

Development of Dengue Fever Prevention and Control Model

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Abstract: *The objective of this research was to develop dengue fever prevention and control model. The populations were community health leader of Nongkhai Province. The questionnaire was used as instrument for data collecting. Pearson Correlation and Path Analysis were used for data analysis. The results revealed that environmental education in terms of knowledge (KN) showed directly affected to inspiration of public mind in aspects of role model (RM), impressive environment (IE), and impressive environment (IV) with .553, .572, and .627. Public mind in aspects of role model (RM), impressive environment (IE), impressive environment (IV) showed directly affected to participation of Dengue fever prevention and control (PAR) with .559, .608 and .516. KN also directly affected to PAR with .612. Environmental education in terms of awareness (AW) showed directly affected to RM, IE, and IV with .612, .558 and .601. AW also directly affected to PAR with .635. KN and AW showed directly affected to Dengue fever prevention and control behavior (BEH) with .544 and .653. RM, IE, and IV showed directly affected to BEH with .462, .537 and .542 respectively.*

Key Words: *Development / Dengue Fever / Prevention / Control / Model*

1. Introduction

Climate change is likely to have indirect effect on vector abundance and vector population. Environmental condition might stimulate the patten of vector behavior such as *Aedes aegypti*, which is a vector of Dengue fever changing its behavior of day time feeding to take more long duration of feeding. Moreover, the vector might be replaced by another vector species (McMichael, Haines, Slooff, & Kovats, (Eds), 1996).

Additionally, human behavior has also promoted the spreading of vector, especially, the waste disposal of man-made containers like earthenware jars, metal drums and concrete cisterns used for domestic water storage, as well as discarded plastic food containers, used automobile tyres and other items that collect rainwater (WHO, 2009, & Theingkamol, 2011e).

WHO presently estimates there may be 50 million dengue infections worldwide every year. The disease is now endemic in more than 100 countries in Africa, the Americas, the Eastern Mediterranean, South-east Asia and the Western Pacific. South-east Asia and the Western Pacific are the most seriously affected. Before 1970 only nine countries had experienced dengue hemorrhagic fever (DHF) epidemics, a number that had increased more than four-fold by 1995. Not only is the number of cases increasing as the disease is spreading to new areas, but explosive outbreaks are occurring. In 2007, there were more than 890, 000 reported cases of dengue in the Americas, of which 26,000 cases were DHF. Additionally, Venezuela reported over 80, 000 cases, including more than 6,000 cases of DHF (WHO, 2009).

Dengue fever (DF) or Dengue Hemorrhagic Fever (DHF) is occurred by a bite from an infected *Aedes* mosquito. The victim is happened when the patient got second or even third strain of virus after the initial infection of a strain of dengue virus. Prevention and control are more importance than treatment. It is a fatal disease. Therefore, the global population should pay attention on change behavior housing and community environment.

Environmental management involves planning, organization, execution and monitoring of activities for the modification and/or manipulation of environmental factors or their interplay with human beings with a view to prevent or minimize vector breeding and reduce human-vector-virus contact. The control of *Ae. aegypti* in Cuba and Panama in the early part of the 20th century was based mainly on environmental management. Such measures remain applicable wherever dengue is endemic (WHO, 2009 & Langly, 1998).

Environmental methods of *Ae. aegypti* and *Ae. Albopictus* control, it is reducing man-vector contact, solid waste management, modification of man-made breeding sites, and improved house design. The major environmental management of *Ae. aegypti* control, it should begin at production sites such as water evaporation cooler, water storage tank/cistern, drum, flower vase with water, potted plants with saucers, ornamental pool/fountain, roof gutter/sun shades, animal water container, ant-trap, used tyres, discarded large appliances, discarded buckets, discarded food and drink containers, including natural sources such as tree holes, and rock holes are important sources (WHO, 2009).

Therefore, prevention and control on physical and biological and to achieve sustainability of a successful DF/DHF vector control program, it is essential to focus on the larval source reduction while closely cooperating with non-health sectors such as nongovernmental organizations, civic organizations and community groups to ensure community understanding and involvement in implementation.

Biological control is based on the introduction of organisms that prey upon, parasitize, compete with or otherwise reduce populations of the target species.

The application of biological control agents, which are directed against the larval stages of dengue vectors, in South-East Asia has been somewhat restricted to specific container habitats in small-scale field operations. While biological control avoids chemical contamination of the environment, there may be operational limitations such as the expense and task of rearing the organisms on a large scale, difficulty in applying them and their limited utility in aquatic sites where temperature, pH and organic pollution may exceed the narrow requirements of the organism. Importantly, the biological control organisms are not resistant to desiccation, hence their utility is mainly restricted to container habitats that are seldom emptied or cleaned, such as large water-storage containers or wells. However, the willingness of communities to accept the introduction of organisms into water containers is essential. Community involvement is also desirable in distributing the agents, and monitoring and restocking containers, as necessary (WHO, 2009).

