DEVELOPMENT OF THE DENGUE FEVER PREVENTION PARADIGM IN PEOPLE OF KHAM KAEW SUB-DISTRICT, SO PHISAI DISTRICT, BUENG KAN PROVINCE, THAILAND

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ABSTRACT

Environmental condition is very important for the Dengue Fever Prevention. People in this area lacked the knowledge, awareness of an environmental condition. To achieve sustainable control of the occurrence of dengue fever, therefore, this mixed methodology research was performed: 1) to gather general information related to the community environment for dengue fever prevention, 2) to develop a paradigm for dengue fever prevention, and 3) to compare the levels of knowledge, attitude, and community participation after attending a training course on dengue fever prevention. The gathering general information related to the community environment for dengue fever prevention was performed by survey method, 341 participants were recruited by using the Taro Yamane formula and stratified random sampling, subsequently, the model was developed for training. After that, the training and evaluation were implemented. Thirty-two volunteers participated in the training on dengue fever prevention. The testing instruments consisted of Knowledge Test Form, Attitude Test Form, and Dengue Prevention Participatory Test Form. The results indicated that the dengue fever prevention paradigm was supported by the following six factors: 1) having reliable data, 2) providing training on disease prevention, 3) having competent agents, 4) presenting the dengue prevention system to the community, 5) having people participation, and 6) having environmental management. Concerning the training on dengue fever prevention, the villagers' post-test scores on knowledge, attitude, and participation in dengue fever prevention were significantly higher than their pre-test scores. This research increased the knowledge, attitude and participation of people after training on dengue fever prevention in their community.

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Keywords: paradigm development; dengue fever prevention; knowledge; attitude; participation

INTRODUCTION

Dengue fever is a mosquito-transmitted virus infection of global public health concern. Incidence of dengue fever is increasing, and two-fifths of the world's population is now at risk from the disease in over 100 endemic countries (Al-Muhandis & Hunter, 2011; Schmidt et al., 2011). The current estimate is a total of 390 million cases of dengue infections worldwide, of which 96 million are clinically apparent (Orella-no et al., 2016; Kumaran et al., 2018). Overall mean costs were international dollar (I\$) 514 and 1394 of Dengue for ambulatory and hospital cases (Suaya et al., 2009). Dengue is an acute febrile illness caused by *Aedes aegypti* and *Aedes albopictus* (Araújo et al., 2009; Alhaeli et al., 2016).

The Dengue is an RNA virus belonging to the genus Flavivirus in the family of Flaviviridae (De la Guardia & Lleonart, 2014; Pitaksajjakul et al., 2016). The causative agents of dengue fever (DF) are Dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) (Pitaksajjakul et al., 2016). The infection may be the out-

come of transmission of any of the four dengue serotypes, DEN-1, DEN-2, DEN-3 and DEN-4 (Mau & Sopi, 2014). Currently, there is no specific antiviral treatment or effective vaccine to combat this infection, except controlling the vectors involved in the transmission of this infection (Hapuarachchi et al., 2016; Bos et al., 2018). This disease is common in tropical and subtropical regions, with currently close to 75% of the global population exposed to Dengue being in the Asia-Pacific region (World Health Organization, 2012; Kusairi & Yulia, 2020). Several factors may influence the dynamics of a mosquito-transmitted virus infection, including several demographic, climate factors, social, virological, immunological and ecological variables. (Cazelles et al., 2005; Bouzid et al., 2014; Alhaeli et al., 2016; Hapuarachchi et al., 2016). The causative agents are transmissible to people of all ages and both genders (Atique et al., 2018; Haroon et al., 2019; Ahmed et al., 2020). More surprisingly, use of the Wolbachia bacterium is the carrier of a new type of dengue fever virus, even though they are not bloodsuckers as are their female counterparts (Ndii et al., 2016).

In Thailand, dengue fever is spreading in all regions and has been a significant public health problem for the past fifty years (Promprou et al., 2005; Suwanbamrung et al., 2011). The 2013 outbreak was the most intense outbreak of the disease on record over ten years. The northern and southern territories had the highest number of patients, 384 and 276.28 patients *per* 100,000 people, respectively (Department of Disease Control, 2016).

The number of patient case rate increased 2.3 times from 2018 to 2019, with the Central region having the highest number of cases at 5,981 and the northeastern region having 3,555 cases respectively (Department of Disease Control, Ministry of Public Health, 2019).

In Bueng Kan Province, the number of dengue patients *per* 100,000 people increased between 2012 and 2016 from 48.07, 305.42, 38.85, 60.92, and 150.86, respectively (Public Health Office of Buengkhan Provincial, 2016).In the northeastern region, Health Service Area 8, Bueng Kan Province had the highest of patients *per* 100,000 people in 2019 (11.84) (Department of Disease Control, Ministry of Public Health, 2019).

