

RESEARCH ARTICLE

Open Access

The Relationship between Knowledge and Attitudes about Community Disaster Preparedness in Lambung Village, Banda Aceh

Taufik Suryadi¹, Zulfan Zulfan² and Kulsum Kulsum^{3,*}

¹ Department of Forensic Medicine and Medico-legal, Faculty of Medicine, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia.

² Medical Doctor, Faculty of Medicine, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia.

³ Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia.

*Corresponding author: kulsum.anestesi@gmail.com

Received 13 February 2021; Received in revised form 19 March 2021; Accepted 29 March 2021

Abstract

Disaster preparedness is an important component that all levels of society must address in terms of disaster management. Lack of knowledge on disaster preparedness will have a direct impact on one's attitude in responding to disasters. This study aims to determine the relationship between community knowledge and disaster preparedness attitudes in the Lambung village, Banda Aceh. This type of research is analytic observational with a cross sectional approach. The samples in this study were the people of the Lambung village of Banda Aceh City with a sample of 100 people. The data was collected using a questionnaire that has been tested for its validity and reliability. Data analysis was performed univariate and bivariate using the chi-square test. The results showed that the people of Lambung village had a fairly good knowledge of disaster preparedness with levels from high to low being moderate (63.0%) and good (37.0%). The attitude of the community showed that the highest percentage was moderate (69.0%) and well followed (31.0%) in terms of disaster preparedness. The chi-square test results showed that there was a significant relationship between public knowledge and disaster preparedness attitudes about disaster preparedness ($p = 0.001$). The conclusion of this study is that there is a relationship between public knowledge and disaster preparedness attitudes in Lambung Village, Banda Aceh. This study recommends the importance of preparedness in the community so that the risk of the large number of victims due to disasters can be reduced.

Keywords: disaster preparedness; knowledge; attitudes; community.

Introduction

Indonesia is an archipelago with a population of approximately 250 million people spread over a very large archipelago, which consists of 17,000 islands. Indonesia is a meeting place for the three major plates of the world, namely the Indo-Australian plate, the Eurasian plate and the Pacific plate. The interaction between these plates makes Indonesia a potential area for earthquakes and high volcanic activity. The process of plate dynamics which is quite intensive also forms a distinctive and highly variable relief of the earth's surface. Mountain areas with steep slopes along the coast can cause potential damage to the earth such as landslides, floods, tsunamis and other natural disasters (Esteban et al., 2013; Matura, 2011).

An earthquake measuring 8.9 on the Richter Scale (RS) followed by the tsunami waves that occurred on December 26, 2004, destroyed 12 districts / cities in Aceh Province and 5 districts / cities in North Sumatra Province. Data from the Tsunami and Disaster Mitigation Research Center (TDMRC) Universitas Syiah Kuala, not only in Indonesia but also in several parts of Asia and Africa, it is estimated that more than 232 thousand people died and disappeared, and resulted in the destruction of various primary infrastructure such as public service facilities, health facilities, educational facilities and infrastructure, as well as related sources. livelihood. Based



on its geographic conditions, Indonesia is a region prone to natural disasters, so disaster preparedness is needed (Esteban et al., 2013; Matura, 2011).

According to Indonesian Law No.24 of 2007 on disaster management, preparedness is a series of activities carried out to anticipate disasters through organizing and taking appropriate and efficient steps. Meanwhile, according to Carter (2008), preparedness is actions that enable governments, organizations, communities, communities and individuals to be able to respond to a disaster situation quickly and accurately. Management planning, maintenance and personnel training is one of the disaster preparedness measures. Countries that are in disaster-prone areas, of course, have to make increased prevention efforts to minimize the level of risk of natural disasters. The level of risk of natural disasters is determined by the potential for disasters and is also determined by mitigation efforts and community preparedness (Indonesian Law No.24 of 2007; Carter, 2008; Menard et al., 2011).

According to Sunaryo (2004) in his research "Locus of control in flood preparedness", many deaths in the event of natural disasters actually occur during panic. It is important to remember that panic in the event of a natural disaster determines the level of risk of death (Sunaryo, 2004). The National Disaster Management Coordinating Board (BNPB) states that one of the main factors that can cause large losses including the high mortality rate when a disaster occurs is a lack of understanding of the characteristics of hazards which have an impact on attitudes and behavior of human resources, namely the community (BNPB, 2008).

