Changglang	1,058.22	15.	Tungsong	445.92
4.	Praphom	1,016.70	16.	Pipoon	436.62
5.	Chavang	998.73	17.	Khanom	417.44
6.	Pakpanang	971.13	18.	Ronpiboon	400.63
7.	Chaoud	954.55	19.	Chalermpakiert	353.87
8.	Phromkiri	687.17	20.	Huatrai	336.66
9.	Muang	617.10	21.	Bangkhan	331.20
10.	Thungyai	601.48	22.	Tampanara	308.46
11.	Thasala	570.49	23.	Chianyai	263.77
12.	Sichon	470.45			

Lansaka Distrit in Nakhonsithammarat Province with a prevalence rate at 1,354.83 per 100,000 population was selected.

2.2.2 Selection of schools for this study was done according to the following standards.

2.2.2.1 Selecting a school in each Tambon of Lansaka District with Dengue Haemorrhagic Fever prevalence rate higher than 50 per 100,000 pop. This is in line with the project "People United to Prevent and Control Dengue Haemorrhagic Fever for the 50th Anniversary of the King's Coronation 1999-2000" which aims to decrease patients of Dengue Haemorrhagic Fever to not more than 50 per 100,000 pop. (Department of Communicable Disease Control, 1999: 4). In 1998, every Tambon at Lansaka District was found patients with Dengue Haemorrhagic Fever, the presented the prevalence rate was higher than 50 per 100,000 pop. The results indicated Lansaka Tambon had a prevalence rate of 1,969.8, Khaokaew Tambon 1,692, Khunthala Tambon 1,371.38, Gumlohn Tambon 1,065 and Thadee Tambon 859.7 per 100,000 pop. All schools received an equal opportunity for selection.

2.2.2.2 Selecting schools with similar geographic profiles and equal number of students and where the school authorities cooperate well with the implementation. The school should also not have adjoining campuses. From the total of 29 schools, there were only 4 schools which met these criteria. There followed a draw to select the names of only 2 schools. The first being the experimental group school was Thairatwittaya 74 with 43 grade 5 students. The second, the comparison group was Bansanyung school with 48 grade 5 students.

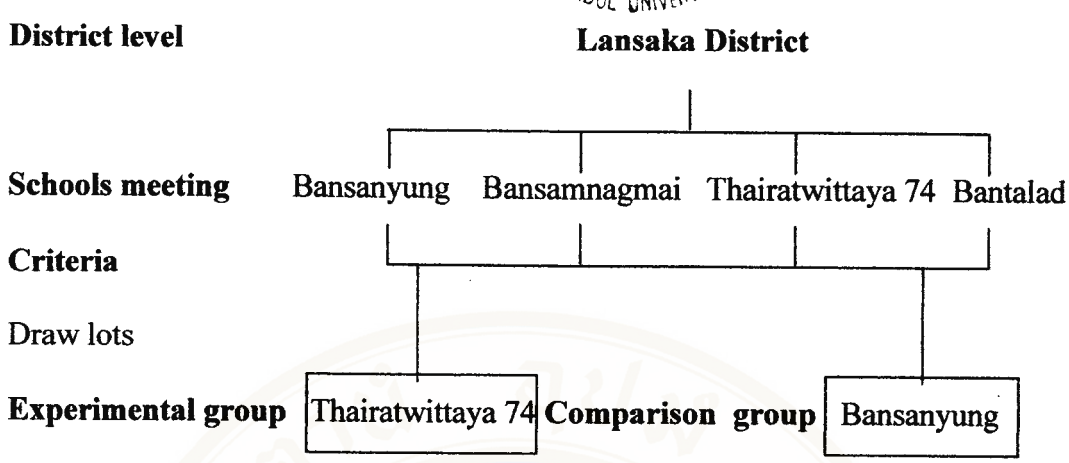

Figure 5. Showing selection of sample groups

3. Research Instruments

Instruments were used in for this study comprise instruments for data collection and instruments used in the experiment.

3.1 Instruments for Data Collection consist of questionnaires created by the researcher for collecting data. They were divided into 9 parts as follow:

Part 1 Questionnaire on socio-demographic data for questioning sample groups such as age, experiences about contacting Dengue Haemorrhagic Fever, parents'occupation, residency and number of family members.

Part 2 Questionnaire on perceived severity of Dengue Haemorrhagic Fever.

Part 3 Questionnaire on perceived vulnerability from Dengue Haemorrhagi Fever.

Part 4 Questionnaire on self-efficacy in preventing Dengue Haemorrhagic Fever.

Part 5 Questionnaire on response efficacy in preventing Dengue Haemorrhagic Fever.

Part 6 Questionnaire on the behavior of preventing Dengue Haemorrhagic Fever at home and school.

Part 7 The record form for surveying breeding places of *Aedes aegypti* at home and school.

Part 8 The record form for stimulating, praising and guaranteeing the results of the practice of preventing Dengue Haemorrhagic Fever for students.

Part 9 The record form for surveying and the practice result on control and elimination of the breeding places of *Aedes aegypti* at home and at school.

Part 1 Questionnaire on socio-demographic data. These were fill in the blank and multiple choice answers.

Part 2,3 These were rating scale questions allowing the one who answers to select according to opinion on the question either positively or negatively with 3 choices of answers which were: agree, unsure and disagree.

Positive statements:

Agree = 3 points

Unsure = 2 points

Disagree = 1 point

Negative statements:

Agree = 1 point

Unsure = 2 points

Disagree = 3 points

Part 4 Questionnaire on self-efficacy in preventing Dengue Haemorrhagic Fever used rating scale questions. The answers could be selected from 3 choices which were: very sure, a little sure and not sure.

Very sure = 3 points

A little sure = 2 points

Not sure = 1 point

Part 5 Questionnaire on response efficacy in preventing Dengue Haemorrhagic Fever was for measuring opinions in preventing the disease. It used rating scale questions. Answers could be selected from 3 choices. They were: agree, unsure and disagree.

Positive statements

Agree = 3 points
Unsure = 2 points
Disagree = 1 point

Negative statements

Agree = 1 point
Unsure = 2 points
Disagree = 3 points

Interpretation of score resulted on perceived severity of Dengue Haemorrhagic Ferver, perceived vulnerbility from Dengue Harmorrhagic Fever, self-efficacy in preventing Dengue Haemorrhagic Fever and response efficacy in preventing Dengue Haemorrhagic Fever was achieved by adding up points from each question and finding the mean score by dividing the level of perception into 3 levels by using arithmetic mean score statistics. Setting the length of measurement as (Best, 1997:174):

$$\frac{\text{Highest score- Lowest score}}{\text{Number of levels}} = \frac{3 - 1}{3} = 0.66$$

The standard in measuring the level of perception and response efficacy in preventing Dengue Haemorrhagic Fever was as follows:

Mean score = 2.34 – 3.00 referred to perception/high level correct response

Mean score = 1.67 – 2.33 referred to perception/moderate correct response

Mean score = 1.00 – 1.66 referred to perception/low level correct response

Part 6 Questionnaire on the practice of preventing Dengue Haemorrhagic Fever. This was a questionnaire which the researcher created by literature reviews, theory and related research and set subject matter on the principle of stressing only methods which students could perform or practice both at home and school either performing alone or joining with others such as by eliminating or reducing breeding places of *Aedes aegypti*, prevention and control or eliminating *Aedes aegypti* with various methods and preventing themselves from being bitten by mosquitoes.

The questionnaire consisted of questions on the practice of preventing Dengue Haemorrhagic Fever by students. They were correct practices in preventing and controlling Dengue Haemorrhagic Fever from the previous term until the present time (May 1999). They were multiple choice answers according to the frequency of the practice. There were 3 choices of which only one is selected.

Choice	Points
Regular practice (Means regular practice weekly)	2
Practice sometime (Means some practice but not regular weekly)	1
Never practice.	0

And a choice without points was included which was no container because it was considered good as there was no source to risk becoming the breeding places of mosquitoes. Hence the number of practices for calculating a score in the sample groups were not equal and so as to be able to assess a score on the practice of each part for comparison, score bases were adapted to the same base e.g. 100 base. This was done by multiplying the real score by 100 and dividing by the full score of each question with answers - 'regular practice', 'some practice' or 'never practice'- e.g. student A. with 2 answers of 'no container' may have a total of 14 so, questions

included for calculation were only 12 (full score = 24). If we supposed the total score from 12 practices was 20, this was multiplied by 100 and divided by 24. The result became the practice score of student A. (83.33 points).

For interpretation of score results from the practice of preventing and controlling Dengue Haemorrhagic Fever, the researcher applied a concept of separating levels with criteria reference by Bloom (1968: 47-62) which consisted of 5 levels as follows:

Lower than low scale	percentage	0 - 49
Passing low scale	percentage	50 - 59
Moderate scale	percentage	60 - 69
Good	percentage	70 - 79
Excellent	percentage	80 -100

For the interpretation of score results of this study, the researcher adaptated this so as to comply with the desired characteristics of the practice, by dividing into 3 levels as follows:

High level of correct practice	percentage	80 -100
Moderate level of correct practice	percentage	60 - 79
Low level of correct practice	percentage	0 - 59

Part 7 The record form of surveying breeding places of *Aedes aegypti* larva at home and at school was a form for recording the number of containers survey and the number of containers found with *Aedes aegypti* larva. The interpretation was done by:

7.1 Breteau Index was measured from the number of containers found with *Aedes aegypti* larva divided by the total number of houses surveyed in the sample groups multiplied by 100.

7.2 Container Index was measured from the number of containers found with *Aedes aegypti* larva divided by the total number of containers multiplied by 100.

7.3 House Index was measured from the number of houses in which *Aedes aegypti* larva was found divided by the total number of houses multiplied by 100.

Part 8 The record form for , praising and guaranteeing the results of practice in preventing Dengue Haemorrhagic Fever for students was a questionnaire for students from the teacher during the preceeding week, measuring the practice, stimulating and guaranteeing of the result of practice . This part was performed by teachers every time there was practice. There was no score for this section because the purpose was to give social support for students. It was also used for testing the reliability and effectiveness of the questionnaire.

Part 9 The record form for surveying and practice results of controlling and eliminating breeding places of *Aedes aegypti* at home and school. This was a fill in the blanks record form created by the researcher for students to use in reporting practice results weekly. There was no score calculation for this part.

The Construction of Instruments for Data Collection. Steps for constructing instruments were:

First Step Study subject matter, concepts, theories and related research.

Second Step Set boundaries and structure of subject matter of questionnaire to be used in the study so as to cover the objective and the hypothesis and to be in line with concept theories used in the research.

Third Step Set questions for the questionnaire and set a score scale.

Fourth Step Submit the created questionnaire to the advisor controlling the thesis to check the correctness of content validity, wording and language clarity. Then, an adaptation was done so as to get a correct assessment on practice and reliability before trying it out.

Fifth Step. Try out the questionnaire with grade 5 students who were most similar in characteristics i.e. grade 5 students at Bansamnugmai numbering 46 students. Then, an analysis was done on discrimination and reliability powers in order to adapt the instrument before actual use, by:

5.1 Analyzing each question's power of discrimination with the technique of dividing high and low groups with Student's t-test statistics by choosing questions with t-value from 1.75 up or p-value less than or equal to 0.05.

5.2 Analyzing to find reliability power by analyzing each part to find Cronbach's Alpha Coefficient with reliability on each topic as follows:

Topic	Reliability power
Perceived severity	0.6996
Perceived vulnerbility	0.7256
Self-efficacy	0.8209
Response efficacy	0.7466

Kusolvisitkul,V. (1991: 316) suggested that reliability power between 0.60 – 0.79 was a high level so the questionnaire used in this research adheres to this reliability power.

After analyzing reliability and discrimination powers, the researcher adapted questions which were still unclear, vague and deleted repeated wording. On some

questions the wording was altered for better clarity and easier understanding. The number of questions was also adapted to provide questions covering all issues of study. Then, it was submitted to the advisor for another check .

3.2 Instruments Used in the Experiment.

Instruments used in the experiments were:

3.2.1 Video document on "Operation conquering Dengue Haemorrhagic Fever." by the Office of Planning for Control of Dengue Haemorrhagic Fever, Department of Communicable Disease Control, Public Health Ministry. The length of the document was 41 minutes with subject matter on cause, tendency of the disease statistics, clear characteristics of *Aedes aegypti*, symptoms, severity, treatment, vulnerability from Dengue Haemorrhagic Fever and methods of prevention and the benefits of practice in preventing Dengue Haemorrhagic Fever.

3.2.2 Video documentary on "Secret that can be narrated." by the Office of Control Planning on Dengue Haemorrhagic Fever, Department of Communicable Disease Control, Public Health Ministry. The length was 27 minutes with subject matter on cause, symptoms, severity and prevention methods. The story was about a pretty foreign girl in a school who contacted Dengue Haemorrhagic Fever and had to be hospitalized. After the cure, there was a campaign to eliminate breeding places of *Aedes aegypti* at school.

3.2.3 Video documentary on a stage show by the Smiling Apple Youth Club on the project of preventing and controlling Dengue Haemorrhagic Fever for the 50th anniversary of the King's coronation by the Department of Communicable Disease Control, Ministry of Public Health. The length was 21 minutes. It was an interesting stage show with subject matter on cause, symptoms, severity and prevention methods.

3.2.4 Manual on preventing Dengue Haemorrhgic Fever "Close Danger" by the Office of Control Planning on Dengue Haemorrhagic Fever, Department of Communicable Disease Control, Ministry of Public Health. It was produced in collaboration with Life and Family magazine. The subject matter was about cause, symptoms, spread, first treatment and the destruction of breeding places of *Aedes aegypti*.