In So Phisai District, the number of dengue patients *per* 100,000 people from 2012 to 2016 was 7.81, 209.03, 16.93, 39.75, and 192.47, respectively (Public Health Office of Sophisai, 2016). In Kham Kaew Sub-district, the number of dengue patients per 100,000 people) from 2012 to 2016 were 10.23, 202.45, 30.22, 20.05, and 149.81, respectively. The four villages with the highest level of dengue fever incidence were Kham Waeng, Tha Rua, Kham Kaew, and Non Samakee (Public Health Office of Sophisai, 2016).

To achieve sustainable control of the occurrence of dengue fever. Currently, people or community participation should be established by disseminating them with knowledge, attitude and preventive activities with appropriate environmental changes. (Singseewo & Jintana, 2011; Sayavong et al., 2015; Boonchutima et al., 2017; Kumaran et al., 2018; Herbuela et al., 2020). Subsequently, the new paradigm on preventive measures will be organized through a course on environmental change in dengue fever control (Romani et al., 2007; Suwanbamrung et al., 2010).

As the reason mentioned above, this research aimed to develop a paradigm for dengue fever prevention in Kham Kaew Sub-district has not this dengue fever prevention program in the past. Environmental studies were beneficial as a means of spreading knowledge on the prevention of dengue fever, creating greater public awareness, and recruiting public participation to assist in disease prevention complied with Suwanbamrung et al. (2011) study.

This research aimed: 1) To gather general information related to the community environment for dengue fever prevention, 2) to develop a paradigm for dengue fever prevention, and 3) to compare the levels of knowledge, attitude, and community participation after attending a training workshop on dengue fever prevention.

METHODS

A mixed methods research design was used to study the phenomenon. The research area is all the villages under the jurisdiction of Kham Kaew Sub-district in So Phisai District of Bueng Kan Province. The population consisted of 2,289 residents of the villages. The study was classified into three phases:

Phase 1: **Gathering general information and investigating the community environment for the prevention of dengue fever**. Data from 341 participants were recruited by using the Taro Yamane formula (Yamane, 1967) and stratified random sampling. Then, the general information on the community and its environment for dengue fever protection were collected. The commu-

nity field information and data from a literature review of environmental studies were used to design a dengue prevention measure in phase 2.

Phase 2: **Developing the prevent dengue fever program and designing the measurement by the villagers' participation**. The five experts were composed of doctors, public health officials, and environment officials who were purposively selected to approve the program. The developing steps were as follows:

1. Data from Phase 1 were used to establish the following measures for dengue fever prevention:

1.1 The community's environmental information for the prevention of dengue fever;

1.2 Hosting a training workshop to disseminate knowledge on dengue fever prevention;

1.3 Use of media channels, such as pamphlets, manuals, and pocketbooks to begin a campaign against dengue fever; and

1.4 Engaging community participation in the following areas:

- Investigating the community environment for dengue fever prevention;

- Planning for dengue fever prevention;

- Implementing dengue fever prevention measures;

- Evaluating dengue fever prevention practices; and

-Sharing the benefits, which result from a successful dengue fever prevention scheme

2. The draft of the dengue fever prevention manual was presented to five specialists. Following their suggestions, the plan was revised by applying the findings from environmental studies. The finished version of the dengue fever prevention manual was deemed appropriate for the elimination of the disease in the context of the Kham Kaew Sub-district environment.

3. The specialists suggested that families and public health volunteers monitor the mosquitoes at the household level and that measures taken against the disease be publicized to the villagers.

4. Piloting of the dengue fever prevention paradigm

Phase 3: **Evaluating the efficiency of the dengue fever preventive program**. The researcher conducted a 2-day training workshop for villagers in Kham Kaew Sub-district intending to impart knowledge and change their attitude, as well as enabling them to become part of the dengue fever prevention participation team in their community. Thirty-two villagers had volunteered to participate in the training.

The research instrument consisted of questionnaires and test forms, as listed below:

1. Questionnaires for collecting general information and gauging the community environment for the prevention of dengue fever in Kham Kaew Sub-district; and

2. A knowledge, attitude and participation test form to determine the villagers' degree of understanding about measures for dengue fever prevention in the Kham Kaew Sub-district

The data collection was carried out by using questionnaires and determining the participants' levels of knowledge, attitude, and participation related to dengue fever prevention before and after the training. Descriptive statistics of percentiles, means, and standard deviations, as well inferential statistical tests of paired t-tests, were used to present general findings relating to the participants' levels of knowledge, attitude, and participation before and after the training program.