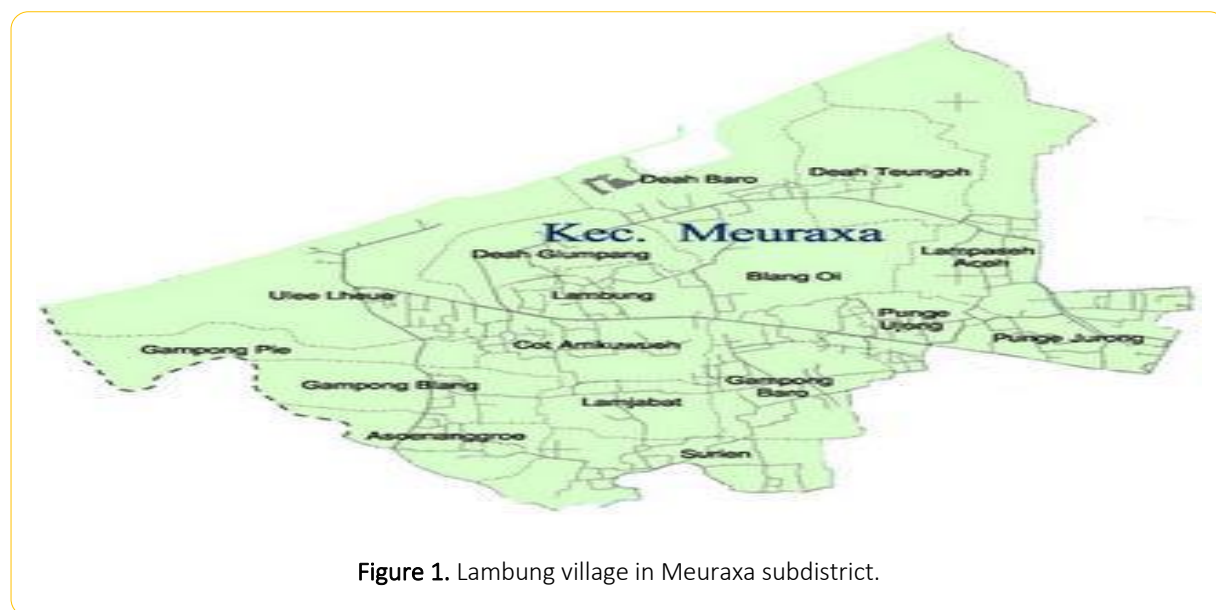


Figure 1. Lambung village in Meuraxa subdistrict.

The community is one of the stakeholders who plays an important role in reducing the impact of disasters. Good public knowledge of disaster preparedness will have an impact on people's attitudes in dealing with natural disasters. Participation of the community in disaster preparedness and prevention will greatly reduce the mortality rate. Therefore, the community must be able to increase knowledge of disaster preparedness because this knowledge is important as a predisposing factor in developing attitudes and will have a direct impact on community behavior related to disaster preparedness as well as an experience (Rinaldi, 2009; Quero, 2012).

Lambung Village is a village known as a disaster response village on a regular basis with training and simulations held by related agencies. Many disaster management training activities are carried out in this village. The Lambung village is in the Meuraxa sub-district, Banda Aceh, adjacent to the Glumpang village and Blang Oi village. In this Lambung village there is a building for rescue in case of a disaster which is called an escape building. Demographically, Lambung Village is in the westernmost position of Banda Aceh, which is directly

adjacent to the Ulee Lheu beach, as shown in Fig.1, with a population of 612 people with 315 men and 297 women. One of the coastal areas affected by the earthquake and tsunami disaster is Lambung Village, which has received post-tsunami disaster preparedness training so that this village has become one of the villages that are prepared for disasters. Therefore, this study intends to identify the relationship between knowledge and attitudes about community disaster preparedness in Lambung village, Banda Aceh.

Disaster preparedness is a part of the disaster management process in the current concept of disaster management. Increased preparedness is one of the important elements of pro-active disaster risk reduction activities, before a disaster occurs. The disaster management process is represented as a cycle model for improving disaster preparedness as part of the disaster risk management process (Hidayati et al., 2006). According to BNPB, at least four main factors interacting with disasters that can cause many victims and major losses, namely lack of understanding of hazard characteristics, attitudes or behaviors that lead to a decrease in natural resources (vulnerability), lack of information/early warning (early warning) which causes unpreparedness and inability to face the threat of danger (Triutomo et al., 2007; BNPB, 2008).

