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A comparative study of knowledge regarding emergency care during disaster between community health volunteers working in tsunami-affected and non-affected areas in Aceh Province, Indonesia

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Purpose: This study aimed to describe and compare the level of knowledge regarding emergency care during disaster between community health volunteers (CHVs) working in the tsunami affected and non-affected areas in Aceh Province, Indonesia.
Method: 144 CHVs from six districts in Aceh were studied during November 2011 to January 2012 to evaluate their level knowledge regarding emergency care during disaster between CHVs working in tsunami-affected 6-areas and non-tsunami-affected areas. The knowledge was assessed using the Community Health Volunteers' Knowledge Regarding Emergency Care Questionnaire (CHVK-ECQ) with 30 true/false statements. The composite scores of each area and the total score were calculated and transformed to percentage for ease of presentation.
Results: Overall, the CHVs' knowledge in emergency care during disaster in Aceh was at a high level in both groups. However, subjects in non-affected areas had significantly higher mean rank of the overall knowledge than those in the affected areas ($p = .02$). In the tsunami area, the highest mean score of knowledge was in the disaster triage dimension (M= 80.62%), and the lowest mean score was in the first aid (60.48 %). In contrast, CHVs' knowledge in the non-tsunami areas had the highest mean score in the first aid (84.52 %) and had the lowest mean score in the disaster triage (64. 38 %).
Conclusion: Although both groups had high levels of overall knowledge, an education program for improved knowledge in the areas of first aid, team organization, and disaster triage should be emphasized to refresh the CHVs' knowledge and skills for disaster management.

Keywords: Knowledge, skills, community health volunteers, and natural disaster

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Introduction

Large-scale disasters around the world demonstrate that no one and no country is immune from the threat of natural disaster (Fung, Loke & Lai, 2008). The occurrence of natural disasters is becoming more frequent, especially in the Asia-Pacific region, where more than 80% of the reported victims live (Rodríguez & Aguirre, 2006). The World Health Organization (2008) reported that in the South-East Asian region in the last 10 years, approximately 61.6% of the total number of people killed were in disasters. Indonesia is one of the most high risk countries with disasters occurring almost every year, because its geographical area is an active tectonic region (Indonesia Disaster, 2010). Aceh Province is a particularly high risk area for natural disasters as to most districts and cities are located at the boundary of plate and earth fault (Her, 2010). The Asian tsunami on December 26, 2004 in Aceh caused more than 120,514 deaths, and left 403,420 persons homeless and 37,000 people missing and presumed dead (Vogt & Kulbok, 2008).

To prevent loss of life and reduce the impact of disaster, there is a need for emergency preparedness. Community health volunteers (CHVs) are often trained to perform certain tasks in helping people in the community in an emergency situation (Flint & Brennan, 2006). The evidence suggests that CHVs (both lay and professional) can play an important role in the development and achievement of emergency management, in all phases including mitigation, preparedness, emergency or response, and recovery (Fulmer, Portelli & Foltin, 2007). Many victims can be saved by CHVs in the first hours after a crisis before external teams arrive to give help because they are often the first persons on the scene, closest to the catastrophe, and typically trusted by the victims (Thomas, 2003). Well prepared and well organized CHVs for the community can reduce risks and the impact of disaster (IFRC & RCS, 2009). In order to assist victims in the emergency phase during a disaster, basic knowledge is required in providing early warning, first aid, triage, logistics and communication, search and rescue, and

team organization (Flint & Brennan, 2006).

Owing to a lack of professional staff and the limited number of health volunteer assistants during disaster events, trained CHVs are necessary (DeSimore, 2009). According to a statement from the head of the CHVs organization, the members of trained CHVs in Aceh province may still have low competencies particularly regarding the emergency phase of disaster (Tarmizi, 2011). It is unknown whether trained CHVs have met the required knowledge for working during a disaster. However, disaster preparedness in the emergency phase is important to everyone.

Therefore, it is important to compare the knowledge of emergency care between CHVs who work in the tsunami-affected areas and non-affected areas in Aceh Province. CHVs are needed in both areas to meet the minimum standard of knowledge in helping victims in the community due to the high risk of disaster in the future. Furthermore, no study has been conducted in Aceh to evaluate the knowledge of CHVs, particularly lay volunteers, specifically related to emergency care during disaster management. The objectives of the study were to describe and compare the levels of knowledge regarding emergency care during disaster between the CHVs who are working in the tsunami-affected areas and non-affected areas in Aceh province, Indonesia.