RESULTS AND DISCUSSION

The following observations were made about the villagers' general living environment: 1) most families had four members (31.40%), 2) most of them had their plots of rubber trees (76.20%), and 3) 76.50% of the participants reported having regularly worked on the rubber tree plantation. Focusing on the level of perception related to dengue fever prevention, most of the informants stated that they obtained information about the disease from public health workers (92.40%), training and seminars (51.30%), the media, especially television (73.10%). In the present study, the common source of dengue knowledge came from television. More than 70% of the participants cited television as a source of their information (Ibrahim et al., 2009), printed materials and pamphlets (28.70%). For dengue fever prevention, most informants reported sleeping in good conditions using a sleeping net (93.80%), while for most houses, it was reported that doors had not been installed and that there was no window mosquito netting (94.80%). Some looked for mosquito larvae and pupae (average score of 1.99). It was reported that they had occasionally destroyed the mosquitoes' breeding places (average score of 1.83) and had occasionally covered water basins or bowls with lids (average score of 2.00).

Nevertheless, they had seldom raised pupa-eating fish (average score of 3.48). They had shown a high level of knowledge on dengue fe-

ver prevention (average score of 12.29), but there were differences in attitude towards preventing dengue fever (average score of 2.09). Finally, they had shown a moderate level of knowledge on dengue fever prevention (average score of 2.93). In addition to obtaining important information on the prevention of dengue fever, the researcher also encouraged interaction between herself and the local people, representing a type of correspondence that helps to smooth the process of the research. The primary data, which were obtained directly from residents, enabled the researcher to identify appropriate measures for dengue fever prevention. Taking some action against the spread of dengue fever cultivates a sense of community spirit, a sense of belonging, and community commitment. People's participation in problem-solving was observed right from the beginning. Similar findings were revealed in a research study by Wongsasuk et al. (2016). Besides, participants who were involved in community activities and the health network community became aware of the community problems, which had arisen from the spread of the disease.

2. The result of the development of the program for dengue fever prevention is illustrated

2.1. The program had trustworthy sources of data as public health officials were able to collect field information in the villages (Pitaksajjakul et al., 2016; Atique et al., 2018; Ahmed et al., 2020) and used dengue case data acquired from the hospital records. These data helped the researcher to formulate appropriate measures for preventing dengue fever that fitted the particular contexts of the communities.

2.2 Based on this program, the use of pamphlets, manuals and pocketbooks advised that dengue fever prevention training be conducted by designated public health officers at least twice a year (Siriwatthanamichai, 2019; Siwiendrayanti et al., 2019).

2.3 The program suggests that a family agent be appointed at the household level to inspect and destroy mosquito breeding sources every week. Many public health volunteers should be assigned, each of whom was in charge of inspecting 10-15 houses and ensuring the continual termination of the mosquitoes' breeding sources were observed in a study by Alyousefi et al. (2016), who ensured that more than 90% of household heads had correct knowledge about dengue fever.

2.4 The program also proposes the dissemination of dengue fever prevention measures through different channels in the villages and schools, such as education, public speaker system, a manual and a pocketbook. (Ibrahim et al., 2009; Kusairi & Yulia, 2020).

2.5 The program encourages the participation of people in the following activities:

- Studying the environmental conditions
- Destroying the mosquitoes' breeding places and keeping a record of the tasks performed
-Planning the steps for dengue fever prevention
-Taking part in dengue fever prevention activities
-Evaluating the efficiency of dengue fever preventive measures (Romani et al., 2007; Suwanbamrung et al., 2011).

2.6 Based on this program, the following six measures should be taken: covering water basins, changing the water in uncovered water bowls every seven days, raising pupa-eating fish in water bowls, keeping the areas surrounding the houses clean in order to prevent mosquitoes from breeding, implementing dengue fever prevention measures every seven days, and draining abandoned water bowls. (Phuong et al., 2008; Tapia-Conyer et al., 2012).

From 2.1 to 2.6, the community or people's participation were the primary outcomes to indicate the sustainability of the dengue fever prevention paradigm in Kham Kaew Sub-district, which involved the people in many processes: making environmental surveys of their communities, planning the paradigm, implementing the plan, evaluating the program's success, and sharing the benefits. Similar results were observed in a study by Labkosa et al. (2016), who investigated the paradigm for dengue fever prevention in the Muangboa Sub-District, Surin Province. They concluded that the development of that anti-dengue scheme had made the people more aware of the security and wellness of their community, while engaging them in different processes of the research, such as identifying the problem, analyzing the data, planning the scheme, evaluating the plan, and sharing the research benefits. The paradigm developed in this research was meant to disseminate knowledge on dengue fever and to motivate people to take preventive measures against the disease in their communities. To obtain valid data to establish measures against the sickness, it was essential to scrutinize the community's general information. A community-based environmental management plan embedded in a routine control program was effective at reducing the level of Aedes infestation Vanlerberghe et al. (2010).