The basic concept of community-based disaster management is an effort to increase community capacity or reduce community vulnerability. The magnitude of the disaster is the accumulation of various hazards with a series of vulnerabilities that exist in the community. These series of vulnerabilities include poverty, lack of vigilance, sensitive natural conditions, helplessness, and various other dynamic pressures. The vulnerability of one community group to another the root causes of the problem are different, so are the threats of different kinds (Hidayati et al., 2006; Kearns et al., 2013).

In essence, disaster management is vigilance and preparedness to reduce or avoid the threat of hazards that can potentially lead to harmful disasters, namely understanding that disaster management is an integral part of sustainable development. Disaster management must meet the requirements, namely clear aspects (institutional, organizational, procedures), current functions (planning, implementation, supervision), and complete elements (human resources, finance, equipment and the like) (Sutton, 2006; Kearns et al., 2013).

Methods

This type of research is an observational analytic study using a cross-sectional survey design to determine the relationship between the independent variable (community knowledge) and the dependent variable (disaster preparedness attitude) in the community. The population in this study were all adults aged over 17 years in Lambung village with a total of 354 people. The sampling technique used was non-probability sampling with a quota sampling method. The sample in this study were all people of Lambung Village and fulfilling the inclusion criteria. In this study, inclusion criteria are the Lambung Village community with adult category (18-59 years), people who are able to read and write, and people who are willing to sign the willingness sheet to become respondents.

The data were collected by using a questionnaire as a measuring tool to measure each variable. The questionnaire was developed by the researcher and modified from some previously used questionnaires developed by LIPI-UNESCO/ISDR. After the measuring instrument has been compiled, the questionnaire must be tested in the field. Testing the instrument in the form of a questionnaire was carried out directly on 15 people in other village (Glumpang village). The test instrument in the form of validity test and reliability test were analyzed using the Cronbach test technique (Cronbach alpha). In this study, the Cronbach alpha coefficient value was 0.889 for knowledge and 0.894 for attitude, so it can be said that the research instrument is valid and reliable.

The data analysis used in this research is univariate analysis followed by bivariate analysis. Univariate analysis is used to obtain an overview of the frequency distribution and proportion of the dependent variable and variable.

Bivariate data analysis was carried out to determine whether there was a relationship between knowledge and attitude of disaster preparedness. This data analysis was carried out by using the Chi-Square test with the criteria for the relationship set based on the value (probability) generated with 95% Confidence interval. Conclusion in this study is based on the p-value which will be compared with the value of $\alpha = 0.05$ as follows: (1). If $p\text{value} > 0.05$, then the relationship between the two variables is not significant at 95% CI, and (2) If $p\text{value} \leq 0.05$, then the relationship between the two variables is significant at CI = 95% and $\alpha = 0.05$ (Dahlan, 2010).

Results

A total of 100 people respondents have filled with the complete questionnaire (100% response rate). In this study, data collection was conducted in Lambung village Banda Aceh. Demographic data in this study include gender, economic status, occupation, ethnicity, types of disasters that have been experienced by respondents and whether or not they have participated in counseling and the data in particular are knowledge and attitudes towards preparedness.

Table 1. Characteristics of respondents.

Characteristics of Respondents	n (100)	(%)
Age		
18-45 year	78	78
46-59 year	22	22
Sex		
Male	57	57
Female	43	43
Ethnicity		
Acehnese	77	77
Batak	8	8
Javanese	10	10
Others	5	5
Education		
Elementary school	2	2
Junior high school	20	20
Senior high school	48	48
College	30	30
Profession		
Civil Servant/ Indonesian National Army/Indonesian National Police	18	18
Private Employee	12	12
Entrepreneur	33	33
Farmer/Fisherman	1	1
Housewife	27	27
Not work (as student)	9	9
Income		
< IDR 1.000.000	31	31
IDR. 1.000.000-1.500.000	21	21
IDR. 1.500.000-2.500.000	26	26
IDR. 2.500.000-3.500.000	19	19
>IDR.3.500.000	3	3
Disaster management training		
Participated	84	84
Not participated	16	16