3.2.5 Leaflet on "Dengue Haemorrhagic Fever" by the Office of General Communicable Diseases, Department of Communicable Disease Control, Ministry of Public Health. The subject matter was about cause, symptoms, first treatment and methods of preventing Dengue Haemorrhagic Fever.

3.2.6 Manual on "Community Volunteers on Dengue Haemorrhagic Fever" by the Department of Communicable Disease Control, Ministry of Public Health with subject matter on cause, symptoms, methods of control and the elimination of breeding places of *Aedes aegypti* and the benefits of practice in preventing and controlling Dengue Haemorrhagic Fever.

3.2.7 Live media by a person who contacted Dengue Haemorrhagic Fever. This was done by arranging for a student who has contacted Dengue Haemorrhagic Fever to narrate about the symptoms, severity, prevention methods and subsequent self-practice.

3.2.8 Assistant researchers.

In this research study there were 4 assistant researchers who were public health officials at a Health Station attached to the Office of Public Health, Lansaka District. They received an explanation about the research project and understood the stages of Health Education very well. Their roles were to assist the researcher in

collecting data, arrange Health Education activities for the experimental group and survey breeding places of *Aedes aegypti* among the houses and schools in the sample groups.

4. Planning Steps in Data Collection and Research Operation.

Data collection and research were conducted as follows:

4.1 Preparation. This was arranged according to the following steps:

1. Distributed letters from the Faculty of Graduate Studies, Mahidol University to the principals of the schools in the experimental and comparison groups explained the aims and details of the research project in order to request for cooperation and permission.

2. Built the officials meeting among the teachers and asked for permission. The details of the research project which included the times appointment for data collection and steps for the Health Education activities.

3. Prepared the location and various instruments used in the research.

4.2 Operational Steps

First Week

- Surveyed for Entomological Index and proportion of *Aedes aegypti* larva correlated with the occurrence of Dengue Haemorrhagic Fever at home and school of the experimental and comparison groups.

- Data collected for pre-test by using questionnaire in the experimental and comparison groups on the parts of perceived severity, perceived vulnerability, self-efficacy, response efficacy and the practices of preventing Dengue Haemorrhagic Fever at home and school.

- Explained the problem and the significance of Dengue Haemorrhagic Fever to the class teacher of students in the experimental group included the role, duty and process to complete the records on Social Support to students group due to the created form.

Second Week

For the experimental group, the researcher and assistant researchers arranged first and second Health Education activities (X_1 and X_2) according to the Health Education Program created by the researcher at the meeting hall of Thairatwittaya 74 school. Each activity took 1 hour and 40 minutes.

First Health Education Activity

1. Lecture cum video on "Stage show of smiling apple youth club" which was about the project on preventing and controlling of Dengue Haemorrhagic Fever on the occasion of the 50^{th} anniversary of the King's coronation and "Operation conquering Dengue Haemorrhagic Fever" with subject matter about Dengue Haemorrhagic Fever circumstances now and in the future, symptom and probability, the impact of Dengue Haemorrhagic on self, family, community and society.

2. Using live media. This was done by asking the students who used to be infected with Dengue Haemorrhagic Fever before to narrate the experience of sickness to the experimental group by stressing on the symptoms of Dengue Haemorrhagic Fever. The researcher was the moderator opening the floor for questioning and voicing of opinions.

3. Distributed the manual on preventing Dengue Haemorrhagic Fever which was named "Close danger".

Second Health Education Activity.

1. Lecture cum video on "Operation conquering Dengue Haemorrhagic Fever". The subject matter was about the cause of Dengue Haemorrhagic Fever, the disease vector was *Aedes aegypti* which lay eggs and reside among the houses and schools included the informations about the risk group to infect with the disease.

2. Using live media. This was done by asked the students who used to infected with the disease before to narrate the experience of sickness to the experimental group stressing on the cause of this disease with the researcher as moderator opening the floor for questioning and voicing of opinion.

3. Distributed the leaflet which were named "Dengue Haemorrahagic Fever".

Third Week

For the experimental group, the researcher and the assistant researchers arranged the third and fourth Health Education activities (X_3 and X_4) according to the Health Education Program created by the researcher at the meeting hall of Thairatwittaya 74 school. Each activity took 1 hour and 40 minutes.

Third Health Education Activity

1. Lecture cum video on "Secret that can be narrated" with subject matter on preventing and controlling Dengue Haemorrhagic Fever on the part of practice and methods of eliminating and destroying breeding places of *Aedes aegypti* among various containers by stressing on the practices that the students can perform.

2. Using live media. This was done by asking the student who used to infected with Dengue Haemorrhagic Fever before to narrate to the experimental group

by stressing on the practices in preventing Dengue Haemorrhagic Fever with the researcher as moderator opening the floor for questioning and voicing of opinion.

3. Distributed the manual which was named "Community volunteer on Dengue Haemorrhagic Fever".

Fourth Health Education Activity

1. Lecture cum video on "Operation conquering Dengue Haemorrhagic Fever" and "Secret that can be narrated" in order to revise on the knowledge about methods of destroying breeding places of *Aedes aegypti* in various containers both at home and school. This was a continuation from the third activity.

2. Demonstrated the used of abate sand granules.

3. Divided students in to 8 groups, 5-6 students in each group, were divided. Each group was done by practice surved and destroyed the breeding places of *Aedes aegypti* larva. This was done included the practice record form. Later representatives from each group present the resulted of the surveying and destruction. The practice and the record forms were corrected and completed by the researcher, assistant researchers and class teacher.

Fourth Week.

Activities for the experimental group.

1. Class teacher gave the social support to the students:

- Reminded the students to survey and destroy of breeding places of *Aedes aegypti* larva at home and school and recorded in the record forms which the researcher created.

- The praise when the students surveyed and destroyed the breeding places of *Aedes aegypti* larva was given.

- The signature to guarantee the result of the practice on the record form for surveying and destroying breeding places of *Aedes aegypti* larva of the students was given.

2. First recorded forms gave social support from the class teacher were collected.

3. First results of practice in preventing Dengue Haemorrhagic Fever by the students were collected.

4. The class teacher who responded to give social support to the students continuously were stimulated.

Fifth Week

Activities for the experimental group.

1. Class teacher gave social support to students:

- Reminded the students to survey and destroy of breeding places of *Aedes aegypti* larva at home and school and recorded in the record forms which the researcher created.

- The praise when the students surveyed and destroyed the breeding places of *Aedes aegypti* larva was given.

- The signature to guarantee the result of the practice on the record form for surveying and destroying breeding places of *Aedes aegypti* larva of the students was given.

2. Second recorded forms gave social support from the class teacher were collected.

3. Second results of practice in preventing Dengue Haemorrhagic Fever by the students were collected.

4. The class teacher who responded to give social support to the students continuously were stimulated.

Sixth Week

Activities for the experimental group.

1. Class teacher gave social support to students:

- Reminded the students to survey and destroy of breeding places of *Aedes aegypti* larva at home and school and recorded in the record forms which the researcher created.

- The praise when the students surveyed and destroyed the breeding places of *Aedes aegypti* larva was given.

- The signature to guarantee the result of the practice on the record form for surveying and destroying breeding places of *Aedes aegypti* larva of the students was given.

2. Third recorded forms gave social support from the class teacher were collected.

3. Third results of practice in preventing Dengue Haemorrhagic Fever by the students were collected.

4. Third class teacher who responded to give social support to the students continuously were stimulated.

Seventh Week

Activities for the experimental group.

1. Class teacher gave social support to students:

- Reminded the students to survey and destroy of breeding places of *Aedes aegypti* larva at home and school and recorded in the record forms which the researcher created.

- The praise when the students surveyed and destroyed the breeding places of *Aedes aegypti* larva was given.

- The signature to guarantee the result of the practice on the record form for surveying and destroying breeding places of *Aedes aegypti* larva of the students was given.

2. Fourth recorded forms gave social support from the class teacher were collected.

3. Fourth results of practice in preventing Dengue Haemorrhagic Fever by the students were collected.

4. Fourth class teacher who responded to give social support to the students continuously were stimulated.

Eighth week

- Surveyed for Entomological Index and proportion of *Aedes aegypti* larva correlated with the occurrence of Dengue Haemorrhagic Fever at home and school of the experimental and comparison groups.

- Data collected for post-test by using questionnaire in the experimental and comparison groups on the parts of perceived severity, perceived vulnerability, self-efficacy, response efficacy and the practices of preventing and controlling Dengue Haemorrhagic Fever at home and school.

5. Data Analysis

After data collection was completed, the data was taken for result assessing by Computer SPSS/PC$^+$ Program for Windows version 7.5 according the following;

5.1 The socio-demographic with descriptive statistics using table to describe frequency, percentage, mean score and standard deviation were analyzed.

5.2 Mean scores on perceived severity of Dengue Haemorrhagic Fever, perceived vulnerability from Dengue Haemorrhagic Fever, self- efficacy, response efficacy in preventing Dengue Haemorrhagic Fever and the practice of preventing Dengue Haemorrhagic Fever between the experimental and comparison groups both at pre-test and post-test with Student's t-test statistics by considering validity level at 95% were compared.

5.3 Mean scores on perceived severity of Dengue Haemorrhagic Fever, perceived vulnerability from Dengue Haemorrhagic Fever, self- efficacy, response efficacy in preventing Dengue Haemorrhagic Fever and the practice of preventing Dengue Haemorrhagic Fever in the experimental and comparison groups both at pre-test and post-test by using paired samples t-test statistics considering validity level at 95% were compared.

5.4 Breteau Index, Container Index and House Index between the experimental and comparison groups both before and after the intervention with percentage statistics were compared.

5.5 Breteau Index, Container Index and House Index both before and after the intervention of the experimental and comparison groups with percentage statistics were compared.

CHAPTER IV

RESULTS

This study was a quasi-experimental research. Sample groups for the research comprised 91 second term grade 5 students in Lansaka District, Nakhonsithammarat Province. The students were divided into experimental groups comprised of 43 students at Thairatwittaya 74 school (Ban Kiriwong community) and a comparison group of 48 students from Ban Sanyung school. The students in the experimental group participated in the Health Education Program as planned. The period of activities was from December 1999 to February 2000. The researcher analyzed the data by using SPSS/PC$^+$ Program for Windows version 7.5 and the results are presented in 3 parts as follow.

Part 1 : Socio-demographic Characteristics of the sample groups consisted of sex, age, number of family members aged below 14 years old, number of family members etc.

Part 2 : Analysis results on the perception of Dengue Haemorrhagic Fever in the areas of perceived severity, perceived vulnerability, self-efficacy, response efficacy in preventing Dengue Haemorrhagic Fever and the practice of preventing Dengue Haemorrhagic Fever at home and school of the sample groups both pre-test and post-test.

Part 3 : Analysis of results of the entomological index and the proportion of larva index correlated with the occurrence of Dengue Haemorrhagic Fever before and after the intervention.

Part 1 : Socio-demographic Characteristics of the Sample Groups

Sex : In the experimental group 62.8% were male numbering 27 and 37.2% were female numbering 16. For the comparison group 45.8% were male numbering 22 and 54.2% were female numbering 26 as shown in table 1.

Age : In the experimental group 86% were 11 years old and 7% were 10 years old, mean = 11.05, S.D.= 0.58. For the comparison group 87.5% were 11 years old and 8.3% were 12 years old, mean = 11.04, S.D.= 0.35 as shown in table 1.

Number of family members aged below 14 years : Most students (51.2%) in the experimental group had one family member aged below 14, fewer (11.6%) with 2 members, mean = 0.84, S.D. = 0.81. In the comparison group most students (47.9%) had one member aged below 14, fewer (8.3%) with 2 members, mean = 0.94, S.D.=1.02 as shown in table 1.

Number of family members : Most students (51.2%) in the experimental group had 4 members in the family, fewer (25.6%) with 5 members, mean = 4.47, S.D.= 0.91. Most students (35.4%) in the comparison group had 4 members in the family, fewer (31.3) with 5 members, mean = 4.96, S.D. = 1.24 as shown in table 1.

Father's education : Most fathers (88.4%) in the experimental group had a primary school education, fewer (7%) had a junior high school education. Most fathers (58.3%) in the comparison group had a primary school education, fewer (20.8%) with a senior high school education as shown in table 1.

Mother's education : Most mothers (81.4%) in the experimental group had a primary school education, fewer (16.3%) with a junior high school education. Most mothers (66.7%) in the comparison group had a primary school education, fewer (14.6%) with a senior high school education as shown in table 1.

Father's occupation : Most fathers (81.4%) in the experimental group were farmers, fewer (11.6%) were employees. Most fathers (47.9%) in the comparison group were employees, fewer (35.4%) were farmers as shown in table 1.

Mother's occupation : Most mothers (86%) in the experimental group were farmers, fewer (7%) were employees and merchants. Most mothers (52.1%) in the comparison group were employees, fewer (33.3%) were farmers as shown in table 1.

Dengue Haemorrhagic Ferver experiences : The number of people (34.9%) who had contracted Dengue Haemorrhagic Feverin in the preceeding year in the experimental group was 15. The number of people (25%) who had contracted Dengue Haemorrhagic Fever in the preceeding year in the comparison group was 12 as shown in table 1.

Table 1 Distribution of Socio-demographic Characteristics in experimental and comparison group.

Socio-demographic Characteristics	Experimental group		Comparison group	
	No.	%	No.	%
Sex				
male	27	62.8	22	45.8
female	16	37.2	26	54.2
total	43	100.0	48	100.0
Age (years)				
10	3	7.0	2	4.2
11	37	86.0	42	87.5
12	2	4.7	4	8.3
13	1	2.3	0	0
total	43	100.0	48	100.0
	$\overline{X}$ = 11.05 S.D. = 0.58		$\overline{X}$ =11.04 S.D. =0.35	

Table 1 Distribution of Socio - demographic Characteristics in experimental and comparison group (cont.).