Method

Settings

The target population in this study was CHVs who work in the community in Aceh province, Indonesia.

Sample

According to the Health Department of Aceh Province[13], there are 23 districts, which include 1314 CHVs who are persistently and actively working in these communities

According to a statement from the head of the CHVs organization of Aceh province (Tarmizi, 2011). Six districts were selected and a total of 144 CHVs were included in the study. The inclusion criteria were age 18 – 55 years, able to communicate in Indonesian language, currently working as a CHV located in the tsunami-affected areas (n=72) or non-affected areas (n=72). A stratified disproportional random sampling technique was used to select the subjects from 2 strata based on the location: urban areas and rural areas (12 districts from urban and 11 districts from rural).

Data Collection Instruments

The Demographic Data Questionnaire (DDQ)

This questionnaire was developed by the researcher to collect the patient's demographic data. It consisted of the following items: age, gender, religion, and marital status, level of education, occupation, area of residence, period of working, training in first aid and other matters related to emergency care, previous disaster experience and training needs for the future.

Community Health Volunteer Knowledge Regarding Emergency Care Questionnaire (CHVK-ECQ)

CHVK-ECQ was developed based on the study framework of Flint and Brennan (2006); Vogt and Kulbok (2008). The questionnaire consists of 6 dimensions including early warning, disaster triage, first aid, logistic and communication, search and rescue, and team organization. Thirty items using True/False type questions were measured using a score of 1 for a correct answer and 0 for an incorrect answer, yielding a possible total score ranging from 0 to 30. These scores were converted into percentage and interpreted into 4 levels by criterion method based on McDonalds' study (2002) as cited in Putra (2011): needs improvement (<60%), low (60-69.99%), moderate (70-79.99%), and high (>80%).

Ethical consideration

Data were collected after receiving approval of the research proposal by the Institutional Review Board of Faculty of Nursing, Prince of Songkla University, Thailand and also obtaining permission from the head of the Social Department of Aceh Province. Subjects who met the inclusion criteria were provided with an explanation of the purpose of the study and asked to sign a consent form prior to participation. To maintain confidentiality, a code was used and the personal information was kept until all processes of the study were complete.

Data Analysis

Data were analyzed and presented using descriptive statistics: frequencies, percentage, means, and standard deviations. Chi-square was used to test the differences of demographic data between the two groups. Median and interquartile range and Mann-Whitney U test were used to test for differences in knowledge score between the CHVs working in tsunami-affected and non-affected areas. The significance level was set at $p < .05$.

Results

Demographic data of the subjects

A total of 144 subjects aged 18-55 years participated in the study. Most of them were male (84.0%), approximately half were married (52.8%), and the mean age was 29.15 years (SD = 6.64). The majority (70.2%) had received education up to high school and half had been working as community volunteers for 4-5 years (51.4 %) as well as working as private business (51.4%). Most of them (78.5%) had previous experience in emergency care during disaster and had received training in first aid (77.8%). When comparing the demographic data between the two groups, those in the affected areas were found to have a higher level of education, to more likely have received training in emergency care, and less likely to report further training needs (Table 1).

Table 1 *Characteristics of subjects in tsunami and non-tsunami affected areas (N= 144)*

Characteristics	Total		Affected area (n=72)		Non-affected area (n=72)			
	N	%	n	%	n	%	χ^2	*p*
Gender							.05[b]	.82
Male	121	84.0	61	84.7	60	83.3		
Female	23	16.0	11	15.3	12	16.7		
Marital status							.03[b]	.87
Married	70	52.8	37	51.4	39	54.2		
Single	68	47.2	35	48.6	33	45.8		
Age (years)							.30[a]	.09
18-26	53	36.8	26	36.1	27	37.5		
27-36	73	50.7	37	51.4	36	50		
>37	18	12.5	9	12.5	9	12.5		
Education							4.01[a]	.04
High school or less	101	70.16	45	62.6	56	77.8		
Beyond high school	43	29.9	27	37.4	16	22.2		
Duration of working (years)							25.15[a]	<.01
2-3	58	40.3	40	55.5	18	25		
4-5	74	51.4	23	32.0	51	70.8		
>6	12	8.3	9	12.5	3	4.2		
Occupation							1.78[a]	.61
Private business	74	51.4	34	47.2	40	55.6		
Labor	21	14.6	10	13.8	11	15.3		
Farmer	6	4.2	4	5.7	2	2.8		
Students	43	29.8	24	33.3	19	26.3		
Previous experiences in emergency care during disaster							2.63[b]	.11
No	31	21.5	20	27.8	11	15.3		
Yes	113	78.5	52	72.2	61	84.7		
Attended training in first aid							3.254[b]	.07
No								
Yes	32	22.2	21	29.2	11	15.3		
	112	77.8	51	70.8	61	84.7		
Attended previous training regarding emergency care								
a. Early warning							32.62[b]	<.01
No	63	43.8	14	19.4	49	68.13		
Yes	81	56.2	58	80.6	23	1.9		
b. Disaster triage							11.28[b]	<.01
No	79	54.9	29	40.3	50	49.4		