With the high rate of infection of Dengue fever, it was projected that in 2008, there would be around 25,000 to 30,000 reported cases in Thailand. If we set it at 35,000 out of a population of 70 millions that would mean about 1 in 2,000 people will be infected. (It's fairly similar to HIV / AIDS statistics) (Thailandguru, 2011).

Empowerment for community for dengue fever prevention and control, the ultimate goal of controlling any epidemic disease including dengue is to prevent its transmission and control the spread of the disease as soon as possible. The success of the efforts for prevention and control of dengue relies on the effectiveness of the initiatives to control the breeding sites of the vector by improving public and household environmental sanitation and water supply, and through sustained modification of human behavior. This requires the entire gamut of the success of a disease control program relies heavily on community participation and intersectoral cooperation with non-health sectors in the prevention of disease, including vector control, and the treatment of the sick. To secure and sustain community participation and intersectoral cooperation, the following activities should be carried out community participation involvement of community health volunteer or leader to change problematic conditions and influence policies and program that affect the quality of their lives or the lives of others. Even though, Ministry of Public Health of Thailand has paid attention to prevent and control Dengue fever intensively with elimination of vector by using chemical control and public relation through community health volunteer or leaders but the epidemic of disease are still high. It might lack of the genuine recognition of Thai people on the serious fatal of dengue infection. Therefore, it might be needed the education process such as environmental education to raise awareness, change attitude and behavior of prevention and control for Dengue fever spreading in any community with public consciousness participation (WHO, 2009, Thiengkamol, 2004, Thiengkamol, 2005a, Thiengkamol, 2010b).

In order to achieve self-care prevention and control of community, they should adjust their concept and practice for daily living health care through environmental education aims to increase knowledge and understanding, awareness raising and values, belief, attitude, and behavioral change to achieve sustainable development. The community people should closely cooperate or collaborate with health official to meet success for prevention and control dengue fever. The environmental education concept is congruent to sustainable development principle, therefore it is able to use for empowering their competencies to emphasize sustainable self care management (UNESCO, 1978, Weiss, 1995 &

Thiengkamol, 2011e), including for developing people to understand that they have a relationship with the environment and that whatever they do, their activities would also affects it. This education is there to help create consciences within people and stimulate them to take a responsible behavior by using environmental education principle to develop the capability of community people to practice themselves for proper environment management to meet disease prevention and control dengue fever effectively with self-care and public consciousness (Stapp & Dorothy, 1981, Schmieder, & Allen, 1977a, Chunkao, 1993, WHO, 2009, Thiengkamol, 2011e, & Thiengkamol, 2011f, Thiengkamol, 2011g, Thiengkamol, 2011h, Thiengkamol, 2011i & Thiengkamol, 2011j).

2. Objective

The objective of this research was to develop dengue fever prevention and control model.

3. Methodology

The research design was implemented in steps by step as follows:

The populations were 9,299 community health leaders of Nongkhai Province in 2012. The 400 community health leaders were collected by simple random sampling from different districts of Nongkhai Province.

The research instrument was the questionnaire and it was used for data collecting. The content and structural validity were determined by Item Objective Congruent (IOC) with 5 experts in the academic of public health for Dengue fever prevention and control, environmental education, and social research methodology. The reliability was done by collecting the sample group with 50 community health leaders of Udonthani Province, which is adjacent province. The reliability was determined by Cronbach's Alpha (Sproull, 1995). The reliability for knowledge and understand of Dengue fever prevention and control was .899, participation for Dengue fever prevention and control was .902, environmental education was .924, inspiration of public conscious for Dengue fever prevention and control was .882, was .839 and the whole questionnaire was .921.

The descriptive statistics used were frequency, percentage, mean and standard deviation. The inferential statistics used Pearson Correlation and Path Analysis for data analysis (Hair, Anderson, Tataham, & Black, 1998).

4. Results

4.1 General Characteristics of Sample Group

The sample group of this study was community health leaders were collected by simple random sampling from different districts of Nongkhai Province with the same proportion. Most of them were female with 325 leaders (81.25%), and most of them had marital status of marriage with 281 community health leaders (70.25 %). Majority had occupation as agriculturist with 319 peoples (79.75%). Most of them had education level at primary school with 287 (71.75%) and all of them were Buddhist. Average of family income was 17,244 Baht per year and average age was 32.56 years as illustrated in table 1.

