SCNJ
The Southern College Network Journal of Nursing and Public Health
e273857

การวิจัยเชิงปฏิบัติการเสริมสร้างความรอบรู้ทางสุขภาพด้านการป้องกันโรคไข้เลือดออก ตำบลหนองตรุด อำเภอเมือง จังหวัดตรัง

Action Research to Enhance Health Literacy on Dengue Fever Prevention in Nong Trud Subdistrict, Mueang District, Trang Province

วรารัตน์ ทิพย์รัตน์[1], จรูญรัตน์ รอดเนียม[2*], พอเพ็ญ ไกรนรา[3], อรจิรา วรรธนะพงษ์[2]

Wararat Tiparat[1], Jaroonrat Rodniam[2*], Porpen Krinara[3], Onchira Vadtanapong[2]

[1]วิทยาลัยพยาบาลบรมราชชนนี ตรัง คณะพยาบาลศาสตร์ สถาบันพระบรมราชชนก

[2]คณะพยาบาลศาสตร์ สถาบันการจัดการปัญญาภิวัฒน์, [3]นักวิชาการอิสระ

[1]Boromarajonani College of Nursing, Trang, Faculty of Nursing, Praboromarajchanok Institute

[2]Faculty of Nursing, Panyapiwat Institute of Management, [3]Freelance Scholar

(Received: *September 14, 2024*; Revised: *November 11, 2024*; Accepted: *December 16, 2024*)

บทคัดย่อ

การวิจัยเชิงปฏิบัติการนี้เพื่อศึกษาสถานการณ์และผลการเสริมสร้างความรอบรู้ทางสุขภาพด้านการป้องกันโรคไข้เลือดออกแก่ประชาชน กลุ่มเป้าหมายเป็นตัวแทนครัวเรือนที่พบภาชนะที่มีลูกน้ำยุงลายอย่างน้อย 1 ภาชนะ จำนวน 266 คน เลือกแบบเจาะจง โดยดำเนินกิจกรรมเสริมสร้างความรอบรู้ทางสุขภาพในผู้สมัครใจ จำนวน 85 คน ดำเนินการระหว่างเดือนกันยายนถึงธันวาคม พ.ศ. 2562 รวบรวมข้อมูลจากการสังเกตและสัมภาษณ์ เครื่องมือที่ใช้ในการวิจัย ประกอบด้วย แบบสอบถามข้อมูลส่วนบุคคล แบบประเมินความรอบรู้ด้านสุขภาพ และแบบบันทึกค่าดัชนีลูกน้ำยุงลาย ได้แก่ ดัชนีบ้าน (HI) และดัชนีภาชนะ (CI) กิจกรรมเพื่อเสริมสร้างความรอบรู้ด้านสุขภาพ ได้ค่าความเที่ยงตรง (CVI) เท่ากับ .87 แบบสอบถามได้ค่า KR-20 และค่าสัมประสิทธิ์แอลฟาของครอนบาคได้เท่ากับ .84 และ .97 ตามลำดับ วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา ได้แก่ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และสถิติ Paired t-test ผลการวิจัยพบว่า

1. สถานการณ์เกี่ยวกับระดับความรอบรู้ทางสุขภาพด้านการป้องกันโรคไข้เลือดออกของประชาชนส่วนใหญ่อยู่ในระดับต่ำและระดับปานกลาง ร้อยละ 80.45 ด้านปัญหาอุปสรรคต่อความรอบรู้ทางสุขภาพด้านการป้องกันโรคไข้เลือดออก ได้แก่ ปัจจัยส่วนบุคคล เช่น ระดับการศึกษา และอาชีพ ส่วนปัจจัยสนับสนุน ได้แก่ การมีบุคลากรของโรงพยาบาลส่งเสริมสุขภาพตำบล และทีมอาสาสมัครสาธารณสุขประจำหมู่บ้านที่เข้มแข็ง มีที่ปรึกษาด้านวิชาการจากวิทยาลัยพยาบาล รวมทั้งการได้รับงบประมาณสนับสนุนในการดำเนินงานอย่างต่อเนื่องจากกองทุนหลักประกันสุขภาพถ้วนหน้า และองค์การบริหารส่วนตำบล

2. หลังจากเข้าร่วมกิจกรรม 4 เดือน พบว่า 1) ผู้เข้าร่วมสามารถเข้าถึงแหล่งข้อมูลต่าง ๆ และได้รับข้อมูลมากขึ้น (Obtain) 2) คะแนนความรู้หลังเข้าร่วมกิจกรรมฯสูงกว่าก่อนเข้าร่วมกิจกรรมฯ (Understand) 3) ผู้เข้าร่วมกิจกรรมฯ มีความสามารถในการตัดสินใจเพื่อควบคุมและป้องกันโรคไข้เลือดออกมากขึ้น (Decide) และ 4) ผู้เข้าร่วมกิจกรรมฯ สามารถนำความรู้ไปใช้ในการควบคุมแหล่งเพาะพันธุ์ลูกน้ำยุงลาย (Apply) หนึ่งเดือนหลังการดำเนินกิจกรรม ไม่พบค่าดัชนี HI, CI หรือผู้ป่วยโรคไข้เลือดออก