Socio-demographic Characteristics	Experimental group		Comparison group	
	No.	%	No.	%
Number of family member age lower than 14 years old				
1 member	22	51.2	23	47.9
2 members	5	11.6	4	8.3
3 members	1	2.3	4	8.3
no members	15	34.9	17	35.4
total	43	100.0	48	100.0
	$\overline{X}$ = 0.84	S.D. = 0.81	$\overline{X}$ = 0.94	S.D. = 1.02
Number of family members				
3 members	4	9.3	3	6.2
4 members	22	51.2	17	35.4
5 members	11	25.6	15	31.3
6 members	5	11.6	8	16.7
7 members	1	2.3	2	4.2
8 members	0	0	3	6.2
total	43	100.0	48	100.0
	$\overline{X}$ = 4.47	S.D. = 0.91	$\overline{X}$ = 4.96	S.D. = 1.24
Father's education (case)				
primary school	38	88.4	28	58.3
junior high school	3	7.0	9	18.8
senior high school	1	2.3	10	20.8
diploma/ certificate	1	2.3	1	2.1
total	43	100.0	48	100.0

Table 1 Distribution of Socio-demographic Characteristics in experimental and comparison group (cont.).

Socio-demographic Characteristics	Experimental group		Comparison group	
	No.	%	No.	%
Mother's education (case)				
primary school	35	81.4	32	66.7
junior high school	7	16.3	4	8.3
senior high school	1	2.3	7	14.6
diploma/ certificate	0	0	5	10.4
total	43	100.0	48	100.0
Father's occupation (case)				
government service	0	0	4	8.3
employees	5	11.6	23	47.9
merchants	2	4.7	2	4.2
farmers	35	81.4	17	35.4
unemployed	0	0	1	2.1
deceased	1	2.3	1	2.1
total	43	100.0	48	100.0
Mother's occupation (case)				
employees	3	7.0	25	52.1
merchants	3	7.0	6	12.5
farmers	37	86.0	16	33.3
unemployed	0	0	1	2.1
total	43	100.0	48	100.0
Dengue Haemorrhagic Ferver experiences (case)				
with experience	15	34.9	12	25.0
without experience	28	65.1	36	75.0
total	43	100.0	48	100.0

Part 2: Analysis of Results of Scores on the Perception of Dengue Haemorrhagic Fever in the Areas of Perceived Severity, Perceived Vulnerability, Self-efficacy, Response Efficacy and the Practice in Preventing Dengue Haemorrhagic Fever at Home and School.

2.1 The number and percentage in the sample groups according to score level of perceived severity, perceived vulnerability, self-efficacy, response efficacy and the practice of preventing Dengue Haemorrhagic Fever at home and school of the experimental and comparison groups at pre-test (Table 2).

2.1.1 The score level on perceived severity of Dengue Haemorrhagic Fever in the experimental group at pretest was mostly average numbering 27 (62.8%).The comparison group had 25 with the highest level score (52.1%) as shown in table 2.

2.1.2 The score level on perceived vulnerability from Dengue Haemorrhagic Fever at pre-test in the experimental group was mostly moderate numbering 28 (65.1%). In the comparison group most score levels were moderate numbering 26 (54.2%) as shown in table 2.

2.1.3 The score level on self-efficacy in preventing Dengue Haemorrhagic Fever at pre-test in the experimental group was mostly moderate numbering 27 (62.8%). In the comparison group the score level was mostly moderate numbering 28 (58.3%) as shown in table 2.

2.1.4 The score level on response efficacy in preventing Dengue Haemorrhagic Fever at pre-test in the experimental group was mostly at the highest level numbering 39 (90.7%). In the comparison group the score level was mostly at the highest level numbering 41 (85.4%) as shown in table 2.

2.1.5 The score level on the practice of preventing Dengue Haemorhagic Fever at home at pre-test in the experimental group was mostly moderate numbering 37 (86%). In the comparison group score level was mostly moderate numbering 38 (79.2%) as shown in table 2.

2.1.6 The score level on the practice of preventing Dengue Heamorrhagic Fever at school at pre-test in the experimental group was mostly moderate numbering 31 (72.1%). In the comparison group the score level was mostly moderate numbering 24 (50%) as shown in table 2.

Table 2 Number and percentage in sample groups according to score level of perceived severity, perceived vulnerability, self-efficacy, response efficacy and the practice of preventing Dengue Haemorrhagic Fever at home and at school of the experimental and comparison groups at pre-test.

Selected Variables	Experimental group (n = 43)		Comparison group (n =48)	
	No.	%	No.	%
perceived severity				
High level	16	37.2	25	52.1
Moderate level	27	62.8	23	47.9
Low level	0	0	0	0
perceived vulnerability				
High level	15	34.9	22	45.8
Moderate level	28	65.1	26	54.2
Low level	0	0	0	0
self-efficacy				
High level	27	62.8	15	31.3
Moderate level	13	30.2	28	58.3
Low level	3	7.0	5	10.4

Table 2 Number and percentage in sample groups according to score level of Perceived severity, perceived vulnerability, self-efficacy, response efficacy And the practice of preventing Dengue Haemorrhagic Fever at home and at School of the experimental and comparison groups at pre-test (cont.).

Selected Variables	Experimental group (n = 43)		Comparison group (n =48)	
	No.	%	No.	%
response efficacy				
High level	39	90.7	41	85.4
Moderate level	4	9.3	6	12.5
Low level	0	0.0	1	2.1
practice of preventing Dengue Haemorrhagic Fever at home				
High level	3	7.0	6	12.5
Moderate level	37	86.0	38	79.2
Low level	3	7.0	4	8.3
practice of preventing Dengue Haemorrhagic Fever at school				
High level	9	20.9	2	4.2
Moderate level	31	72.1	24	50.0
Low level	3	7.0	22	45.8

2.2 The number and percentage of sample groups according to score level on perceived severity, perceived vulnerability, self-efficacy, response efficacy and the practice of preventing Dengue Haemorrhagic Fever at home and school of the experimental and comparison groups at post-test (Table 3).

2.2.1 The score level on perceived severity of Dengue Haemorrhagic Fever at post-test of the experimental group was mostly at the highest level numbering

41(95.3%). In the comparison group the score level was mostly moderate numbering 36 (75 %) as shown in table 3.

2.2.2 The score level on perceived vulnerability from Dengue Haemorrhagic Fever at post-test in the experimental group was mostly at the highest level numbering 39 (90.7%). The comparison group score level was mostly moderate numbering 26(54.2%)as shown in table 3.

2.2.3 The score level on self-efficacy in preventing Dengue Haemorrrhagic Fever at post-test in the experimental group was mostly high numbering 41 (95.3%). In the comparison group score level was moderate numbering 30 (62.5%) as shown in table 3.

2.2.4 The score level on response efficacy in preventing Dengue Haemorrhagic Fever at post-test in the experimental group was mostly high numbering 42 (97.7%). In the comparison group score level was mostly high numbering 39 (81.3%) as shown in table 3.

2.2.5 The score level on the practice of preventing Dengue Haemorrhagic Fever at home at post-test in the experimental group was mostly high numbering 43 (100%). In the comparison group the score level was mostly moderate numbering 30 (62.5%) as shown in table 3.

2.2.6 The score level on the practice of preventing Dengue Haemorrhagic Fever at school at post-test in the experimental group was mostly high numbering 43 (100%). In the comparison group the score level was mostly low numbering 24 (50%) as shown in table 3.

Table 3 Number and percentage in sample groups according to score level of perceived severity, perceived vulnerability, self-efficacy, response efficacy and the practice of preventing Dengue Haemorrhagic Fever at home and at school of the experimental and comparison groups at post-test.

Selected Variables	Experimental group (n = 43)		Comparison group (n =48)	
	No.	%	No.	%
perceived severity				
High level	41	95.3	12	25.0
Moderate level	2	4.7	36	75.0
Low level	0	0	0	0
perceived vulnerability				
High level	39	90.7	22	45.8
Moderate level	4	9.3	26	54.2
Low level	0	0	0	0
self-efficacy				
High level	41	95.3	17	35.4
Moderate level	2	4.7	30	62.5
Low level	0	0	1	2.1
response efficacy				
High level	42	97.7	39	81.3
Moderate level	1	2.3	9	18.8
Low level	0	0	0	0
practice of preventing Dengue Haemorrhagic Fever at home				
High level	43	100.0	10	20.8
Moderate level	0	0	30	62.5
Low level	0	0	8	16.7

Table 3 Number and percentage in sample groups according to score level of Perceived severity, perceived vulnerability, self-efficacy, response efficacy And the practice of preventing Dengue Haemorrhagic Fever at home and at school of the experimental and comparison groups at post-test (cont.).

Selected Variables	Experimental group (n = 43)		Comparison group (n =48)	
	No.	%	No.	%
practice of preventing Dengue Haemorrhagic Fever at school				
High level	43	100.0	1	2.1
Moderate level	0	0	23	47.9
Low level	0	0	24	50.0

2.3 Comparing mean score on perceived severity, perceived vulnerability, self efficacy, response efficacy and the practice of preventing Dengue Haemorrhagic Fever at home and school both pre-test and post-test of the experimental groups (Table 4).

2.3.1 Analysis result on perceived severity of Dengue Haemorrhagic Fever showed that in the experimental group at pre-test mean score was 36.98, S.D. = 2.39. At post-test it was found that mean score was higher at 41.81, S.D. = 2.49. When comparing the difference of mean score between pre-test and post-test it was found that at post-test mean score was higher than pre-test with statistical significance ($p < 0.001$) as shown in table 4.

2.3.2 Analysis result on perceived vulnerability from Dengue Haemorrhagic Fever showed that in the experimental group at pre-test mean score was 27.91, S.D. = 2.36. At post-test it was found that mean score is higher at 32.86, S.D. = 3.01. When comparing the difference of mean score between pre-test and

post-test it was found that at post-test mean score was higher than pre-test with statistical significance ($p < 0.001$) as shown in table 4.

2.3.3 Analysis result on self-efficacy in preventing Dengue Haemorrhagic Fever showed that in the experimental group at pre-test mean score was 32.91, S.D. = 4.56. At post-test it was found to be higher with mean score at 40.77, S.D. = 2.63. When comparing the difference between pre-test and post-test it was found that at post-test mean score was higher than pre-test with statistical significance($p < 0.001$) as shown in table 4.

2.3.4 Analysis result on response efficacy in preventing Dengue Haemorrhagic Fever showed that in the experimental group at pre-test mean score was 29.30, S.D. = 2.51. At post-test it was found to be higher with mean score at 32.19, S.D. = 1.8. When comparing the difference between pre-test and post-test it is found that at post-test mean score is higher than pre-test with statistical significance ($p < 0.001$) as shown in table 4.

2.3.5 Analysis result on practice of preventing Dengue Haemorrhagic Fever at home, showed that in the experimental group at pre-test, mean score was 70.92, S.D. = 7.85. At post-test it was found to be higher with mean score at 98.19, S.D. = 3.79. When comparing the difference between pre-test and post-test it is found that at post-test mean score is higher than at pre-test with statistical significance ($p < 0.001$) as shown in table 4.

2.3.6 Analysis result on the practice of preventing Dengue Haemorrhagic Fever at school, showed that in the experimental group, at pre-test, mean score was 63.54, S.D. = 10.85. At post-test it was found to be higher with mean score at 99.61, S.D. = 1.88. When comparing the difference of mean score between

pretest and post-test it was found that at post-test mean score was higher than at pretest with statistical significance ($p < 0.001$) as shown in table 4.

Table 4 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy and the practice of preventing Dengue Haemorrhagic Fever at home and school both pre-test and post-test of the experimental group (n=43).

Selected Variables	$\bar{X}$	S.D.	t	df	p - value
perceived severity					
pre-test	36.98	2.39			
			9.09	42	< 0.001
post-test	41.81	2.49			
perceived vulnerability					
pre-test	27.91	2.36			
			7.90	42	< 0.001
post-test	32.86	3.01			
self-efficacy					
pre-test	32.91	4.56			
			9.96	42	< 0.001
post-test	40.77	2.63			
response efficacy					
pre-test	29.30	2.51			
			8.04	42	< 0.001
post-test	32.19	1.80			

Table 4 Comparing mean score on perceived severity, perceived vulnerability, Self-efficacy, response efficacy and the practice of preventing Dengue Haemorrhagic Fever at home and school both pre-test and post-test of the experimental groups (n=43) (cont.).

Selected Variables	$\bar{X}$	S.D.	t	df	p - value
practice of preventing Dengue Haemorrhagic Fever at home					
pretest	70.92	7.85			
			21.75	42	< 0.001
post-test	98.19	3.79			
practice of preventing Dengue Haemorrhagic Fever at home					
pretest	63.54	10.85			
			21.41	42	< 0.001
post-test	99.61	1.88			

2.4 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, practice of preventing Dengue Haemorrhagic Fever at home and school both pre-test and post-test in the comparison group (Table 5).

2.4.1 Analysis result on perceived severity of Dengue Haemorrhagic Fever, showed that in the comparison group at pre-test mean score was 37.15, S.D. = 3.17. At post-test it was found to be slightly reduced with mean score at 35.65, S.D. = 2.89. When comparing mean score between pre-test and post-test it was found that there was difference with statistical significance ($p < 0.001$) as shown in table 5.