3. About knowledge and attitude towards the prevention of dengue fever, the post-test scores in this area were significantly higher than the pre-test alternative (p<.001). The results indicated that villagers' knowledge and attitude toward disease prevention changed after the training (see Table 1).

Table 1. Average Pre-test and Post-test Scores on Knowledge, Attitude in Dengue Fever Prevention in the Experimental Group (n=32)

Item	Pre-test			Post-test			df	t	P
	$\overline{X}$	S.D.	Level	$\overline{X}$	S.D.	Level			
Knowledge (n=20)	12.37	2.45	High	17.84	1.46	Highest	31	11.94	<.001*
Attitude (n=5)	2.10	0.37	Disagree	3.85	0.18	Agree	31	36.82	<.001*

Level of statistical significance was set at .05.

The techniques employed in this research to implement measures against the disease included training, a manual and a pocketbook. The integration of these types of media triggered the participation and learning enthusiasm among the anti-dengue trainees. Similar results were observed in a study by Siriwatthanamichai (2019), who revealed that a manual produced by agriculturalists resulted in, after training, farmers having more knowledge and more positive attitudes than before training. Similar results were observed in a study by Siwiendrayanti et al. (2019), who revealed that a "MANDIRI" Pocket Book could generally increase the knowledge and behaviours in terms of filariasis prevention efforts. Laohapichatchai et al. (2013) studied the efficiency of group processes in a physical education program for the prevention of dengue fever in Pra Nakhon Sri Ayudhaya. After the application of this program in an experimental group, it was observed that the post-test scores on knowledge, attitude, and practices of this group of participants were significantly higher (p<.01) than the pre-test scores. The post-test scores of the experimental group were also significantly higher (p<.05) than the scores gauged from the control group. In conclusion, the training process had increased knowledge and the positive attitudes of villagers. There are available training media, training manuals and pocketbook that help people understand more.

4. The informants' level of participation in preventing dengue fever, which was observed in the post-test score was significantly higher (p<.05) than that found in the pre-test. This supports the observation that training on dengue fever prevention can increase the participation of community members (see Table 2).

Table 2. Average Pre and Post Scores on People's Participation in Dengue Fever Prevention in the Experimental Group (n=32)

Item	Pre			Post			df	t	P
	$\overline{X}$	S.D.	Level	$\overline{X}$	S.D.	Level			
Participation (n=5)	2.97	0.41	Moderate	4.25	0.23	High	31	24.90	<.001*

Level of statistical significance was at 0.05.

The level of people's participation in dengue fever prevention in Kham Kaew Sub-district was significantly higher (p<0.05) after training had been introduced to the villagers. This finding demonstrates that the training increased community participation in the prevention of dengue fever. The researcher observed that the villagers were involved in all processes of the research, including the following: community environmental observation, setting plans for dengue fever prevention, implementing the plans, evaluating the program, and sharing the benefits of the research.

One factor that explains the increase in participation was the incorporation of environmental study techniques into the research process. Based on the environmental study principle, the participants were encouraged to take part in expressing their opinions, participating in group discussions, and exchanging knowledge. These collaborations were crucial in creating new knowledge and collective achievement.

Similar results were also achieved in the sustainability of community-based dengue control by Romani et al. (2007) and Suwanbamrung

et al. (2011) who revealed that continuous capacity building in the community led to participatory planning, implementation and evaluation of the Aedes control activities. Also, studies of the community's engagement in defeating dengue fever suggested that sustainable prevention of the disease relies on overhauling of the community's environment, disseminating knowledge, and changing behaviour at the household level (Phuong et al., 2008; Tapia-Conyer et al., 2012).

CONCLUSION

In this study, the Dengue Fever Prevention Paradigm was developed based on the community's information, subsequently, improved by the experts and villagers' participation. After that, the researcher used a training method that employed environmental study techniques to increase the knowledge and positive attitudes about dengue fever prevention to people in Kham Kaew Sub-district. The participants were engaged in group discussions, while different types of media, such as PowerPoint presentations, a manual and a pocketbook, were used to achieve higher levels of comprehension and positive attitudes. The participants' knowledge was evaluated before and after the training. The post-test was administered a month after the training, with significant gains in both knowledge of and attitudes towards dengue fever prevention. Community participation since the beginning is the core to succeed in the sustainable control of the Dengue Fever Prevention.

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