ดังนั้นควรใช้การดำเนินงานเชิงรุกให้ครอบคลุมทุกหลังคาเรือน โดยเฉพาะกลุ่มที่มีระดับความรอบรู้อยู่ในระดับปานกลางและพบแหล่งเพาะพันธุ์ลูกน้ำยุงลาย เพื่อให้สามารถควบคุมและป้องกันโรคไข้เลือดออกได้อย่างมีประสิทธิภาพในพื้นที่

คำสำคัญ: การวิจัยเชิงปฏิบัติการ ความรอบรู้ด้านสุขภาพ โรคไข้เลือดออก ยุงลาย ดัชนีลูกน้ำ

*ผู้ให้การติดต่อ (Corresponding e-mail: nonplus24@hotmail.com)

Abstract

This action research aimed to study the situation and outcomes of enhancing health literacy in dengue fever prevention among the public. To study the situation and assess health literacy, the target group consisted of 266 household representatives, selected specifically, each of whom had at least one container with Aedes mosquito larvae. Of these, 85 people voluntarily participated in health literacy enhancement activities conducted from September to December 2019. Data were collected through observation and interviews. The research tools included a personal information questionnaire, a health literacy assessment, and an index for Aedes larvae, comprising the House Index (HI) and Container Index (CI). The validity of the tool (CVI) was .87, and the reliability of the questionnaire was KR-20 with Cronbach's alpha coefficients of .84 and .97, respectively. Data were analyzed using descriptive statistics and the Paired t-test. The research results showed as follows.

1. The majority of the population had low to moderate levels of health literacy regarding dengue fever prevention, with 80.45% in low to moderate levels and only 19.55% in high levels. Barriers to health literacy in dengue fever prevention included personal factors such as education level and occupation. Supporting factors included personnel from the Tambon Nong Trud Health Promoting Hospital and a strong team of village health volunteers. The technical advice was provided by the Boromarajonani College of Nursing, Trang, with continuous annual budget support from the Universal Health Coverage Fund of the Nong Trud Subdistrict Administrative Organization.

2. After participating in health literacy enhancement activities, it was found that: 1) participants could access various sources of information and received more information (Obtain) 2) post-activity knowledge scores were higher than pre-activity scores (Understand) 3) participants showed improved decision-making abilities in controlling and preventing dengue fever (Decide), and 4) participants could apply their knowledge to modify behaviors to control mosquito-breeding sites (Apply). One month after the activities, there were no reported HI, CI indices, or dengue cases.

Therefore, proactive measures should be implemented to cover all households, particularly those with moderate literacy levels and mosquito breeding sites, to effectively control and prevent dengue fever in the area.

Keywords: Action Research, Health Literacy, Dengue, *Aedes Aegypti*, Larval Indices

Introduction

Dengue is a vector-borne disease caused by the dengue virus, which remains a significant public health issue in Thailand and local communities (Department of Disease Control, Ministry of Public Health, 2020). The factors contributing to the disease's spread are complex and vary by area, including immunity levels in the population, types of dengue virus strains, mosquito species, population density and movement, climate conditions, and public awareness and understanding in eliminating mosquito breeding sources. Additionally, the cooperation of various agencies in dengue prevention and control and national-level policies play a role. These factors are dynamic and continuously affect the spread of dengue fever, leading to annual fluctuations in disease patterns (Department of Disease Control, Ministry of Public Health, 2020).

According to the dengue situation, between 2016 and 2020, Thailand had, per 100,000 population, morbidity rates of 96.76, 80.80, 129.96, 152.53, and 106.23, respectively. During that 4-year period, mortality rates were 1.10%, 0.12, 0.13, 0.70, and 0.07, respectively. In 2020, in the health region 12 (seven provinces, including Trang province), there was still a morbidity rate of 71.65 per 100,000 population. The mortality rate was 0.17%, which was higher than the national level. The province of Trang had a morbidity rate of 79.30 per 100,000 population. The mortality rate of 0.39% was the third highest, and the Trang City District was one of the 20 target areas in Health Region 12 with the highest dengue morbidity rate. (Vector-Borne Disease Bureau, Department of Disease Control, Ministry of Public Health, (2020). In the past, guidelines for the prevention and control of dengue have come in various forms, followed by campaigns to prevent both proactive and reactive services. But there are still outbreaks of dengue in each area and the number of patients with dengue remains stable. From the analysis of the data, it was found that most of the causes were due to campaigns or emphasis on preventing dengue when there was an outbreak in the area. There must be a proactive work from public health personnel. But people still pay attention to protecting themselves and give priority to their families. The elimination of mosquito larvae breeding sites in the household is relatively few or intermittent. Waiting for help from the agency in fogging and eliminating mosquitoes, etc., as well as having a wrong attitude in preventing and controlling the incidence of dengue fever, thinking that it is the role of public health personnel to destroy breeding grounds. Mosquito larvae in each household, therefore, wait for public health personnel to take action. This is consistent with Aninlabon & Maithongngam (2020) study on factors related to knowledge of mosquito-led disease prevention and control among people in Chumphon Province. Prevention and control of infectious diseases brought by Aedes mosquitoes were exclusively conducted by public health officials or village health volunteers (VHVs). Important measures to control and prevent dengue are focusing on intensive action before the rainy season, especially the campaign to destroy mosquito larvae breeding grounds so to prevent and reduce the severity of outbreaks that occur during the rainy season. (Vector-Borne Disease, 2018).