Table 1 Demographic Characteristics of Sample Group

Characteristics	Community Health Leader	
	Frequency	Percent
Sex		
Male	75	18.75
Female	325	81.25
Marital Status		
Marriage	281	70.25
Single	101	25.25
Divorce/ Widow/Separate	18	4.50
Occupation		
Agriculturist	299	74.75
Government Officials	2	0.50
Private Business	7	1.75
Employee	5	1.25

General Hire	72	18.00
House wife	15	3.75
Education Level		
Primary School Level	319	79.75
Secondary School Level	67	16.75
High School Level/ Vocational Certificate	10	2.50
Bachelor	2	0.50
Master or higher	2	0.50
Religion		
Buddhist	400	100.00
Average Family Income per year 17,224 Baht		
Average of Age 32.56 years		
Total	400	100.00

4.2 Comparison of Sex on Knowledge of Sample Group

The demographic characteristics of sample in terms of sex, the comparison of knowledge of Dengue fever prevention and control between different sex of sample group was revealed that it was highly statistical significance ($p < .01$) as shown in table 2.

Table 2 Comparison of Knowledge of Dengue Fever Prevention and Control between Different Sex of Sample Group

Sex	Number (n)	Mean	S.D.	t	Sig.
Male	75	13.563	2.015	8.443	.000**
Female	325	15.87	2.213		

** Statistically Significant at the .01 level

4.3 Comparison of Sex on Awareness of Sample Group

The demographic characteristics of sample in terms of sex, the comparison of awareness of Dengue fever prevention and control between different sex of sample group was revealed that it was highly statistical significance ($p < .01$) as shown in table 3.

Table 3 Comparison of Awareness for Dengue Fever Prevention and Control between Different Sex of Sample Group

Sex	Number (n)	Mean	S.D.	t	Sig.
Male	75	9.98	1.784	3.909	.000**
Female	325	12.94	1.811		

** Statistically Significant at the .01 level

4.4 Comparison of Sex on Participation of Sample Group

The demographic characteristics of sample in terms of sex, the comparison of participation for Dengue fever prevention and control between different sex of sample group was revealed that it was highly statistical significance ($p < .01$) as shown in table 4.

Table 4 Comparison of Participation for Dengue Fever Prevention and Control between Different Sex of Sample Group

Sex	Number (n)	Mean	S.D.	t	Sig.
Male	75	8.85	1.564	4.875	.000**
Female	325	10.94	1.237		

** Statistically Significant at the .01 level

4.5 Comparison of Sex on Inspiration of Public Mind of Sample Group

The demographic characteristics of sample in terms of sex, the comparison of Inspiration of public mind for Dengue fever prevention and control between different sex of sample group was revealed that it was highly statistical significance ($p < .01$) as shown in table 5.

Table 5 Comparison of Inspiration of Public Mind for Dengue Fever Prevention and Control between Different Sex of Sample Group

Sex	Number (n)	Mean	S.D.	t	Sig.
Male	75	14.33	2.313	4.201	.000**
Female	325	15.98	2.415		

** Statistically Significant at the .01 level

4.6 Comparison of Sex on Behavior of Sample Group

The demographic characteristics of sample in terms of sex, the comparison of Behavior for Dengue fever prevention and control between different sex of sample group was revealed that it was highly statistical significance ($p < .01$) as shown in table 6.

Table 5 Comparison of Behavior for Dengue Fever Prevention and Control between Different Sex of Sample Group

Sex	Number (n)	Mean	S.D.	t	Sig.
Male	75	14.89	2.112	4.658	.000**
Female	325	16.77	2.035		

** Statistically Significant at the .01 level

4.7 Dengue Fever Prevention and Control Model for Community Health Leaders

The results revealed that environmental education in terms of knowledge (KN) showed directly affected to inspiration of public mind in aspects of role model (RM) with .553, it also showed directly affected to participation of Dengue fever prevention and control (PAR) with .612. Public mind in aspects of role model (RM) showed directly affected to participation of Dengue fever prevention and control (PAR) with .559.

Environmental education in terms of knowledge (KN) showed directly affected to inspiration of public mind in aspects of impressive environment (IE) with .572, public mind in aspects of impressive environment (IE) showed directly affected to participation of Dengue fever prevention and control (PAR) with .608.

Environmental education in terms of knowledge (KN) showed directly affected to inspiration of public mind in aspects of impressive environment (IV) with .627. Public mind in aspects of impressive event (IV) showed directly affected to participation of Dengue fever prevention and control (PAR) with .516.