2.4.2 Analysis result on perceived vulnerability from Dengue Haemorrhagic Fever, showed that in the comparison group at pre-test mean score was 27.89, S.D. = 2.88. At post-test it was found to have increased slightly to 28.15, S.D. = 2.84. When comparing the difference of mean score on perceived vulnerability from Dengue Haemorrhagic Fever it was found that there was no difference between pre-test and post-test with statistical significance as shown in table 5.

2.4.3 Analysis result on self-efficacy in preventing Dengue Haemorrhagic Fever, showed that in the comparison group, at pre-test, mean score was 31.17, S.D. = 5.39. At post-test it was found to be about the same with mean score at 31.46, S.D. = 4.37. When comparing the difference of mean score on self-efficacy in preventing Dengue Haemorrhagic Fever it was found that there was no difference between pre-test and post-test with statistical significance as shown in table 5.

2.4.4 Analysis result on response efficacy in preventing Dengue Haemorrhagic Fever, showed that in the comparison group at pre-test mean score was 29.56, S.D. = 3.21. At post-test it was found to be about the same with mean score at 29.10, S.D. = 3.32. When comparing the difference of mean score on response efficacy in preventing Dengue Haemorrhagic Fever it was found that there was no difference between pre-test and post-test with statistical significance as shown in table 5.

2.4.5 Analysis result on the practice of preventing Dengue Haemorrhagic Fever at home, showed that in the comparison group at pre-test mean score is 70.96, S.D. = 9.29. At post-test it was found to be somewhat the same with mean score at 70.19, S.D. = 11.76. When comparing the difference of mean score between pre-test

and post-test it was found that there was no difference with statistical significance as shown in table 5.

2.4.6 Analysis result on the practice of preventing Dengue Haemorrhagic Fever at school, showed that in the comparison group at pre-test mean score was 59.31, S.D. = 11.32. At post-test it was found to have reduced slightly with mean score at 56.94, S.D. = 10.72. When comparing the difference of mean score between pre-test and post-test it was found to have no difference with statistical significance as shown in table 5.

Table 5 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, practice of preventing Dengue Haemorrhagic Fever at home and school both pre-test and post-test in the comparison group(n=48).

Selected Variables	$\bar{X}$	S.D.	t	df	p - value
perceived severity					
pre-test	37.15	3.17			
			3.53	47	0.001*
post-test	35.65	2.89			
perceived vulnerability					
pre-test	27.89	2.88			
			0.65	47	0.521
post-test	28.15	2.84			
self-efficacy					
pre-test	31.17	5.39			
			0.49	47	0.630
post-test	31.46	4.37			

Table 5 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, practice of preventing Dengue Haemorrhagic Fever at home and school both pre-test and post-test in the comparison group(n=48) (cont.).

Selected Variables	$\bar{X}$	S.D.	t	df	p - value
response efficacy					
pre-test	29.56	3.21			
			0.93	47	0.355
post-test	29.10	3.32			
practice of preventing Dengue Haemorrhagic Fever at home					
pre-test	70.96	9.29			
			0.49	47	0.626
post-test	70.19	11.76			
practice of preventing Dengue Haemorrhagic Fever at school					
pre-test	59.31	11.32			
			1.15	47	0.258
post-test	56.94	10.72			

* Significant differences at p - value < 0.05

2.5 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, the practice of preventing Dengue Haemorrahgic Fever at home and school between the experimental and comparison groups at pre-test (Table 6).

2.5.1 Analysis result on perceived severity of Dengue Haemorrhagic Fever, showed that at pre-test mean score of experimental group was 36.98, S.D. = 2.39. The comparison group's mean score was 37.15, S.D. = 2.88. Both groups had

similar mean score on perceived severity of Dengue Haemorrhagic Fever. When comparing the difference of mean scores it was found to be no difference between the experimental and comparison group with statistical significance as shown in table 6.

2.5.2 Analysis result on perceived vulnerbility of Dengue Haemorrhagic Fever, showed that at pre-test mean score of the experimental group was 27.91, S.D. = 2.36. The comparison group's mean score was 27.89, S.D. = 2.88. Both groups' mean scores were similar. When comparing the difference of mean scores it was found to be no difference between the experimental and comparison groups with statistical significance as shown in table 6.

2.5.3 Analysis result on self-efficacy in preventing Dengue Haemorrhagic Fever, showed that at pre-test mean score of experimental group was 32.91, S.D. = 4.56. The comparison group's mean score was 31.17, S.D. = 5.39. Both groups' mean scores on self-efficacy in preventing Dengue Haemorrhagic Fever were similar. When comparing the difference of mean scores it was found to be no difference with statistical significance as shown in table 6.

2.5.4 Analysis result on response efficacy in preventing Dengue Haemorrhagic Fever, showed that at pre-test, mean score of experimental group was 29.30, S.D.= 2.51. The comparison group's mean score was 29.56, S.D.= 3.21. Both groups' mean scores were similar. When comparing the difference of mean scores it was found to be no difference with statistical significance as shown in table 6.

2.5.5 Analysis result on the practice of preventing Dengue Haemorrhagic Fever at home, showed that at pre-test mean score of experimental group was 70.92, S.D. = 7.85. The comparison group's mean score was 70.96, S.D. = 9.29. Both groups' mean scores were similar. When comparing the difference of mean scores

between both groups it was found to be no difference with statistical significance as shown in table 6.

2.5.6 Analysis result on the practice of preventing Dengue Haemorrhagic Fever at school, showed that at pre-test mean score of experimental group was 63.54, S.D. = 10.85. The comparison group's mean score was 59.31, S.D. = 11.32. Both groups' mean scores were similar. When comparing the difference of mean scores of both groups it was found to be no difference with statistical significance as shown in table 6.

Table 6 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, the practice of preventing Dengue Haemorrahgic Fever at home and school between the experimental and comparison groups at pre-test .

Selected Variables	$\bar{X}$	S.D.	t	df	p - value
perceived severity					
experimental group	36.98	2.39			
			2.85	89	0.776
comparison group	37.15	3.17			
perceived vulnerability					
experimental group	27.91	2.36			
			0.20	89	0.984
comparison group	27.89	2.88			

Table 6 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, the practice of preventing Dengue Haemorrahgic Fever at home and school between the experimental and comparison groups at pre-test (cont.).

Selected Variables	$\bar{X}$	S.D.	t	df	p - value
self-efficacy					
experimental group	32.91	4.56			
			1.65	89	0.102
comparison group	31.17	5.39			
response efficacy					
experimental group	29.30	2.51			
			0.43	89	0.670
comparison group	25.56	3.21			
practice of preventing Dengue Haemorrhagic Fever at home					
experimental group	70.92	7.85			
			0.03	89	0.980
comparison group	70.96	9.29			
practice of preventing Dengue Haemorrhagic Fever at school					
experimental group	63.54	10.85			
			1.82	89	0.073
comparison group	59.31	11.32			

2.6 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, the practice of preventing Dengue Haemorrhagic Fever at home and school between the experimental and comparison groups at post-test (Table 7).

2.6.1 Analysis result on perceived severity of Dengue Haemorrhagic Fever, showed that at post-test mean score of experimental group was higher than the comparison group with mean score of the experimental group at 41.81, S.D. = 2.49 and the comparison group at 36.65, S.D. = 2.89. When comparing the difference of mean score between both groups it was found that the experimental group's mean score was higher than the comparison group with statistical significance ($p < 0.001$) as shown in table 7.

2.6.2 Analysis result on perceived vulnerability from Dengue Haemorrhagic Fever, showed that at post-test mean score of the experimental group was higher than the comparison group with mean score of the experimental group at 32.86, S.D. =3.01 and the comparison group's mean score was 28.15, S.D. = 2.85. When comparing the difference of mean scores between both groups it was found that the experimental group's mean score was more than the comparison group with statistical significance ($p < 0.001$) as shown in table 7.

2.6.3 Analysis result on self-efficacy in preventing Dengue Haemorrhagic Fever, showed that at post-test mean score of experimental group was higher than comparison group with mean score of the experimental group at 40.77, S.D. = 2.63 and the comparison group's mean score was 31.46, S.D. = 4.37. When comparing the difference of mean scores between both groups it was found that the

experimental group's mean score was more than the comparison group with statistical significance ($p < 0.001$) as shown in table 7.

2.6.4 Analysis result on response efficacy in preventing Dengue Haemorrhagic Fever, showed that at post-test mean score of experimental group was higher than the control group with experimental group's mean score at 32.19, S.D. = 1.80 and the comparison group's mean score was 29.10, S.D. = 3.32. When comparing the difference of mean scores of both groups it was found that the experimental group's mean score was more than the comparison group's with statistical significance ($p < 0.001$) as shown in table 7.

2.6.5 Analysis result on the practice of preventing Dengue Haemorrhagic Fever at home, showed that at post-test mean score of experimental group was higher than the comparison group with mean score of the experimental group at 98.19, S.D. = 3.79 and the comparison group's mean score was 70.19, S.D. = 11.76. When comparing the difference of mean scores between both groups it was found that the experimental group's mean score was higher than the comparison group with statistical significance ($p < 0.001$) as shown in table 7.

2.6.6 Analysis result on the practice of preventing Dengue Haemorrhagic Fever at school, showed that at post-test mean score of the experimental group was higher than the comparison group with the experimental group's mean score at 99.61, S.D. = 1.88 and the comparison group's mean score was 56.94, S.D. = 10.72. When comparing the difference of mean score between both groups it was found that the experimental group's mean score was higher than the comparison group's with statistical significance ($p < 0.001$) as shown in table 7.

Table 7 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, the practice of preventing Dengue Haemorrhagic Fever at home and school between the experimental and comparison groups at post-test.

Selected Variables	$\bar{X}$	S.D.	t	df	p - value
perceived severity					
experimental group	41.81	2.49			
			10.82	89	< 0.001
comparison group	35.65	2.89			
perceived vulnerability					
experimental group	32.86	3.01			
			7.69	89	< 0.001
comparison group	28.15	2.84			
self-efficacy					
experimental group	40.77	2.63			
			12.14	89	< 0.001
comparison group	31.46	4.37			
Response efficacy					
experimental group	32.19	1.80			
			5.41	89	< 0.001
comparison group	29.10	3.32			
practice of preventing Dengue Haemorrhagic Fever at home					
experimental group	98.19	3.79			
			14.92	89	< 0.001
comparison group	70.19	11.76			

Table 7 Comparing mean score on perceived severity, perceived vulnerability, self-efficacy, response efficacy, the practice of preventing Dengue Haemorrhagic Fever at home and school between the experimental and comparison groups at post-test (cont.).

Selected Variables	$\bar{X}$	S.D.	t	df	p - value
practice of preventing Dengue Haemorrhagic Fever at school					
experimental group	99.61	1.88			
			25.73	89	< 0.001
comparison group	56.94	10.72			

Part 3. Analysis Results of Entomological Index and Proportion of Larva Index Correlated with Occurrence of Dengue Haemorrhagic Fever of Experimental and Comparison Groups Both Before and After the Intervention.

3.1 Breteau Index (BI), Container Index (CI) at home and school and House Index (HI) between the experimental and comparison groups both before and after the intervention.

3.1.1 The result of Breteau Index (BI) before the intervention showed that the experimental group's Betreau Index (BI) was 260.5, the comparison group's Betreau Index (BI) was 295.8 which showed that the comparison group's Betreau Index was higher than the experimental group's. After the intervention it was found that the experimental group's Betreau Index was 20.9 and the comparison group's Betreau Index was 306.3 which showed that the comparison group's Betreau Index was higher than the experimental group's.

When analysis was done on the increase/decrease Betreau Index after the intervention, the experimental group's Betreau Index reduced more than the comparison group's. The experimental group's Betreau Index reduced by 91.9% but the comparison group's Betreau Index increased by 3.5% as shown in table 8.

3.1.2 The result of Container Index (CI) at home before the intervention showed that the experimental group's Container Index was 39.2, the comparison group's Container Index (CI) was 40.3. Both groups' Container Index was similar. After the intervention it was found that the experimental group's Container Index was 3.4, the comparison group's Container Index was 42.5. The comparison group's Container Index was higher than the experimental group.

When analysis was done on the increase/decrease Container Index after the intervention it was found that the experimental group's Container Index decreased more than the comparison group's. The experimental group's Container Index decreased by 91.3%, the comparison group's Container Index increased by 5.3% as shown in table 8.

3.1.3 The result of Container Index at school before the intervention showed that the experimental group's Container Index was more than the comparison group's. The experimental group's Container Index was 44.6, the comparison group's was 28. After thr intervention it was found that the experimental group's Container Index was less than the comparison group's. The experimental group's Container Index was 3.9, the comparison group's was 32.

When analysis was done on the increase/decrease of Container Index at school after the intervention it was found that the experimental group's Container Index decreased more than the comparison group's. The experimental group's

Container Index decreased by 91.1%, the comparison group's increased by 14.3% as shown in table 8.

3.1.4 The result of House Index (HI) before the intervention shown that the experimental group's House Index was less than the comparison group. The experimental group's House Index was 79.1, the comparison group's was 91.7. After the intervention it was found that the experimental group's House Index was less than the comparison group's. The experimental group's House Index was 18.6, the comparison group's House Index was 93.8.

When analysis was done on the increase/decrease of House Index after the intervention it was found that the experimental group's House Index decreased more than the comparison group's.The experimental group's House Index decreased by 76.5%,the comparison group's House Index increased by 2.5% as shown in table 8.

Table 8 Analysis results of entomological index and Larva Index of experimental and comparison groups both before and after the intervention.