Recent studies have found that enhancing people's health literacy is one of the important factors affecting health behaviors and health outcomes (Kitterawuttiwong, 2015). This is consistent with the European Health Literacy Consortium (2012) indicating that health literacy is related to reading public writable and is a framework for knowledge; an individual's motivation to obtain, understand, evaluate, and apply health information to make decisions daily about using health services, disease prevention, and health promotion to maintain health or improve one's health. Having a high level of health literacy leads to self-care behaviors, knowledge, understanding and obtaining information, getting information, and knowing the severity of the disease and the cause of the disease. Prevention and control dengue study by Konsnan & Poum (2020) found that health literacy was significantly correlated with dengue and control behaviors among Village Health Volunteers (VHVs) (Chayyaphong & Onmasen, 2020).

Nong Trud Subdistrict is located in Trang province and is a Memorandum of Understanding (MOU) area with Boromarajonani College of Nursing, Trang where the number of patients in the past 3 years equals 162.67, 200.32, and 552.48 (Nong Trud Sub-District Health Promoting Hospital, 2019), which is an urgent problem that needs to be corrected. Therefore, cooperation was established

between the Trang Boromarajonani College of Nursing, Nong Trud Subdistrict Administrative Organization and Nong Trud Subdistrict Health Promoting Hospital so to increase health knowledge among people in order to strengthen and sustain the control and prevention of dengue in the area. It is necessary to operate to cover all villages in Nong Trud Subdistrict. To develop into a model sub-district in building knowledge in preventing and controlling dengue.

The researcher, therefore, conducted an action research study following Stringer's (2007) model, which includes the stages of look (gathering information and observation), think (analysis), and act (planning, implementation, and evaluation). This approach was integrated with Kaeodumkoeng's (2019) concept of health literacy enhancement, emphasizing core skills that empower individuals to obtain, understand, and use information to make informed decisions and take actions impacting their health. Health literacy was classified into three levels: functional, interactive, and critical (Nutbeam, 2008). This study applied the health literacy framework to empower people in the area with knowledge and effective actions for dengue prevention at both individual and community levels.

Objectives

1. To investigate the situation of dengue, contributing factors, and obstacles to preventing dengue in the Nong Trud sub-district, Trang Province,

2. To create activities to enhance health literacy on dengue prevention and evaluate its effectiveness in terms of Health Literacy Score, Aedes larvae index (HI and CI), and the morbidity rate of dengue.

Conceptual Framework

The action research was guided by Stringer (2007) interactive spiral model, consisting of three main phases: look (information gathering and observation), think (analysis), and act (planning, implementation, and evaluation). This process was complemented by Kaeodumkoeng (2019) health literacy enhancement concept, which emphasizes the key skills individuals need to access, understand, and utilize information to make informed decisions and take effective action. Together, these frameworks, as depicted in Figure 1, provided a structured approach to promoting health literacy and empowering individuals to make proactive health-related choices.