Characteristics	Total		Affected area (n=72)		Non-affected area (n=72)			
	N	%	n	%	n	%	χ^2	*p*
Yes	65	45.1	43	59.7	22	30.6		
c. Logistic communication							10.00[b]	<.01
No	40	27.8	11	15.3	29	40.3		
Yes	104	72.2	61	84.7	43	59.7		
d. Search and rescue							17.36[b]	<.01
No	72	50%	23	31.9	49	68.1		
Yes	72	50%	49	68.1	23	31.9		
e. Team organization							4.32[b]	.04
No	29	20.1	9	12.5	20	27.8		
Yes	115	79.9	63	87.5	52	72.2		
Training need for future							43.95[a]	<.01
No	22	15.3	22	30.6	0	0		
Yes								
- First aid and logistic	32	22.2	21	29.2	11	15.3		
- Disaster triage	15	16.4	2	2.7	13	18.2		
- Search and rescue	42	29.2	12	16.6	30	41.6		
- Evacuation and shelter	19	12.2	11	15.3	8	11.1		
- Team organization	14	9.7	4	5.6	10	13.8		

Comparison of Knowledge Regarding Emergency Care during Disaster

Mann-Whitney U Test was used to compare the mean rank of CHVs knowledge regarding emergency care during disaster between CHVs working in tsunami-affected and non-affected areas. Subjects in the non-affected areas had a higher mean score of overall knowledge than subjects in the affected areas (80.59 versus 64.41) and there was a significant difference of overall knowledge of CHVs regarding emergency care during disaster (p =.02). In addition, when compared the mean score in each dimension between two groups, only four dimensions of knowledge (early warning, disaster triage, first aid and team organization) were significantly different (Table 2).

Table 2 *Comparison of knowledge regarding emergency care during disaster between CHVs working in tsunami-affected and non-affected areas*

Knowledge	Affected area (n=72)			Non-affected area (n=72)				
	Mean score	Min	Max	Mean score	Min	Max	*Z*	*P**
Early warning	66.14	40	100	78.86	40	80	-2.08	.04
Disaster triage	80.62	20	100	64.38	20	100	-2.45	.01
First aid	60.48	60	100	84.52	20	100	-3.75	<.01
Search and rescue	74.22	60	100	70.78	20	100	-.656	.51
Logistic/communication	71.72	60	100	73.28	40	100	-.435	.66
Team organization	61.59	40	100	83.41	20	100	-3.45	<.01
Total score	64.41	46.66	100	80.59	26.66	100	-2.35	.02

** Mann-Whitney test.*

Discussion

The study found that subjects in the non-affected area had a higher mean score of knowledge than those in the affected area (80.59 versus 64.41). Several factors may have contributed to the better knowledge of the subjects in the non-affected areas although there was no significant difference in demographic data. These include duration of working, previous experience in emergency care during disaster and training in first aid.

Firstly, the difference of knowledge in both groups in this study was related to duration of working. In non-affected areas, 54/72 subjects (75%) had worked as a CHV for 4 or more years, compared with only 32/72 (44.5%) in the affected areas. This is similar to a previous study among public health nurses conducted by Maulidar (2010), who found that half of the nurses (52.3%) who had less than five years of working experience were considered to have limited knowledge regarding disaster nursing management. This may suggest that the lower experience in working as a CHV among subjects in affected areas may contribute to the limited knowledge regarding emergency care during disaster.