Entomological index and Larva Index	Sample groups	
	Experimental group	Comparison group
Before the intervention		
Breteau Index	260.5	295.8
Container Index at home	39.2	40.3
Container Index at school	44.6	28.0
House index	79.1	91.7
After the intervention		
Breteau Index	20.9	306.3
Container Index at home	3.4	42.5
Container Index at school	3.9	32.0
House index	18.6	93.8
Percentage of Index increase / decrease after the intervention		
Breteau Index	- 91.9	+ 3.5
Container Index at home	- 91.3	+ 5.3
Container Index at school	- 91.1	+ 14.3
House index	- 76.5	+ 2.5

CHAPTER V

DISCUSSION

The objective of this research is to study the effectiveness of Health Education Program on the behavior of preventing Dengue Haemorrhagic Fever among grade 5 students of Lansaka District Nakhonsithammarat by applying Protection Motivation Theory and Social Support as guideline in creating Health Education Program for the students. The said activities better changed the experimental group's perceptions of severity and vulnerability on Dengue Haemorrhagic Fever, self-efficacy, response efficacy and the practice of preventing Dengue Haemorrhagic Fever as can be discussed according to set hypothesis as follow:

1. First hypothesis. Health Education Program affects better behavior on preventing Dengue Haemorrhagic Fever among students in the experimental group on these topics:

1.1 Perceived Severity on Dengue Haemorrhagic Fever.

Post-test showed that the experimental group's perception of severity on Dengue Haemorrhagic Fever changed more than at pre-test with statistical significance ($p<0.001$). This is according to the hypothesis number 1.1 and the experimental group's mean score at post-test was more than the comparison group's with statistical significance ($p<0.001$). Level of perception of the experimental group changed from mostly moderate to mostly high. This could be explained that the increase perception on severity of Dengue Haemorrhagic Fever in the experimental group could be due to first Health Education Activities arranged by the researcher by using lecture cum

video show on the symptoms of Dengue Haemorrhagic Fever. After viewing the show, the students felt that Dengue Haemorrhagic Fever was severity, frightful, cause suffering and could cause death so, they were afraid and did not want the disease to happen to self, closed relations or other people. Kiewkarnka, B.(1987:445) said about video show or movie that it could arouse viewers' emotion and feeling which could change perception and practice because real events could be presented. The distribution of leaflets and arranging for students who had contacted Dengue Haemorrhagic Fever to narrate the symptoms they experienced to the experimental group. The members could talk, voice their feeling, opinions and asked questions. These activities affected better perception on severity of Dengue Haemorrhagic Fever more than at pretest with statistical significance. This is also consistent with the study of Thiarawiboon, S. (1999:91) which studied on changed practice in preventing Dengue Haemorrhagic Fever of mothers in Muang District Pathumthani by applying Protection Motivation Theory and Social Support along with group discussion, viewing video show and distribution of leaflets and found out that at post-test the experimental group's mean score on perceived severity of Dengue Haemorrhagic Fever changed more than at pre-test and more than the comparison group with statistical significance ($p<0.001$). It is also consistent with the study of Koonawoot, S. (1997:91) who made a study on changing the practice of late primary students on preventing Dengue Haemorrhagic Fever at Sawangha District, Angtong Province by applying Protection Motivation Theory and Social Support, giving Health Education and video show and found out that at post-test the experimental group's mean score on perceived severity of Dengue Haemorrhagic Fever was higher than at pre-test and higher than the comparison group's with statistical significance. In the comparison

group, it was found that at post-test there was a reduction of perceived severity of Dengue Haemorrhagic Fever to less than at pre-test with statistical significance. This could be explained that it was due the spread of Dengue Haemorrhagic Fever prior to the research so, there was campaign on giving information through state media by making propaganda on Dengue Haemorrhagic Fever on television, and newspaper for a period of time and campaign was also done by area public health unit such as Disrtict Public Health Office and Health care station. When the spread of the disease died down all the campaigns stopped too. This caused non-continual and unsystematic dissemination of information compared to that arranged by the researcher to the experimental group. As time passed, information on the severity of Dengue Haemorrhagic Fever also faded and this could affected the comparison group with reduced perception on severity of Dengue haemorrhagic Fever.

1.2 Perceived Vulnerability from Dengue Haemorrhagic Fever.

At post-test it was found that the experimental group's perception of vulnerability from Dengue Haemorrhagic Fever changed more than at pre-test with statistical significance ($p<0.001$). This is according to the hypothesis number 1.2 and the experimental group's mean score at post-test was higher than the comparison group with statistical significance ($p<0.001$). Level of perception in the experimental group changed from mostly moderate to mostly high. In the comparison group it was found that at pre-test perception on vulnerability from Dengue Haemorrhagic Fever did not differ from the experimental group and at post-test the comparison group's perception of vulnerability from Dengue Haemorrhagic Fever did not differ from at pre-test. This could be explained that the increase on perception of vulnerability from Dengue Haemorrhagic Fever in the experimental group could be due to the second

Health Education Activities arranged by the researcher by using lecture cum video show on the cause, cycle of Dengue Haemorrhagic Fever, life cycle of *Aedes aegypti*, people at risk from Dengue Haemorrhagic Fever and the narration by students with Dengue Haemorrhagic Fever experience on the cause of Dengue Haemorrhagic Fever and home surrounding while contacting the disease to the experimental group. The group members could express their feeling, opinions, talk, ask questions, discuss including distribution of pamphlets for further reading, all these activities affected post-test result. The experimental group perceived vulnerability from Dengue Haemorrhagic Fever more than at pre-test with statistical significance. This is consistent with the study of Thiarawiboon, S. (1999:92) and Koonnawoot, S. (1997: 62) which found that the experimental group's perception of vulnerability from Dengue Haemorrhagic Fever changed more than at pre-test with statistical significance. This is also consistent with the study of Saeunk, P. (1992: 82-89) who made a study on the effectiveness of arranging Health Education Program by applying Health Belief Model and Social Support by using lecture cum slide and using live media who was a student who contacted Dengue Haemorrhagic Fever before to narrate the experience of illness, the cure and protection to the group. At post-test it was found that the experimental group's mean score on perception of vulnerability from Dengue Haemorrhagic Fever and perception on severity of Dengue Haemorrhagic Fever were better than at pre-test and better than the comparison group with statistical significance ($p<0.001$).

1.3 Self-efficacy in preventing Dengue Haemorrhagic Fever.

At post-test the experimental group's self-efficacy in preventing Dengue Haemorrhagic Fever changed more than at pre-test with statistical significance

($p < 0.001$). This is consistent with the hypothesis number 1.3 and the experimental group's mean score at post-test was higher than the comparison group with statistical significance ($p<0.001$). In the comparison group it was found that at pre-test self-efficacy in preventing Dengue Haemorrhagic Fever was not different from the experimental group. At post-test the comparison group's self-efficacy in preventing Dengue Haemorrhagic Fever was not different from at pre-test. The increase on the self-efficacy in preventing Dengue Haemorrhagic Fever in the experimental group could be due to the third Health Education activities arranged by the researcher with subject matters on practice and method of controlling breeding places of *Aedes aegypti* in various containers with water both at home and school by stressing on activities which students could practice. This was done by using lecture cum video show with student as model in destroying breeding places of *Aedes aegypti*. Bandura (Bandura 1989: cited by Iumsupasit,S. 1996:50) believed that our learning experiences mostly occurred from observing model which differed from direct learning experience that used trial and error because apart from time consuming there could be danger from some forms of experience. By learning from model, one model could impart both idea and expression at the same time. And due to the limited surrounding in our daily life hence, social perception of various circumstances were done through the experiences of others through hearing and seeing without involving any direct experience. Most people perceived different social events through media. Using model by arranging student with Dengue Haemorrhagic Fever experience to narrate the experience of the practice of preventing Dengue Haemorrhagic Fever that could be practiced and was still a practice. This was according to what Iumsupasit, S. (1996:256-257) said that using model similar to the observers would make the

observers felt sure that the practice shown by model was suitable and could be practiced because the model was similar to them. This causes them to feel that they too could do it. Furthermore life model is beneficent because it is more interesting than symbolic model for the perception by some and the expression could be changed according to circumstances. Moreover, there is demonstration, method of survey and destroying breeding places of larva in various containers that hold water such as car tyre, vases, plates for flower pots and table legs. Kiewkarnka,B.(1992:412) said about the benefits of demonstration that viewers could see real things which made better understanding and lasting remembrance. Viewers could use all the 5 senses that help better learning and attract attention and arouse viewers to follow all the time which cause desired learning. Demonstration and the practice of surveying and destroying the breeding places of larva including noting down in record book with the researcher and assistant and class teacher assessing the correctness and gaurantee the result of the practice made the experimental group learn and experience concretely. Bandura (Bandura :1986 cited by Iumsupasit, S.,1996 :59) believed that mastery experiences is the most effective method in developing self-efficacy because it is a direct experience. Success increases self-efficacy. One believes one can do it. So, in developing self-efficacy it is necessary to make him skillful enough to be successful and make him perceive that he can do that action. This will make him use the skill effectively. One who perceives that he is capable will not give up easily but will try to work in order to attain the desired aim. This said Health Education activities made the experimental group's self-efficacy in preventing Dengue Haemorrhagic Fever better. This is consistent with the study of Thiarawiboon,S. (1999:101) and Koonawoot, S. (1997:73-74) who found that the experimental group 's self-efficacy in preventing

Dengue Haemorrhagic Fever changed better than at pre-test and better than the comparison group with statistical significance.

1.4 Response Efficacy in Preventing Dengue Haemorrhagic Fever.

At post-test the experimental group's response efficacy in preventing Dengue Haemorrhagic Fever changed more than at pre-test with statistical significance ($p<0.001$). This is according to the hypothesis number 1.4 and the experimental group's mean score at post-test is more than the comparison group with statistical significance ($p<0.001$). In the comparison group it is found that at pre-test, response efficacy in preventing Dengue Haemorrhagic Fever is not different from the experimental group and at post-test the comparison group's response efficacy in preventing Dengue Haemorrhagic Fever is not different from at pre-test. So, the increase in response efficacy in preventing Dengue Haemorrhagic Fever of the experimental group should come from the third Health Education activities that the researcher arranged by using lecture cum video show, live model, symbolic model and demonstration which cause the experimental group to know and learn about guideline and correct response efficacy in preventing Dengue Haemorrhagic Fever from the researcher. This caused increase response efficacy and self-efficacy which is consistent with the study of Thiarawiboon,S. (1999:102) and Koonawoot, S. (1997: 72) who found that the experimental group's response efficacy in preventing Dengue Haemorrhagic Fever changed more than at pre-test and more than the comparison group with statistical significance. This is also consistent with the study of Saeunk, P. (1992 :82-89) who found that at post-test the experimental group perceived benefits better than at pre-test and better than the comparison group with statistical significance.

1.5 The Practice of Preventing Dengue Haemorrhagic Fever.

At post-test the experimental group's practice of preventing Dengue Haemorrhagic Fever at home and school changed more than at pre-test with statistical significance ($p<0.001$). This is according to the hypothesis number 1.5 and 1.6 and the experimental group's mean score at post-test is more than the comparison group with statistical significance ($p<0.001$). In the comparison group it is found that at pre-test the practice of preventing Dengue Haemorrhagic Fever at home and school is not different from the experimental group and at post-test the comparison group's practice in preventing Dengue Haemorrhagic Fever at home and school is not different from at pre-test. So, it can be explained that the increase in the practice of preventing Dengue Haemorrhagic Fever at home and school should be from the experimental group receive all four Health Education activities which cause change on perceived severity of Dengue Haemorrhagic Fever, perceived vulnerability, self-efficacy and response efficacy in preventing Dengue Haemorrhagic Fever which were factors in Protection Motivation Theory of Rogers (Rogers 1983 : 153-176). This Theory believes that Protection Motivation is maximized when (Prentice-Dunn & Rogers, 1986 : 156) 1. The treat to health is severe. 2. The individual feels vulnerable. 3. The adaptive response is believed to be an effective means for averting the threat. 4. The person is confident in his or her abilities to complete successfully the adaptive response. 5. The rewards associated with the maladaptive behavior are small. 6. The costs associated with the adaptive response are small. Health Education method by using lecture cum video show impart both theoretical knowledge, basic principles and all the realities are pleasant made viewers remember different events accurately and longer and giving joint experience which was near to reality (Kiewkarnka, B.1992 : 409,446). Then,

apart from showing symbolic model through video and live model by using student who experienced Dengue Haemorrhagic Fever to narrate the experience including allowing time for questioning and voicing of opinion this caused fear, arousal, perception, aware of the significance, seeing benefits for self and family in practice of preventing Dengue Haemorrhagic Fever in the group. The arranged activities gave the experimental group assurance of practicing because others had practiced and were successful. This cause more perception on the significance of the practice of preventing Dengue Haemorrhagic Fever.(Fisher & Gochros: 1975 cited by Iumsupasit, S. : 51) has concluded the duty of model into 3 characteristics as follow: 1.Creating new behavior. 2. Enhancing existing behavior. 3.Obstructing the occurrence of undesirable behavior. Furthermore, demonstration and the practice of surveying and destroying breeding places of larva and noting down in record book caused the experimental group to receive concrete knowledge and experiences which was beneficent in real practice at home and school. Then, from receiving Social Support by class teacher with verbal arousal for the practice of preventing Dengue Haemorrhagic Fever, with surveying and destroying breeding places of larva at home and school once a week, with appreciation and confirmed signature on every record practice in controlling and destroying breeding places of larva, all these arouse, motivate the experimental group to practice preventing Dengue Haemorrhagic Fever better. This is consistent with the study of Saeunk, P. (1992: 89) who found that at post-test the experimental group's practice on preventing Dengue Haemorrhagic correlated with Social Support. This is also consistent with the study of Thiarawiboon, S.(1999:102) and Koonawut, S. (1997:72) which found that the experimental group's practice of

preventing Dengue Haemorrhagic Fever changed more than at pre-test and more than the comparison group with statistical significance ($p<0.001$).