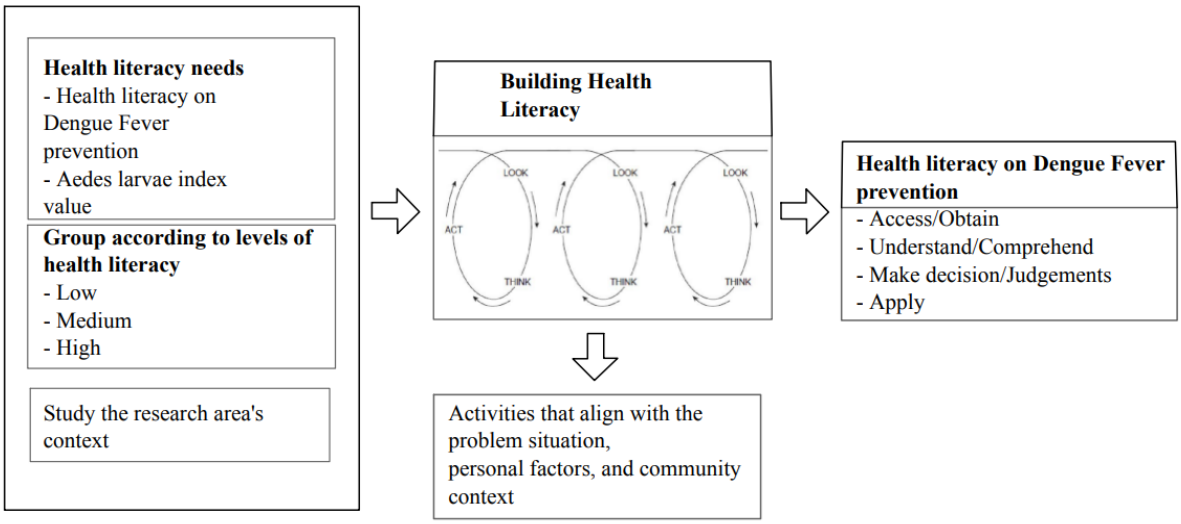

Figure 1 Conceptual Framework

Methods

Population and Sample

Purposive sampling was applied to select the target area. There were four villages in the Nong Trud sub-district, Muang District, Trang Province: the southern part of Thailand where the Memorandum of Understanding (MOU) under the Strong Community Development Project has been signed with Boromarajonani College of Nursing, Trang.

The target population for this study was representative of 266 households, aged 20 - 70 years, in the Nong Trud Sub-district, Muang District, Trang Province, where at least one container of Aedes mosquito larvae breeding site was found. The inclusion criteria were as follows: 1) being a family member who plays a major role in decision-making for family management, and not a village health volunteer (VHV), 2) aged 20-70 years, 3) being able to communicate with the Thai language, 4) having health literacy in the prevention and control of dengue at a low level, 5) being able to participate at least 80 percent of all activities. The exclusion criteria were a household that did not have regular residents, moved out from one's own house, or did not voluntarily participate. The discontinuation criterion was the sample's withdrawal to participate in a research project.

Research Instruments

1. Tools used for assessment and data collection

1.1 Semi-structured interview used for assessment of health literacy and obstacles in dengue prevention

1.2 The personal factor questionnaire included gender, age, marital status, highest education, occupation, family income, number of household members, and experience of getting dengue

1.3 Health Literacy Assessment Form which the researcher developed from the questionnaire of Chantarintrakorn (2014) was a 40-item questionnaire consisting of 4 components as follows: 1) access to information about prevention and control of dengue, 2) understanding the prevention and control of dengue, 3) decision-making, and 4) prevention and control of dengue.

Validity and Reliability of the Research Instrument

All questions were reviewed by three experts with expertise in health literacy research including community health nurses and epidemiologists to confirm the content validity, obtaining a CVI of .87. The reliability of the health literacy assessment form was tested using KR-20, and Cronbach's alpha coefficient, obtaining values of .84, and .97, respectively.

1.4 A record form of the Aedes larvae index (HI and CI) survey was developed by the Department of disease control, Ministry of Public Health (2020). The researcher used to survey the mosquito larvae breeding sites of each household.

2. Tool for enhancing health literacy in dengue prevention

The researchers designed activities to enhance health knowledge in dengue prevention with the participation of household representatives and those involved in the community, including public health personnel and village health volunteers. The activities were run for four months. Each session lasted for 2 - 3 hours, consisting of skill training, group discussions, exchanging experiences, using a role model, and giving hand out /manuals; the contents were determined based on the results of the survey. The tool was validated by experts.

Data Collection

The research process was divided into 2 phases as follows:

1. The preparation phase was carried out by 1) reviewing relevant knowledge, 2) building relationships and clarification of objectives to related parties, namely health personnel in Nong Trud Sub-District Health Promoting Hospital, village health volunteers; and the target groups, and 3) studying the community context, and general information of the target group.

2. The research phase followed Stringer's (2007) operating cycles: look, think, and act.

2.1 The Look step-gathering information about the study area and the level of health literacy in dengue prevention among the target group including 1) agreeing on the process of collecting data among researchers and local coordinators, 2) collecting data from all 4 villages for 4 weeks by an interview with the target group at home or the appointment location to assess health literacy in dengue prevention, 3) making an observation regarding the way of life of the people in the community, occupation, transportation, and health activities in the community, 4) reviewing the documents to collect relevant information at Nong Trud Sub-District Health Promoting Hospital, such as the number of patients with DENGUE in the area, and 5) analysis of the health literacy level in dengue prevention, and dividing the target groups into 3 groups: low level of health literacy (red group), medium level of health literacy (yellow group), and high level of health literacy (green group).