Environmental education in terms of awareness (AW) showed directly affected to inspiration of public mind in aspects of role model (RM) with .612, it also showed directly affected to participation of Dengue fever prevention and control (PAR) with .635.

Environmental education in terms awareness (AW) showed directly affected to inspiration of public mind in aspects of impressive environment (IE), and inspiration of public mind in aspects of impressive environment (IV) with .558 and .601.

Environmental education in terms of knowledge (KN) showed directly affected to Dengue fever prevention and control behavior with .544 and Environmental education in terms awareness (AW) showed directly affected to Dengue fever prevention and control behavior (BEH) with .653. Inspiration of public mind in aspects of role model (RM), impressive environment (IE), and impressive environment (IV) showed directly affected to Dengue fever prevention and control behavior with .462, .537 and .542 respectively as illustrated in diagram.

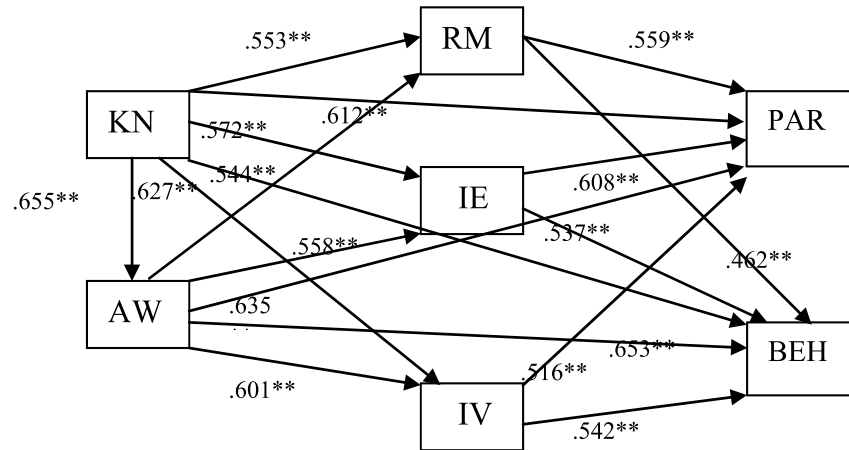


Diagram 1: Dengue Prevention and Control Model

** Statistically Significant at the .01 level

5. Discussions

The findings illustrated that After testing with Independent t-test, it was found that the mean score of knowledge, awareness, inspiration of public mind and behavior for Dengue fever prevention and control of female were higher than male with statistically significant ($p < .01$, .01, .01, and .01) respectively. Therefore, it might be explained that female had better knowledge, awareness, inspiration of public mind, participation and behavior for Dengue fever prevention and control. This indicated that the female might be easily to give knowledge, to raise awareness, to stimulate to have inspiration of public mind or public consciousness for changing participation and behavior for dengue fever prevention and control easier than male.

These results also pertinent to different researches of Jumrearnsan & Thiengkamol, (2012), and Thiengkamol, (2005a, 2005b, 2010b, 2011g, 2011h, 2011i, & 2011j) including concept proposed by Thiengkamol about environmental education and inspiration of public mind or public consciousness are able to adjust participation and behavior for dengue fever prevention and control (Thiengkamol, 2011e, Thiengkamol, 2011f, Thiengkamol, 2011g, & Thiengkamol, 2011i). Furthermore, it also congruence with Participatory Appreciation Influence and Control (PAIC) in different studies on environmental education volunteer building, development of food security, development of energy security, development of network for natural resources conservation, strengthening community through energy conservation and political competency development for women (Thiengkamol, 2004, Thiengkamol, 2005a, Thiengkamol, 2005b, Thiengkamol, 2010b, Thiengkamol, 2011f, Thiengkamol, 2011g, Thiengkamol, 2011h, Thiengkamol, 2011i, & Thiengkamol, 2011j, & Jansab, 2005)

Dengue fever prevention and control model community health leaders as presented in diagram 1, the results illustrated that if we want to develop and to build community health leaders to participate and change their behavior for Dengue fever prevention and control for rural region likes as Nongkhai Province, we might use the inspiration of public mind in terms of role model of public health officers for them. However, environmental education in term of knowledge and awareness also illustrated affected participation and behavior for Dengue fever prevention and control, therefore, we might use environmental education process to educate them in the community by public health officers. These findings were also congruent to studies of Thiengkamol, (2005a, 2005b, 2010b, 2001f, 2011g, 2011h, 2011i, & 2011j). Furthermore, to build inspiration of public mind in aspects of impressive environment and impressive event, these can be done with arrangement of appropriate environment and event for community health leaders with demonstration of Dengue fever prevention and control at community site.

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