The second factor that might contribute to higher knowledge in non-affected areas is the higher proportion of CHVs having received training in first aid. The trainings were mainly provided by NGOs and military related to emergency care during disaster. According to PAHO (2011), trained CHVs personnel can provide early intervention with first aid, which is critical and efficient in emergency care when the victims cannot directly be transferred to health facility. Moreover, training courses often prepare CHVs to deal with mass casualty incidents with many injured people at the same time, or how to organize and practice basic search and rescue operations after a flood or earthquake when access to the outside has been cut off,

A similar finding was found in the study of Kano, Siegel and Bourque (2005), that first-aid training can increase both expected and actual utilization of first-aid skills, as well as perceived competence in implementing those skills. Repeated training is recommended because of its association with higher perceived competence levels. With the appropriate training and skill retention, lay members of the public can potentially contribute to a post-disaster medical response. Moreover, all CHVs in Aceh Provinces were prepared for emergency care during disaster including multi-purpose social welfare to improve their competencies during a disaster so that they could fulfil various roles in the field of disaster management (Tarmizi, 2011).

The third factor that may have contributed to the higher knowledge of CHVs working in the non-affected area was having previous experience in emergency care during disaster. Somewhat more subjects in non-affected areas than in affected areas (84.7% vs 72.2%) had previous experiences in emergency care during disaster. Previous studies have shown that an individual who has had a greater experience may have increased confidence and master (O'Sullivan, Dow, Turner, Lemyre, Corneil, & Amaratunga, 2008), and that better knowledge and skills of health volunteers are influenced by having a direct experience of a

disaster event (Arbon, Borrowski, Zeitz , Williams & Thitchener, 2006). Furthermore, CHVs who have had experience in a disaster can gain insights, acquire new views on the benefit of former learning, absorb from others' example, and pick up from their mistakes and repeat actions in similar situations by becoming attune (Jensen et al, 2008). This is similar to a previous study conducted to evaluate the first aid capabilities of the lay public, it was found that those who were trained would be more willing to use acquired knowledge and skills, particularly to assist family members, than those who had never attended training (Pan American Health Organization [PAHO], 2011). Consistently, Flint and Brennan (2006), found that CHVs who had more experience in disaster response can play an important role at site of disaster and can also perform actions such as performing triage, starting basic life support, and communication with other teams. Hence, CHVs who had more experience in emergency care during a disaster could play a critical role in disaster response.

Furthermore, in the non-affected areas, despite the limitations of available resources and equipment to provide early warning during a disaster compared to tsunami-affected areas, more than half (68.1%) of the subjects had attending training on early warning compared with only one half in tsunami-affected areas (49%). It can be assumed that all of the subjects in non-affected areas were alert and aware when disaster occurred to be the first responders to emergency, particularly in the community, and really want to prepare and improve their knowledge to work during disaster. The CHVs also need to be concerned about warning and evacuating the victims because that is the first action needed during a disaster (Vogt & Kulbok, 2008). In addition, CHVs need to identify the available resources and equipment that can be used for early detection and notify the community (Gebbie & Qureshi, 2002).

The limitations of this study was the sampling methodology used in this study may have resulted in a sample that was representative of CHVs in Aceh, and the findings regarding knowledge of emergency care during disaster possibly generalizable to all CHVs in Indonesia,

some limitations were found. The use of a self-report questionnaire may have failed to pick up the actual response of CHVs regarding emergency care during disaster. Another limitation is related to the knowledge questionnaires with the True/False format, which could be answered correctly by chance, and the items generated in the questionnaire being based on theoretical rather than practical knowledge and some items being common-sense questions.

Conclusions

In summary, the findings of this study showed that the subjects in both areas had a high level of knowledge. Although those in non-affected areas had a higher mean score of overall knowledge than subjects in the affected areas, conducting regular training, especially in first aid and rescue, is important. Factors that may contribute to the results of this study include duration of working, experience in emergency care, and previous training regarding emergency care during a disaster. From the study results, it was recommended that the CHVs should be well prepared to be ready to face future disaster. Enhancing their knowledge in disaster via attending regular training, particularly on first aid and disaster triage must be continuously performed. For subsequent studies, the questionnaire should be refined to better measure the real situation, and should cover CHVs' knowledge and skills for all types and all phases of disaster. The term of "emergency care" should be further explored to reflect how much it's influencing the study results.

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