2.2 The Think step was to analyze conditions, problems, and operational guidelines by meeting between the researchers, health personnel in Nong Trud Sub-district Health Promoting Hospital, village health volunteers, and the household representatives to present the results found namely, the level of health literacy in dengue prevention, and the Aedes mosquito larvae indexes. Then those team runs a plan following 4W1H (What, Who, Where, When, and How).

2.3 The Act step was taking action to solve problems and enhance health literacy for the target group, and to evaluate the implementation by setting goals, and planning activities, 2) preparation of media, equipment, and the target group of participants, 3) making a schedule of

activities, 4) implementation of the plan, 5) evaluation according to the concept of Stinger (2007) to review the plan, assess the effect of activities, revise the plan if needed, and prioritize unresolved issues.

Data Analysis

1. Descriptive statistics: frequency, percentage, mean and standard deviation were used to analyze the personal information, the mosquito larvae index, and health literacy in dengue prevention.

2. Paired t-test was used to compare the mosquito larvae index and health literacy before and after enhancing health literacy.

Ethical Consideration/Informed Consent

This research was reviewed and approved by the Research Ethics Committee of Boromarajonani College of Nursing, Trang, No. 14/2562. The researcher protected the rights of the sample group for participating in this study.

Results

The findings included 1) general information of the setting, 2) demographic data, 3) factors Affecting Health Literacy, 4) level of health literacy in dengue prevention, and 5) the effectiveness of enhancing health literacy in dengue prevention. The details are as follows.

1. Nong Trud Sub-district is located northeast of Mueang Trang District, Trang Province. It is approximately 8 kilometers away from the center. It consists of 7 villages. However, this study included only 4 villages (Moo 1,2,3 and 7) with 866 households. Whereas only 266 households met the inclusion criteria.

2. Most of the household's representatives were female (80.08%), aged between 50 and 59 years (30.83%) (M = 57.74, SD = 11.32), had the highest education in primary school (60.34%), worked in rubber tree farm (39.66%), had average income 10,019.55 baht (SD = 7,711.65) per month, and ever had family members with dengue (19.92%). Aedes mosquito larvae were found in 1 - 5 water containers of the households (89.66%).

3. Factors Affecting Health Literacy The situation analysis of the target group revealed that 1) factors related to health literacy problems and obstacles in dengue prevention included personal factors (low level of education, working on a rubber farm, moderate income). Some families had only the elderly who stayed at home. So that they were less interested in accessing health resources in searching for dengue knowledge and prevention. The preventive behaviors were undertaken only when the VHVs encouraged them to practice. In some areas, VHVs surveyed and eliminated mosquito larvae breeding sites of households every week; people in the community thought that it was the VHVs' responsibility; and 2) factors supporting health literacy in dengue prevention included the collaboration of health personnel at Nong Trud Sub-District Health Promoting Hospital, the village health volunteer team, and lecturers and nursing students to survey mosquito larvae breeding sites. An annual budget was continuously supported by Nong Trud Sub-district, the Local Administrative Organization. However, some households still had little access to knowledge about dengue prevention due to the above limitations.

4. Level of health literacy in dengue prevention

Table 1 The level of health literacy and the mosquito larvae's breeding sites of the target group classified by village (n = 266)

Village	The mosquito larvae's breeding sites (before) Number of households	Found	HI	CI	Level of health literacy (n = 266) Low < 60 % of the total score	Medium 60 - < 80% of the total score	High ≥80% of the total score
1	174	54	31.03	4.17	11 (4.13)	32 (12.03)	11 (4.14)
2	214	65	30.37	3.76	29 (10.90)	25 (9.40)	11(4.14)
3	267	82	30.71	3.95	23 (8.65)	41 (15.41)	18 (6.77)
7	211	65	30.81	3.89	22 (8.27)	31 (11.66)	12 (4.50)
Total	**866**	**266**	**30.71**	**3.94**	**85 (31.95)**	**129 (48.50)**	**52 (19.55)**

From table 1, most participants had health literacy scores at a moderate level (48.50%), followed by a low level (31.95%), and a high level (19.55%). The HI and CI were 30.71, and 3.94, respectively considered in high-risk areas (HI > 10, CI > 0). In terms of obtaining health information, the item "You can find information about dengue prevention from the internet" was practiced the least (13.16%). In terms of understanding, the most incorrect answer (57.90%) was the item, "Aedes mosquitoes prefer to lay their eggs in polluted water." In terms of the decision-making, the least practice (21.43%) was about "the participants decided to ask for Abet Sand (used for getting rid of mosquitoes) from the municipality or the health-promoting hospital to put it in water containers in their own home instead of waiting for the staff to distribute it". In terms of application, the least practice (20.30%) was about "if you sleep during the daytime, you will use a mosquito net or sleep in a room with mosquito wire screen."