2. Second Hypothesis. After proceed Health Education Program, Entomological Index and the Proportion of Larva Index Correlate with the Occurrence of Dengue Haemorrhagic Fever were Reduced. They were:

2.1 Breteau Index

After the intervention, the experimental group's Breteau Index (BI) was reduced according to the hypothesis number 2.1. Before the intervention, Breteau Index (BI) was 260.5. After the intervention, it was reduced to 20.9 which was 91.9% reduction or 12 times from before the intervention. The Breteau Index reduction to not higher than 100 is a standard of low probability from Dengue Haemorrhagic Fever. Chansang, J.et al. (1993: 104) and Pant & Self (1993:134) proposed that the Breteau Index over than 50 is a high risk of the disease transmission. The Project: "People united in preventing and controlling of Dengue Haemorrhagic Fever for the King 50th coronation anniversary of the year 1999-2000" has limited the Breteau Index to be not beyond 50. In the comparison group it was found that Breteau Index at before and after the intervention were not much different. This could be explained that Breteau Index which was much reduced was due to the Health Education activities that had given to the experimental group which caused the behavior of preventing Dengue Haemorrhagic Fever by increased survey and destroy to the breeding places of larva. This is consistent with the study of Koonawoot, S. (1997: 82) which found the experimental group's Breteau Index was reduced at after the intervention.

2.2 Container Index at Home

After the intervention, the experimental group's Container Index (CI) at home was reduced which was according to hypothesis number 2.2. Before the intervention, the Container Index (CI) at home was 39.2, After the intervention, it was reduced to 3.4 which was reduced by 91.3% or 11 times from before the intervention. As for the comparison group it was found that Container Index (CI) at before and after the intervention did not differ so much. This could be explained that the much reduced Container Index (CI) was due to Health Education activities given to the experimental group which caused the behavior of preventing Dengue Haemorrhagic Fever by increased surveying and destroying breeding places of larva. This is consistent with the study of Kunnawut, S. (1997: 86) which found the experimental group's Container Index was reduced at after the intervention.

2.3 Container Index at School.

After the intervention, the experimental group's Container Index at school was reduced which was according to the hypothesis number 2.3. Before the intervention the Container Index at school was 44.6, after the intervention, it was reduced to 3.9 which was a reduction of 91.1% or 11 times from before the intervention. This is according to the aim of the Project: "People united to prevent and control Dengue Haemorrhagic Fever for the 50th coronation anniversary of the year 1999-2000" which was limited the Container Index of all schools in the country to be not beyond 10. As for the comparison group it was found that the Container Index at before and after intervention was not much different. This could be explained that the much reduced Container Index was due to the Health Education activities that had given to the experimental group which caused the behavior of preventing Dengue

Haemorrhagic Fever by the increased survey and destroy of the breeding places of larva.

2.4 House Index (HI)

After the intervention, the experimental group's House Index (HI) was reduced which was according to hypothesis number 2.4. Before the intervention House Index was 79.1, after the intervention it was reduced to 18.6 which was a reduction of 76.5% or 4 times from before the intervention. For the comparison group it was found that House Index before and after intervention were not much different. This could be explained that the much reduced House Index was due to the Health Education activities that had given to the experimental group which caused the behavior of preventing Dengue Haemorrhagic Fever by the increased survey and destroy the breeding places of larva.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

This study was a quasi-experimantal research with the objective to studying the effectiveness of Health Education Program in preventing Dengue Haemorrhagic Fever of grade 5 students at Lansaka District, Nakhonsithammarat Province by applying Protection Motivation Theory and Social Support as guideline for Health Education Program for students in the experimental group.

Sample groups in this research are 91 fifth grade students under Primary Section Office at Lansaka District, Nakhonsrithammarat Province. The selected sample groups are according to set standard and are divided into 2 groups of experimental group comprising 43 students from Thairatwittaya 74 school (Ban Kiriwong community) and comparison group comprising 48 students from Ban Sanyung school.

The researcher spent 8 weeks on research work. On the first week prior to the experiment there is survey breeding places of *Aedes aegypti* both at home and schools of the experimental and comparison groups. The researcher and assistant used the created questionnaire comprising of data on socio-demographic, perceived severity, vulnerbility, self-efficacy, response efficacy and the behavior of preventing Dengue Haemorrhagic Fever at home and school. The following weeks began Health Education activities in the experimental group according to appointed program- twice weekly on Monday and Tuesday of 1 hour and 40 minutes each starting from 13.00 – 14.40 hr. The activity consists of lecture cum video show, demonstration and skill

practice so that students could change the behavior of preventing Dengue Haemorrhagic Fever at home and school. Home activities on preventing Dengue Haemorrhagic Fever are: surveying and destroying breeding places of *Aedes aegypti* at home or residence once a week. School activities on preventing Dengue Haemorrhagic Fever are: surveying and destroying breeding places of *Aedes aegypti* at school once a week. The students are divided into 8 groups of 5-6 students each and each group is responsible for a portion of the school compound. On every behavior the result of survey and control breeding places of *Aedes aegypti* both at home and school is recorded in the notebook created by the researcher. It is then, submitted to the class teacher who signs to gaurantee the result, give appreciation and listen to problems and obstacles, then, find solution for students, support with abate sand granules and remind the students to survey and destroy breeding places of *Aedes aegypti* on the following week. The comparison group does not receive and program from the researcher but both groups receive various activities from Public Health Officials of the area and from other sources of information. On the 8th week the researcher collects 2nd data at post-test from both experimental and comparison groups using the same questionnaire. The collected data is then assessed by computer using SPSS/PC^{+} Program for Windows version 7.5 such as percentage, mean score, S.D. Analysis of mean score in the sample groups is done with paired samples t-test statistics and mean score between group by using Student's t-test statistics.

Result Conclusion

Part 1: Data on Socio -demographic

Analysis result showed that demographic character of the two sample groups is similar that is: most are 11 years old, in the experimental group there are more male than female, in the comparison group male and female members are equal, parents' highest education are primary, most occupation of parents are farmer, number of family members age lower than 14 years old (excluding sample students) is mostly with 1 member, students who contacted Dengue Haemorrhagic Fever in the experimental and comparison groups are 15 and 12 which are 34.5% and 27.9% respectively.

Part 2: Research Results

At post-test experimental group's perceived severity, vulnerability, self-efficacy, response efficacy, the behavior of preventing Dengue Haemorrhagic Fever at home and school is higher than at pre-test with statistical significance according to the following details:

2.1 Perceived Severity of Dengue Haemorrhagic Fever

At pre-test the experimental and comparison groups' mean scores on perceived severity of Dengue Haemorrhagic Fever are not different with statistical significance.

At post-test, students in the experimental group's mean score on perceived severity of Dengue Haemorrhagic Fever is more correct than at pre-test with statistical significance ($p<0.001$) which is according to hypothesis number 1.1. When comparing mean scores on perceived severity of Dengue Haemorrhagic Fever between the experimental and comparison groups it is found that the experimental

group's perceived severity of Dengue Haemorrhagic Fever is higher than the comparison group's with statistical significance ($p < 0.001$).

2.2 Perceived Vulnerability from Dengue Haemorrhagic Fever

At pre-test the experimental and comparison group's mean scores on perceived vulnerability from Dengue Haemorrhagic are not different with statistical significance.

At post-test student in the experimental group's mean score on correct perceived vulnerability from Dengue Haemorrhagic Fever is more than at pre-test with statistical significance ($p<0.001$) which is according to hypothesis number 1.2. When comparing mean scores on perceived vulnerability from Dengue Haemorrhagic Fever between the experimental and comparison groups it is found that the experimental group's perceived vulnerability from Dengue Haemorrhagic Fever is higher than the comparison group's with statistical significance ($p<0.001$).

2.3 Self-efficacy in Preventing Dengue Haemorrhagic Fever

At pre-test the experimental and comparison groups' mean scores on self-efficacy in preventing Dengue Haehorrhagic Fever are not different with statistical significance.

At post-test student in the experimental group's mean score on self-efficacy in preventing Dengue Haemorrhagic Fever is more than pre-test with statistical significance ($p<0.001$) which is according to hypothesis number 1.3.When comparing mean scores on self-efficacy in preventing Dengue Haemorrhagic Fever between the experimental and comparison groups it is found that the experimental group's perceived self-efficacy in preventing Dengue Haemorrhagic Fever is higher than the comparison group's with statistical significance ($p< 0.001$).

2.4 Response Efficacy in Preventing Dengue Haemorrhagic Fever

At pre-test the experimental and the comparison groups' mean scores in response efficacy in preventing Dengue Haemorrhagic Fever are not different with statistical significance.

At post-test student in the experimental group's mean score on response efficacy in preventing Dengue Haemorrhagic Fever is more than at pre-test with statistical significance ($p<0.001$) which is according to the hypothesis number 1.4. When comparing mean scores on response efficacy in preventing Dengue Haemorrhagic Fever between the experimental and comparison groups it is found that the experimental group's response efficacy in preventing Dengue Haemorrhagic Fever is higher than the comparison group's with statistical significance ($p<0.001$).

2.5 The Behavior of Preventing Dengue Haemorrhagic Fever at Home

At pre-test the experimental and comparison groups' behavior of preventing Dengue Haemorrhagic Fever at home are not different with statistical significance.

At post-test student in the experimental group's behavior of preventing Dengue Haemorrhagic Fever at home is higher than at pre-test with statistical significance ($p<0.001$) which is according to the hypothesis number 1.5. When comparing the behavior of preventing Dengue Haemorrhagic Fever at home between the experimental and comparison groups it is found that the experimental group's behavior of preventing Dengue Haemorrhagic Fever at home is higher than the comparison group's with statistical significance ($p < 0.001$).

2.6 The Behavior of Preventing Dengue Haemorrhagic Fever at School.

At pre-test the experimental and comparison groups' behavior of preventing Dengue Haemorrhagic Fever at school are not different with statistical significance.

At post-test the student in the experimental group's behavior of preventing Dengue Haemorrhagic Fever at school is more than at pre-test with statistical significance ($p<0.001$) which is according to the hypothesis number 1.6. When comparing the behavior of preventing Dengue Haemorrhagic Fever at school between the experimental and comparison groups it is found that the experimental group's behavior of preventing Dengue Haemorrhagic Fever at school is higher than the comparison group's with statistical significance ($p<0.001$).

2.7 Breteau Index

At post-test Breteau Index in the experimental group decreases to less than at pre-test which is according to the hypothesis number 2.1. When comparing the change between the experimental and comparison groups it is found that the experimental group's Breteau Index decreases more than the comparison group's.

2.8 Container Index at Home

At post-test Container Index at home in the experimental group decreases to less than at pre-test which is according to the hypothesis number 2.2. When comparing the change between the experimental and comparison group it is found that the experimental group's Container Index at home decreases more than the comparison group's.

2. 9 Container Index at School

At post-test Container Index at school in the experimental group decreases to less than at pre-test which is according to the hypothesis number 2.3. When comparing the change between the experimental and comparison groups it is found that the experimental group's Container Index at school decreases more than the comparison group's.

2.10 House Index

At post-test House Index in the experimental group decreases to less than at pre-test which is according to the hypothesis number 2.4. When comparing the change between the experimental and comparison group it is found that the experimental group's House Index decreases more than the comparison group's.

Recommendations from Research Results

1. This research arranges Health Education Program by applying Protection Motivation Theory and Social Support from class teacher causing better perceived severity, perceived vulnerability of Dengue Haemorrhagic Fever, self-efficacy, response efficacy in preventing Dengue Haemorrhagic Fever and the behavior of preventing Dengue Haemorrhagic Fever in the experimental group. Hence, schools in epidemic area of Dengue Haemorrhagic Fever could take this Health Education Program to teach the students so that they acquire the behavior of preventing Dengue Haemorrhagic Fever. This could be considered as effective trust for public health work and could be one method of covering target group.

2. This research uses students with high rate of Dengue Haemorrhagic Fever to participate in preventing and controlling Dengue Haemorrhagic Fever so as to promote and inculcate in them the awareness of the significance of the practice. The

class teacher is close to and respected by the students. He is influential to the students' practice. He should promote and arouse the students to practice preventing and controlling with continuity so as to cause frequency of practice compatible with life cycle of *Aedes aegypti* which could prevent the spread of *Aedes aegypti*. At present it is found that Dengue Haemorrhagic Fever could epidemic the whole year round so, students should be inculcated to prevent and destroy breeding places of *Aedes aegypti* regularly such as setting the activity for destroying breeding places of *Aedes aegypti* at home and school every Friday.

3. This research arranges Health Education activities for students in the experimental group in order to adapt and change the behavior in preventing Dengue Haemorrhagic Fever both at home and school. Students are asked to note down the result of survey and the result of practicing control and eliminate breeding places of *Aedes aegypti* both at home and school in the record book created by the researcher on every behavior. This should be one method in promoting and arousing the students to practice preventing Dengue Haemorrhagic Fever. For continuity and regularity of the behavior there should be form of recording the result of survey and the result of the practice of controlling and destroying breeding places of *Aedes aegypti* attached at home and school for students to continue recording the practice every week.

4. Video were really useful tools which helped the students in the experimental group got better knowledge and perception about Dengue Haemorrhagic Fever. But it should be noted that video of entertainment and Dengue Haemorrhagic Fever contents would be more attractive than using only Dengue Haemorrhagic Fever contents.