5. The effectiveness of enhancing health literacy in dengue prevention

The activities were implemented 4 times in 4 months (once a month) as follows:

Act 1: Conducting activities to enhance health literacy regarding the elements, obtaining and understanding basic dengue prevention as follows.

- Presenting the background and data regarding the dengue prevention health literacy, and the survey results of mosquito larvae breeding sites by the research team
- Dividing the participants into small groups to assess risk factors for dengue in each household and then doing the presentations
- Providing the participants' understanding of the dengue prevention and control by using infographics with key messages that could be easily understood, and letting them exchange ideas among the small groups
- Practicing information searching skills to obtain dengue prevention resources

As a result, it was found that the operations were carried out as planned. Fifty-four households (63.53%) participated in activities to enhance health literacy with 60%, which achieved

the goal. The target group was able to identify risk factors for dengue, better understood, and able to answer at least 80% of the questions.

Suggestions to revise the plan for the next intervention were 1) providing more public relations channels for the target group, and 2) making an invitation letter, and letting the VHVs facilitate transportation for the target group who was not able to come to join the activities.

Act 2: Conducting activities to enhance health literacy in dengue prevention in the interaction stage according to the decision-making component, the activities were as follows:

- Reviewing activities carried out in the first week regarding risk factors of dengue in each household

- Household grouping in each village and then practicing questioning skills by using the ask me 3 technique and teach-back technique, as well as asking the representatives to reflect on the activities.

- Brainstorming to set the guideline for dengue prevention

As a result, it was found that the operations were carried out as planned. The target group, 62 households (72.94 %), participated in activities to enhance health literacy. The target group practiced questioning skills and formulated common practice guidelines for the community.

Suggestion to revise the plan for the next intervention was increasing the roles of the VHVs to be mentors for the group.

Act 3: Carry out activities to enhance health literacy in dengue prevention at the critical stage according to the application components, the activities were as follows.

- Doing home visits of the target group to share their experiences in preventing dengue, and to analyze their weaknesses and strengths in practice

- supporting and giving more suggestions, and encouraging the maintenance of correct practices in preventing dengue

Asking the target group to take a test regarding health literacy in dengue prevention, a further assessment of the health literacy level, and advising on issues that were still misunderstood.

- Running a survey of mosquito larvae breeding sites using the HI and CI mosquito larvae index survey

As a result, it was found that the operations were carried out as planned. A survey of mosquito larvae breeding sites was 80 households (94.12 %); there were five houses were closed. Only three houses were found to have the breeding sites for Aedes mosquito larvae. These three houses did not participate in the activities the first and second time.

Suggestion to revise the plan for the next intervention; the VHVs have to encourage and follow up with those three houses to join the next activity.

Act 4: Carry out activities to enhance health literacy in dengue prevention at the critical stage in terms of applying components, the activities were as follows.

- Asking the target group to share their successful and unsuccessful experiences in preventing dengue, and to propose additional guidelines

- Letting the target group formulate guidelines for sustainable prevention of dengue in the community, and giving support for their practice

The results showed that the operations were carried out as planned. The target group, 65 households (76.47%) participated in activities to enhance health literacy. The target group had set guidelines to control and prevent dengue in the community. An example of exchanging experiences was "In the morning, I walked around the house to exercise and looked at the water. I gained both benefits." "At first, I didn't think there were mosquitoes but when I poured some water from an open container, I saw that the mosquito eggs were stuck to it."

At the end of the planned activities, the results were analyzed and discussed. It was found that the research team, health personnel, representatives from the Local Administrative Organization, Village Health Volunteers, and household representatives proposed that a survey of mosquito larvae breeding sites should be done continuously every month by village health volunteers. If the mosquito larvae are not found, a survey will be run every 3 months with a collaboration of nursing students and lecturers from the nursing college. In each survey, a red sticker and a green sticker were posted in front of each house in order to raise awareness among family members to take action to prevent dengue in the community.

5.1 Health literacy in dengue prevention

Table 2 Mean, standard deviation of health literacy in dengue prevention of the target group before and after the implementation (n = 85)

Health literacy	*N*	*M*	*SD*	*t*	*p-value (1-tailed)*
Before	85	74.28	4.79	34.39	<.001
After	85	93.81	7.04		

From Table 2, it was found that the mean score of health literacy in dengue prevention after the implementation was significantly (p-$value$ < .01) higher than before the implementation (M = 93.81, SD = 7.04; M = 74.28, SD = 4.79, respectively).

Table 3 Mean and standard deviation of health literacy components in dengue prevention and control before and after the implementation (n = 85)

Health literacy components	Possible score	Before		After	
		M	*SD*	*M*	*SD*
Obtaining	0-40	21.87	2.49	31.52	2.26
Understanding	0-10	4.91	1.65	8.87	1.06
Decision-making	0-40	29.00	2.46	33.69	2.65
Applying	0-40	30.89	5.16	32.35	5.22

From table 3, it was found that the mean scores of all health literacy components (obtaining, understanding, decision-making, and applying) in dengue prevention after the implementation were higher than before the implementation.