5. Research result shows that students who receive Health Education Program applying Protection Motivation Theory and Social Support change the behavior of preventing Dengue Haemorrhagic Fever better. Hence, this concept should be applied in arranging Health Education Program to solve other problems among students such as the practice of following health rules.

Recommendations for Further Research

1. There should be a study on applying this Health Education Program along with parents group by adapting suitable subject matter, activities and duration. This is because parents are influential to the practice of their children on knowledge, attitude and practice which would enhance the result of the operation.

2. There should be research study in the form of operational research among leaders of the communities especially leaders of the locality in the level of Tambon that is, members of Tamboon council. This could cause awareness of the significance in the community and villagers participate in preventing Dengue Haemorrhagic Fever. It could be done through resource management especially the budget and write operational plan for preventing and controlling Dengue Haemorrhagic Fever in their locality.

3. There should be study on factors correlate with lasting behavior in the future. The result could be used to adapt guideline in giving Health Education suitable to the epidemic of Dengue Haemorrhagic Fever now.

4. Due to time constraint during this research so, there should be research study on the same topic on another level by using the same research area and the same sample groups.This could be done after a period of 6 months to follow up and evaluate on the lasting effect of the behavior in preventing Dengue Haemorrhagic contents.

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APPENDIX A

Table 9 Frequency and percentage distribution on perceived severity of Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test.

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
1. Contacting DHF is as normal as	32	74.4	11	25.6	0	0
contacting a common cold.	42	97.7	1	2.3	0	0
2. There is no need to cure DHF it can be	39	90.7	3	7.0	1	2.3
cured by itself.	43	100.0	0	0	0	0
3. There is a low fever when contacting	29	67.4	14	32.6	0	0
DHF	37	86.0	2	4.7	4	9.3
4. DHF can cause hepatomegaly.	4	9.3	35	81.4	4	9.3
	2	4.7	9	20.9	32	74.4
5. DHF can cause epistaxis.	16	37.2	25	58.1	2	4.7
	3	7.0	3	7.0	37	86.0
6. DHF can cause Pneumonia .	10	23.3	27	62.8	6	14.0
	19	44.2	13	30.2	11	25.6
7. A patient who contacted DHF once can	3	7.0	16	37.2	24	55.8
more contact it again and the symptom will	4	9.3	1	2.3	38	88.4
be severe.						
8. DHF can cause emesis.	3	7.0	24	55.8	16	37.2
	0	0	3	7.0	40	93.0
9. DHF can cause convulsion.	2	4.7	23	53.5	18	41.9
	0	0	2	4.7	41	95.3
10.While contacting DHF if shock occurs	1	2.3	24	55.8	18	41.9
there can be sudden death.	29	67.4	9	20.9	5	11.6
11. Rhinorrhea or coughing are not	11	25.6	23	53.5	9	20.9
symptoms of DHF	12	27.9	5	11.6	26	60.5

Table 9 Frequency and percentage distribution on perceived severity of Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test (cont.).

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
12. Skin haemorrhage is a severe symptom	5	11.6	23	53.5	15	34.9
of DHF.	8	18.6	6	14.0	29	67.4
13. DHF shows symptoms of anorexia,	0	0	14	32.6	29	67.4
vomiting and abdominalpain.	2	4.7	0	0	41	95.3
14. Students sick with DHF can die.	2	4.7	16	37.2	25	58.1
	2	4.7	2	4.7	39	90.7
15. DHF requires expensive treatment.	2	4.7	20	46.5	21	48.8
	2	4.7	9	20.9	32	74.4
16. DHF causes waste of study time.	2	4.7	6	14.0	35	81.4
	1	2.3	2	4.7	40	93.0

Table 10 Frequency and percentage distribution on perceived severity of Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test.

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
1. Contacting DHF is as normal as	36	75.0	11	22.9	1	2.1
contacting a common cold.	32	66.7	15	31.3	1	2.1
2. There is no need to cure DHF it can be	47	97.9	1	2.1	0	0
cured by itself.	44	91.7	3	6.3	1	2.1
3. There is a low fever when contacting	34	70.8	14	29.2	0	0
DHF.	24	50.0	23	47.9	1	2.1
4. DHF can cause hepatomegaly.	7	14.6	40	80.3	1	2.1
	5	10.4	43	89.6	0	0
5. DHF can cause epistaxis.	7	14.6	37	77.1	4	8.3
	12	25.0	29	60.4	7	14.6

Table 10 Frequency and percentage distribution on perceived severity of Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test (cont.).

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
6. DHF can cause Pneumonia .	9	18.8	39	81.3	0	0
	6	12.5	40	83.3	2	4.2
7. A patient who contacted DHF once can more contact it again and the symptom will be severe.	3	6.3	25	52.1	20	41.7
	3	6.3	29	60.4	16	33.3
8. DHF can cause emesis.	5	10.4	22	45.8	21	43.8
	4	8.3	30	62.5	14	29.2
9. DHF can cause convulsion.	9	18.8	28	58.3	11	22.9
	7	14.6	29	60.4	12	25.0
10.While contacting DHF if shock occurs there can be sudden death.	6	12.5	27	56.3	15	31.3
	0	0	36	75.0	12	25.0
11. Rhinorrhea or coughing are not symptoms of DHF	4	8.3	19	39.6	25	52.1
	12	25.0	20	41.7	16	33.3
12. Skin haemorrhage is a severe symptom of DHF.	5	10.4	24	50.0	19	39.6
	2	4.2	30	62.5	16	33.3
13. DHF shows symptoms of anorexia, vomiting and abdominalpain.	4	8.3	20	41.7	24	50.0
	3	6.3	21	43.8	24	50.0
14. Students sick with DHF can die.	4	8.3	13	27.1	31	64.6
	2	4.2	20	41.7	26	54.2
15. DHF requires expensive treatment.	4	8.3	22	45.8	22	45.8
	7	14.6	25	52.1	16	33.3
16. DHF causes waste of study time.	2	4.2	11	22.9	35	72.9
	5	10.4	14	29.2	29	60.4

Table 11 Frequency and percentage distribution on perceived vulnerability from Dengue Haemorrhagic Fever among grade 5 students in experiment group at pre-test and post-test.

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
1. Students with good health will not contact DHF.	17	39.5	12	27.9	14	32.6
	35	81.4	2	4.7	6	14.0
2. Students who have contacted DHF before will not contact it again even if bitten by *Aedes Aegypti.*	14	32.6	22	51.2	7	16.3
	34	79.1	2	4.7	7	16.3
3. If only once bitten by *Aedes Aegypti* you can contact DHF.	2	4.7	31	72.1	10	23.3
	4	9.3	3	7.0	36	83.7
4. Kindergarten and Primary students contact DHF more than grown-ups.	0	0	16	37.2	27	62.8
	3	7.0	1	2.3	39	90.7
5. When students take mid-day naps there is no need to use a mosquito net.	29	67.4	10	23.3	4	9.3
	34	79.1	4	9.3	5	11.6
6. Students can contact DHF the whole year round.	8	18.6	27	62.8	8	18.6
	10	23.3	4	9.3	29	67.4
7. Students in close contact with DHF patients can contact the disease himself.	3	7.0	14	32.6	26	60.5
	33	76.7	1	2.3	9	20.9
8. DHF occurs because there are larva of *Aedes Aegypti* around the home and school.	1	2.3	4	9.3	38	88.4
	0	0	2	4.7	41	95.3
9. Student who prefers to sit still have more chance of contacting DHF than students who move around.	3	7.0	25	58.1	15	34.9
	0	0	3	7.0	40	93.0
10.Staying in a dimly lit area during day time gives more chance of being bitten by *Aedes Aegypti* than staying in a bright area.	2	4.7	11	25.6	30	69.8
	2	4.7	1	2.3	40	93.0
11. A family without any family member who has contacted DHF need not protect themselves from this disease.	34	79.1	7	16.3	2	4.7
	39	90.7	2	4.7	2	4.7

Table 11 Frequency and percentage distribution on perceived vulnerability from Dengue Haemorrhagic Fever among grade 5 students in experiment group at pre-test and post-test (cont.).

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
12. Destroying breeding places of *Aedes Aegypti* alone can decrease the occurrence of DHF.	8 5	18.6 11.6	15 4	34.9 9.3	20 34	46.5 79.1

Table 12 Frequency and percentage distribution on perceived vulnerability from Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test.

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
1. Students with good health will not contact DHF.	21 21	43.8 43.8	19 20	39.6 41.7	8 7	16.7 14.6
2. Students who have contacted DHF before will not contact it again even if bitten by *Aedes Aegypti.*	19 21	39.6 43.8	16 13	33.3 27.1	13 14	27.1 29.2
3. If only once bitten by *Aedes Aegypti* you can contact DHF.	11 11	22.9 22.9	26 25	54.2 52.1	11 12	22.9 25.0
4. Kindergarten and Primary students contact DHF more than grown-ups.	2 2	4.2 4.2	9 13	18.8 27.1	37 33	77.1 68.8
5. When students take mid-day naps there is no need to use a mosquito net.	21 29	43.8 60.4	18 7	37.5 14.6	9 12	18.8 25.0
6. Students can contact DHF the whole year round.	9 9	18.8 18.8	29 22	60.4 45.5	10 17	20.8 35.4
7. Students in close contact with DHF patients can contact the disease himself.	8 7	16.7 14.6	25 26	52.1 54.2	15 15	31.3 31.3
8. DHF occurs because there are larva of *Aedes Aegypti* around the home and school.	1 1	2.1 2.1	2 4	4.2 8.3	45 43	93.8 89.5

Table 12 Frequency and percentage distribution on perceived vulnerability from Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test (cont.).

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
9. Student who prefers to sit still have more chance of contacting DHF than students who move around.	6 1	12.5 2.1	29 27	60.4 56.3	13 20	27.1 41.7
10.Staying in a dimly lit area during day time gives more chance of being bitten by *Aedes Aegypti* than staying in a bright area.	3 3	6.3 6.3	16 17	33.3 35.4	29 28	60.4 58.3
11. A family without any family member who has contacted DHF need not protect themselves from this disease.	39 41	81.3 85.4	3 4	6.3 8.3	6 3	12.5 6.3
12. Destroying breeding places of *Aedes Aegypti* alone can decrease the occurrence of DHF.	7 12	14.6 25.0	17 21	35.4 43.8	24 15	50.0 31.3

Table 13 Frequency and percentage distribution on self-efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test.

Question	Not sure		A little sure		Very sure	
	f	%	f	%	f	%
1. How sure are you that you can survey and eliminate the breeding places of *Aedes Aegypti* at home every week?	8 1	18.6 2.3	16 3	37.2 7.0	19 39	44.4 90.7
2. How sure are you that you can survey and eliminate the breeding places of *Aedes Aegypti* at school every week?	9 0	20.9 0	21 3	48.8 7.0	13 40	30.2 93.0

Table 13 Frequency and percentage distribution on self-efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test (cont.).

Question	Not sure		A little sure		Very sure	
	f	%	f	%	f	%
3. How sure are you that you can cover water containers for consumption at home every time after use?	3 0	7.0 0	10 4	23.3 9.3	30 39	69.8 90.7
4. How sure are you that you can cover water containers for consumption at school every time after use?	1 0	2.3 0	26 3	60.5 7.0	16 40	37.2 93.0
5. How sure are you that you can put any kind of chemical such as washing powder, Sodium Chloride or vinegar, in plates supporting cupboards and refesh the change every month?	8 2	18.6 4.7	20 2	46.5 4.7	15 39	34.9 90.7
6. How sure are you that you can put abate sand granules or clean and change water in the containers in latrine or bathroom at home every week?	6 0	14.0 0	23 2	53.5 4.7	14 41	32.6 95.3
7. How sure are you that you can put Abate Sand Granules or clean and change water in the containers in the latrine or bathroom at school every week?	1 0	2.3 0	26 7	60.5 16.3	16 36	37.2 83.7
8. How sure are you that you can clean and change water in vases for decorative plants or flowers at home every week?	1 2	2.3 4.7	15 2	34.9 4.7	27 39	62.8 90.7
9. How sure are you that you can clean and change water in vases for deco rative plants or flowers at school every week?	7 0	16.3 0	22 0	51.2 0	14 43	32.6 100.0

Table 13 Frequency and percentage distribution on self-efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test (cont.).

Question	Not sure		A little sure		Very sure	
	f	%	f	%	f	%
10. How sure are you that you can put ordinary sand instead of water in plates supporting flower-pots at home every week?	3 2	7.0 4.7	15 1	34.9 2.3	25 40	58.1 93.0
11. How sure are you that you can put ordinary sand instead of water in plates supporting flower-pots at school every week?	8 2	18.6 4.7	25 3	58.1 7.0	10 38	23.3 88.4
12. How sure are you that you can sleep under a mosquito net every time during an afternoon nap and nightly sleep?	1 0	2.3 0	14 1	32.6 2.3	28 42	65.1 97.7
13. How sure are you that you can turn over, Burn or destroy all containers such as cans, coconut shells, fruit shells around the home every week?	0 0	0 0	17 1	39.5 2.3	26 42	60.5 97.7
14. How sure are you that you can turn over, Burn or destroy all containers such as cans, coconut shells, fruit shells around the school every week?	3 0	7.0 0	23 3	53.5 7.0	17 40	39.5 93.0

Table 14 Frequency and percentage distribution on self-efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test.