Table 4 Number and percentage of health literacy in dengue prevention level of the target group in each village before and after the implementation (n=85)

Village	Health literacy level (before)			Health literacy (after)		
	Low (Number/ Percentage)	Medium	High	Low	Medium (Number/ Percentage)	High (Number/ Percentage)
1	11 (4.13)	-	-	-	11 (12.94)	0
2	29 (10.90)	-	-	-	27 (31.76)	2 (2.35)
3	23 (8.65)	-	-	-	19 (22.35)	4 (4.71)
7	22 (8.27)	-	-	-	22 (25.88)	0
Total	**85 (31.95)**				**79 (92.94)**	**6 (7.06)**

From Table 4, after the implementation, it was found that the red group of all 85 households (100%) had an increased health literacy in dengue prevention; 79 households (92.94 %) were improved from low to medium level, and 6 households (7.06%) were improved to a high level of health literacy in dengue prevention.

5.2 The mosquito larvae indices

Table 5 House Index after 1 month of the implementation (n = 266)

Village	Before			After		
	Total (household)	Found (household)	HI	Total (household)	Found (household)	HI
1	174	54	31.03	54	3	5.55
2	214	65	30.37	65	4	6.15
3	267	82	30.71	82	2	2.44
7	211	65	30.81	65	2	3.08
Total	**866**	**266**	**30.71**	**266**	**11**	**4.13**

From Table 5, it was found that the HI after 1 month of the operation was reduced (HI before = 30.71 and HI after = 4.13).

Table 6 Mean, standard deviation of Container Index before and after 1 month of the operation (n = 266)

CI	n	*M*	*SD*	t	*p-value (1-tailed)*
Before	266	3.94	1.21	32.38	<.001
After	266	0.34	0.50		

From Table 6, after the operation, it was found that the CI was lower than before the operation (*M* = 0.34, *SD* = 0.50; *M* = 3.94, *SD* = 1.21, respectively).

5.3 The morbidity rate of dengue

There were no dengue cases found in all 4 villages in Nong Trud Sub-District, Muang District, Trang Province in 2020.

Discussion

The key findings of this study were presented in order of the research objectives as follows:

1. The situation of dengue, contributing factors, and obstacles to preventing dengue in the Nong Trud sub-district, Trang Province.

Most of the people (69.17%) in the Nong Trud Sub-District, Muang District, Trang Province had health literacy in preventing dengue at a low and a moderate level. Only 30.83 percent of them had health literacy in preventing dengue at a high level. This might be related to the level of education; most of the participants graduated from primary school (66.54 %). Some families had only the elderly who stayed at home, resulting in little or no interest in obtaining health resources in searching for dengue prevention knowledge. The prevention activities were undertaken only when the village health volunteers encouraged them. In some areas, the village health volunteers took the main responsibility to eliminate mosquito larvae breeding sites where households put the burden on the village health volunteers to conduct a weekly survey. In terms of obtaining health information components, the least practice was in "You can find Information on dengue prevention from the internet" (13.16%). It was consistent with a study by Chayyaphong & Onmasen (2020), which found that the majority of respondents' health literacy was inadequate. They could access the internet to obtain health information but they were not much interested and searched very little about health information. In addition, the European Health Literacy Consortium (2012) states that health literacy is related to people's literacy. It is a determinant of individuals' health literacy and motivation to obtain, understand and use the information to make decisions and take actions that will have an impact on their health status.

2. The effectiveness of enhancing health literacy in preventing dengue among people in the Nong Trud sub-district, Trang Province on Health Literacy Score, Aedes larvae index (HI and CI), and the morbidity rate of dengue.

Enhancing health literacy in dengue prevention has achieved at least 60 percent of the goals set forth. After the implementation of those activities, it was found that the research team, health personnel, representatives from Sub-district Administrative Organization, Village Health Volunteers, and household representatives agreed to survey mosquito larvae breeding sites continuously every month because it is useful to monitor the preventive practice. There was a consensus that the survey of mosquito larvae breeding sites should be done once a month by village health volunteers. If Aedes larvae are not found; the survey will be done every 3 months. This is consistent with the study of Labkosa, Pansili, & Sripugdee (2016) and Suwanbamrung, Saengsuwan, Sangmanee, Thrikaew, Srimoung, & Maneerattanasak (2021). In addition, a survey of mosquito larvae breeding sites was also conducted by a team of nursing students, and instructors of Boromarajonani College of Nursing, Trang every 3 months. In each survey, stickers (red or green color) representing found/not found mosquitoes were posted in front of each house to raise awareness among family members to take action to prevent dengue in the community. However, the study conducted by Seedaket,

Tantasit, Phajan, & Wasuwipa (2019) about the development of a DHF prevention and control model in community, using Appreciation Influence Control (AIC) Process indicated that the survey of mosquito larvae breeding sites has been done every week by village health volunteers.