Question	Not sure		A little sure		Very sure	
	f	%	f	%	f	%
1. How sure are you that you can survey and eliminate the breeding places of *Aedes Aegypti* at home every week?	5 3	10.4 6.3	22 25	45.8 52.1	21 20	43.8 41.7
2. How sure are you that you can survey and eliminate the breeding places of *Aedes Aegypti* at school every week?	5 7	10.4 14.6	34 34	70.8 70.8	9 7	18.8 14.6
3. How sure are you that you can cover water containers for consumption at home every time after use?	7 1	14.6 2.1	11 8	22.9 16.7	30 39	62.5 81.3
4. How sure are you that you can cover water containers for consumption at school every time after use?	5 3	10.4 6.3	19 27	39.6 56.3	24 18	50.0 37.5
5. How sure are you that you can put any kind of chemical such as washing powder, Sodium Chloride or vinegar, in plates supporting cupboards and refesh the change every month?	3 5	6.3 10.4	26 29	54.2 60.4	19 14	39.6 29.2
6. How sure are you that you can put abate sand granules or clean and change water in the containers in latrine or bathroom at home every week?	8 3	16.7 6.3	25 27	52.1 56.3	15 18	31.3 37.5
7. How sure are you that you can put Abate Sand Granules or clean and change water in the containers in the latrine or bathroom at school every week?	16 11	33.3 22.9	19 28	39.6 58.3	13 9	27.1 18.8

Table 14 Frequency and percentage distribution on self-efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test (cont.).

Question	Not sure		A little sure		Very sure	
	f	%	f	%	f	%
8. How sure are you that you can clean and change water in vases for decorative plants or flowers at home every week?	8 6	16.7 12.5	21 25	43.8 52.1	19 17	39.6 35.4
9. How sure are you that you can clean and change water in vases for deco rative plants or flowers at school every week?	13 12	27.1 25.0	26 28	54.2 58.3	9 8	18.8 16.7
10. How sure are you that you can put ordinary sand instead of water in plates supporting flower-pots at home every week?	12 9	25.0 18.8	18 21	37.5 43.8	18 18	37.5 37.5
11. How sure are you that you can put ordinary sand instead of water in plates supporting flower-pots at school every week?	17 13	35.4 27.1	24 28	50.0 58.3	7 7	14.6 14.6
12. How sure are you that you can sleep under a mosquito net every time during an afternoon nap and nightly sleep?	0 2	0 4.2	16 12	33.3 25.0	32 34	66.7 70.8
13. How sure are you that you can turn over, Burn or destroy all containers such as cans, coconut shells, fruit shells around the home every week?	0 1	0 2.1	20 21	41.7 43.8	28 26	58.3 54.2
14. How sure are you that you can turn over, Burn or destroy all containers such as cans, coconut shells, fruit shells around the school every week?	9 7	18.8 14.6	23 27	47.9 56.3	16 14	33.3 29.2

Table 15 Frequency and percentage distribution on response efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test.

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
1. Sleeping under a mosquito net during day time can prevent DHF.	0 0	0 0	4 0	9.3 0	39 43	90.7 100.0
2.Covering water containers for consumption immediately after use is preventing *Aedes aegypti* from laying larva.	0 0	0 0	10 1	23.3 2.3	33 42	76.7 97.7
3. Putting abate sand granules in a cement tank containing water for bathing, washing or cleaning the latrine helps eliminate larva of *Aedes aegypti*.	1 1	2.3 2.3	17 3	39.5 7.0	25 39	58.1 90.7
4. Cleaning and destroying coconut shells, cans, anything that can hold water around the home and school will prevent DHF.	0 0	0 0	8 1	18.6 2.3	35 42	81.4 97.7
5. The more larva of *Aedes Aegypti* is destroyed the more sefe you are from DHF.	3 0	7.0 0	3 2	7.0 4.7	37 41	86.0 95.3
6. Changing water in vases and containers of decorative plants every week will prevent the spread of *Aedes Aegypti*.	5 0	11.6 0	3 1	7.0 2.3	35 42	81.4 97.7
7. Changing water in plates supporting plant pots every week will prevent the spread of *Aedes Aegypti*.	1 0	2.3 0	13 0	30.2 0	29 43	67.4 100.0
8. Eliminating larva in plates supporting cupboard legs every week prevents the occurrence of DHF.	0 1	0 2.3	11 0	25.6 0	32 42	74.4 97.7

Table 15 Frequency and percentage distribution on response efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test (cont.).

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
9. Students while sick from DHF need not sleep under a mosquito net during the day time because there is no need to prevent this disease again.	26 36	60.5 83.7	10 3	23.3 7.0	7 4	16.3 9.3
10. Raising *Claris fuscus* in a lotus container or water container helps eliminate larva from *Aedes Aegypti* because *Claris fuscus* likes to eat larva.	6 2	14.0 4.7	15 1	34.9 2.3	22 40	51.2 93.0
11.Eliminating breeding places and preventing yourself from being bitten by *Aedes aegypti* is the best method of preventing DHF now.	2 1	4.7 2.3	15 5	34.9 11.6	26 37	60.5 86.0

Table 16 Frequency and percentage distribution on response efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test.

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
1. Sleeping under a mosquito net during day time can prevent DHF.	0 1	0 2.1	10 9	20.8 18.8	38 38	79.2 79.2
2.Covering water containers for consumption immediately after use is preventing *Aedes aegypti* from laying larva.	1 1	2.1 2.1	11 7	22.9 14.6	36 40	75.0 83.3

Table 16 Frequency and percentage distribution on response efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test (cont.).

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
3. Putting abate sand granules in a cement tank containing water for bathing, washing or cleaning the latrine helps eliminate larva of *Aedes aegypti*.	2 3	4.2 6.3	19 24	39.6 50.0	27 21	56.3 43.8
4. Cleaning and destroying coconut shells, cans, anything that can hold water around the home and school will prevent DHF.	0 1	0 2.1	9 9	18.8 18.8	39 38	81.3 79.2
5. The more larva of *Aedes Aegypti* is destroyed the more sefe you are from DHF.	3 3	6.3 6.3	6 10	12.5 20.8	39 35	81.3 72.9
6. Changing water in vases and containers of decorative plants every week will prevent the spread of *Aedes Aegypti*.	3 2	6.3 4.2	14 15	29.2 31.3	31 31	64.6 64.6
7. Changing water in plates supporting plant pots every week will prevent the spread of *Aedes Aegypti*.	4 1	8.3 2.1	4 10	8.3 20.8	40 37	83.3 77.1
8. Eliminating larva in plates supporting cupboard legs every week prevents the occurrence of DHF.	0 5	0 10.4	11 9	22.9 18.8	37 34	77.1 70.8
9. Students while sick from DHF need not sleep under a mosquito net during the day time because there is no need to prevent this disease again.	33 33	68.8 68.8	12 9	25.0 18.8	3 6	6.3 12.5
10. Raising *Claris fuscus* in a lotus container or water container helps eliminate larva from *Aedes Aegypti* because *Claris fuscus* likes to eat larva.	3 1	6.3 2.1	16 16	33.3 33.3	29 31	60.4 64.6

Table 16 Frequency and percentage distribution on response efficacy in preventing Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test (cont.).

Question	Disagree		Unsure		Agree	
	f	%	f	%	f	%
11.Eliminating breeding places and preventing yourself from being bitten by *Aedes aegypti* is the best method of preventing DHF now.	1	2.1	13	27.1	34	70.8
	2	4.2	17	35.4	29	60.4

Table 17 Frequency and percentage distribution on behavior in preventing Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test.

Question	Never		Sometime		Regular	
	f	%	f	%	f	%
1. Do you survey and eliminate breeding places of *Aedes Aegypti* at home every week?	2	4.7	37	86.0	4	9.3
	0	0	3	7.0	40	93.0
2. Do you survey and eliminate breeding places of *Aedes Aegypti* at school every week?	11	25.6	30	69.8	2	4.7
	0	0	3	7.0	40	93.0
3. Do you close water containers for consumption at home every time after use?	0	0	15	37.5	25	62.5
	0	0	1	2.4	41	97.6
4. Do you close water containers for consumption at school every time after use?	6	16.2	18	48.6	13	35.1
	0	0	2	5.0	38	95.0
5. Do you put any chemical such as washing powder, Sodium Chloride or vinegar in the water plate holding cupboard legs or put used engine oil instead of water every month?	2	6.9	27	93.1	0	0
	0	0	1	4.2	23	95.8

Table 17 Frequency and percentage distribution on behavior in preventing Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test (cont.).

Question	Never		Sometime		Regular	
	f	%	f	%	f	%
6. Do you put Abate Sand Granules or clean and change the water in cement tanks or other water containers in the bathroom or latrine at home every week?	6	14.3	35	83.3	1	2.4
	0	0	2	4.8	40	95.2
7. Do you put Abate Sand Granules or clean and change the water in cement tanks or other water containers in the bathroom or latrine at school every week?	11	25.6	32	74.4	0	0
	0	0	0	0	43	100.0
8. Do you clean and change water in vases or containers for decorative plants or fresh flowers at home every week?	0	0	14	85.7	2	12.5
	0	0	0	0	14	100.0
9. Do you clean and change water in vases or containers for decorative plants or fresh flowers at school every week?	4	10.8	31	83.8	2	5.4
	0	0	0	0	43	100.0
10. Do you put ordinary sand instead of water or change water in plates supporting plant pots at home every week?	1	6.7	10	66.7	4	26.7
	0	0	0	0	15	100.0
11. Do you put ordinary sand instead of water or change water in plates supporting plant pots at school every week?	10	27.8	19	52.8	7	19.4
	0	0	0	0	43	100.0
12. Do you sleep under a mosquito net or in a room with a mosquito net during the day and night time?	4	9.3	18	41.9	21	48.8
	3	7.0	0	0	40	93.0
13. Do you turn over, burn or destroy any articles such as cans, coconut rinds or fruit shell around the house every week?	6	14.0	34	79.1	3	7.0
	0	0	3	7.1	39	92.9

Table 17 Frequency and percentage distribution on behavior in preventing Dengue Haemorrhagic Fever among grade 5 students in experimental group at pre-test and post-test (cont.).

Question	Never		Sometime		Regular	
	f	%	f	%	f	%
14. Do you turn over, burn or destroy any articles such as cans, coconut shells or fruit rinds around the school every week?	4 0	9.3 0	37 0	86.0 0	2 43	4.7 100.0

Table 18 Frequency and percentage distribution on behavior in preventing Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test.

Question	Never		Sometime		Regular	
	f	%	f	%	f	%
1. Do you survey and eliminate breeding places of *Aedes Aegypti* at home every week?	3 5	6.3 10.4	41 38	85.4 79.2	4 5	8.3 10.4
2. Do you survey and eliminate breeding places of *Aedes Aegypti* at school every week?	16 24	33.3 50.0	30 23	62.5 47.9	2 1	4.2 2.1
3. Do you close water containers for consumption at home every time after use?	2 3	4.9 6.8	15 19	36.6 43.2	24 22	58.5 50.0
4. Do you close water containers for consumption at school every time after use?	8 11	17.0 22.9	23 25	48.9 52.1	16 12	34.0 25.0
5. Do you put any chemical such as washing powder, Sodium Chloride or vinegar in the water plate holding cupboard legs or put used engine oil instead of water every month?	4 3	13.8 11.1	22 20	75.9 74.1	3 4	10.3 14.8

Table 18 Frequency and percentage distribution on behavior in preventing Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test (cont.).

Question	Never		Sometime		Regular	
	f	%	f	%	f	%
6. Do you put Abate Sand Granules or clean and change the water in cement tanks or other water containers in the bathroom or latrine at home every week?	7 13	15.6 30.2	31 22	68.9 51.2	7 8	15.6 18.6
7. Do you put Abate Sand Granules or clean and change the water in cement tanks or other water containers in the bathroom or latrine at school every week?	22 17	45.8 35.4	24 25	50.0 52.1	2 6	4.2 12.5
8. Do you clean and change water in vases or containers for decorative plants or fresh flowers at home every week?	5 4	20.0 18.2	16 15	64.0 68.2	4 3	16.0 13.6
9. Do you clean and change water in vases or containers for decorative plants or fresh flowers at school every week?	20 16	42.6 33.3	20 31	42.6 64.6	7 1	14.9 2.1
10. Do you put ordinary sand instead of water or change water in plates supporting plant pots at home every week?	3 2	13.0 10.0	15 15	65.2 75.0	5 3	21.7 15.0
11. Do you put ordinary sand instead of water or change water in plates supporting plant pots at school every week?	17 24	37.8 50.0	22 22	48.9 45.8	6 2	13.3 4.2
12. Do you sleep under a mosquito net or in a room with a mosquito net during the day and night time?	5 8	10.4 16.7	18 18	37.5 37.5	25 22	52.1 45.8
13. Do you turn over, burn or destroy any articles such as cans, coconut rinds or fruit shell around the house every week?	6 8	12.5 17.0	37 30	77.1 63.8	5 9	10.4 19.1

Table 18 Frequency and percentage distribution on behavior in preventing Dengue Haemorrhagic Fever among grade 5 students in comparison group at pre-test and post-test (cont.).

Question	Never		Sometime		Regular	
	f	%	f	%	f	%
14. Do you turn over, burn or destroy any articles such as cans, coconut shells or fruit rinds around the school every week?	17 18	35.4 37.5	30 28	62.5 58.3	1 2	2.1 4.2

APPENDIX B

Intruments used in the Experiment

Video

Manual and Leaflet

Aedes aegypti Larva Survey

Demonstration

Skill Practice

Students Activity

Students Activity

Figure 6 : Health Education Program Activities

BIOGRAPHY

NAME	Mr. Manu Taluengpet
DATE OF BIRTH	12 March 1971
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INSTITUTATION ATTENDED	Sukhothai Thammathirat Open University, 1991 -1994 : Bachelor of Public Health (Public Health)
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