This study does not have a control group for comparison an effectiveness of the enhancing health literacy in dengue prevention.

Implication of the Results

1. Health literacy programs should be implemented in the yellow (medium level of health literacy) and green groups (high level of health literacy) for continuous and sustainable prevention of dengue.

2. Health literacy in terms of accessibility was at the lowest level. Therefore, there should be more skill enhancement in this dimension.

Recommendation for Further Study

A follow-up study should be conducted every 3 and 6 months to further assess the persistence of health literacy in dengue prevention.

References

Aninlabon, W. & Maithongngam, K. (2020). Factors associated with the prevention and control of communicable diseases caused by Aedes mosquitoes in Langsuan District, Chumphon. *The Office of Disease Prevention and Control 9th Nakhon Ratchasima Journal, 26(2), 62–71.* (in Thai)

Chantarintrakorn. A. (2014). *Relationship between Health Literacy and Dengue Hemorrhagic Fever Prevention and Control Behaviors of Public Health Volunteers in Suanluang Sub-district Municipality, Krathum Baen District, Samut Sakhon Province*. Graduate School, Kasetsart University. (in Thai)

Chayyaphong, A. & Onmasen, P. (2020). Factors related to health literacy for the prevention of Dengue of school-age children in Nadee District, Prachin Buri Province. *Disease Control Journal, 46*(2), 152-161. (in Thai)

Department of Disease Control, Ministry of Public Health. (2020). *Annual Report on the Prognosis of Dengue Hemorrhagic Fever 2020*. Retrieved 24 September 2020 from https://ddc.moph.go.th/uploads/ckeditor/6f4922f45568161a8cdf4ad2299f6d23/files/Dangue/Prophecy/2562.pdf?fbclid=IwAR0RmXg7Tv8aL2BkIs6XWJyw0YXWfiCFrhdSMJi8NWNWv8cPBFzzRDHn6Zo.

European Health Literacy Consortium. (2012). *Comparative Report on Health Literacy in Eight EU Member States. The European Health Literacy Survey HLSEU; 2012*. Retrieved July 26, 2020 from www.HEALTH-LITERACY.EU.

Kaeodumkoeng, K. (2019). *Health Literacy: Access, Understanding, and Application*. Bangkok, Amarin Printing & Publishing Public Company Limited. (in Thai)

Kitterawuttiwong, N. (2015). Translate health literacy in providing public health activities. *KKU Journal for Public Health Research, 8*(2), 68-75. (in Thai)

Konsnan, W. & Poum, A. (2020). Health literacy associated with preventing and controlling the behavior of dengue among village health volunteers in Nong Yai sub-district, Prasat district, Surin province. *Journal of Health Science and Community Public Health, 3(1),* 35-44. (in Thai)

Labkosa, T., Pansili, W., & Sripugdee, S. (2016). The prevention model of dengue hemorrhagic fever by the participation of community health leaders, Muangboa sub-district, Chumphonburi district, Surin province. *Thaksin Journal, 19*(1), 44-54.

Nong Trud Sub-District Health Promoting Hospital, Trang Provicial Health Office. (2019*). Health Statistics Report 2019*. Trang Provicial Health Office. (in Thai)

Nutbeam, D. (2008). The evolving concept of health literacy. *Social Science and Medicine, 67*(12), 2072-2078.

Seedaket, S., Tantasit Y., Phajan, T., & Wasuwipa, J. (2019). Dengue hemorrhagic fever (DHF): Development of a prevention and control model in community, using appreciation influence control (AIC) process. T*he Southern College Network Journal of Nursing and Public Health, 6*(1), 28-38. (in Thai)

Stringer, E.T. (2007). Action Research. Los Angeles: Sage Publications.

Suwanbamrung C, Saengsuwan B, Sangmanee T, Thrikaew N, Srimoung P, Maneerattanasak S. (2021). Knowledge, attitudes, and practices towards Dengue prevention among primary school children with and without experience of previous Dengue infection in southern Thailand. *One Health, 13*, 1-8.

Vector-Borne Disease. (2018). Annual Report 2018. Bangkok: Aksorn graphic & design.

Vector-Borne Disease Bureau, Department of Disease Control, Ministry of Public Health. (2020). *Dengue Hemorrhagic Fever Situation at 35th Week, 2020*. Retrieved August 14, 2020 from https://ddc.moph.go.th/uploads/ckeditor/6f4922f45568161a8cdf4ad2299f6d23/files/Dangue/Situation/2562/DENGUE%2035.pdf.