Based on the frequency distribution characteristics of the respondents in Lambung Village in the table 1 shows that of the 100 research respondents the majority were 18-45 years old, namely 78% were 46-59 years old and 22% were 18-45 years old. Comparison of the number of respondents based on gender found 57% male and 43% female. Based on the ethnicity obtained in the study in Lambung Village, the majority were Acehnese (77%), Javanese (10%), Batak (8%), and other tribes (5%). The majority of respondents' latest education is Senior high school 48%, college 30%, Junior high school 20% and Elementary school 5%. The people of Lambung Village have the majority of jobs, namely self-employed (33%) such as opening stalls, selling basic necessities and others. In addition, working as a housewife 27%, Civil Servant/ Indonesian National Army/ Indonesian National Police 18%, as many as 12% private employees, do not work like 9% students and 1% farmers or fishermen. The income of the people of Lambung Village, the majority of 31%, low income, this is related to their work status, namely housewife and students. As many as 84% of the people who have attended disaster preparedness training and 16% have never attended training.

Description of respondent's knowledge about disaster preparedness in the community of Lambung village, Banda Aceh, can be seen in Table 2.

Table 2. Distribution of frequency of community knowledge regarding disaster preparedness.

Knowledge	n (100)	%
High	37	37
Medium	63	63
Low	0	0

Based on table 2, it shows that the majority of the level of public knowledge about disaster preparedness is in the medium category, namely 63% and the rest is in the high category, namely 37%. Description of respondent's attitude about disaster preparedness in the community of Lambung village, Banda Aceh, can be seen in Table 3.

Table 3. Distribution of frequency of community attitude regarding disaster preparedness.

Knowledge	n (100)	%
High	31	31
Medium	69	69
Low	0	0

Based on table 3, it shows that the majority of respondents' attitudes about disaster preparedness are in the medium category, namely 69% and the rest are in the good category, namely 31%. The disaster preparedness data based on the respondents, characteristics as reflected in the frequency distribution and percentage can be seen in Table 4.

Bivariate analysis to determine the relationship between the independent variable and the dependent variable. The independent variable in this study is knowledge and the dependent variable is the attitude of preparedness. Analysis of the research data using the Chi-Square test.

Table 4. The disaster preparedness data based on the respondents, characteristics as reflected in the frequency distribution and percentage.

Characteristics	Disaster Preparedness			
	Knowledge		Attitude	
	High	Medium	High	Medium
Age				
18-45 year	25	53	20	58
46-59 year	12	10	11	11
Sex				
Male	24	13	21	36
Female	13	30	10	33
Education				
Low and Middle education	23	46	16	53
High education	14	17	15	16
Profession				
Civil Servant/ Indonesian National Army/ Indonesian National Police	11	7	9	9
Private Employee	23	27	19	31
No job	3	29	3	29
Income				
Above the provincial minimum wage	16	39	12	43
Under the provincial minimum wage	21	24	19	26

Table 5. Relationship between community knowledge and disaster preparedness attitudes.

Knowledge	Attitude of preparedness				Total		p-value
	Good		Medium				
	n	%	n	%	n	%	
Good	30	11.5	7	25.5	31	31	0.001
Medium	1	19.5	62	43.5	69	69	

Based on table 5, it can be seen that there is a significant difference between knowledge and disaster preparedness attitude, $p = 0.001$. So that the hypothesis is meaningful where in this study has a significance level of 95%, there is a significant relationship between knowledge and attitude of preparedness in the community of Lambung Village. The results of the analysis of the relationship between knowledge and disaster preparedness attitudes indicated that the majority had moderate knowledge, namely 69%.

Discussion

This study identified 78 respondents aged 18-45, while the rest 22 were aged between 46 and 59. Most respondents were men with 57 respondents, and the education level was a senior high school (48 respondents). Many respondent work as entrepreneur (33 respondents), and 84 respondents have attended disaster preparedness training. This shows that the number of characteristics of the respondents in this study allows the emergence of different answers for each characteristic of each respondent. This is in accordance with the research conducted by Pangesti (2012) in Jakarta that the differences in the characteristics of each respondent such as gender and age will result in different knowledge and attitudes about disaster preparedness. However, there is no significant difference between the differences in knowledge of disaster preparedness based on

gender because this is very much influenced by individual experiences and the varying intensity of disaster education for each individual (Pangesti, 2012).

The results of the research on 100 research respondents in table 4.2 show that the level of knowledge of the majority of respondents is moderate, namely 63 respondents (63%). In this study, the people of Lambung Village had a fairly good knowledge of important elements of preparedness such as coordination skills which were not only carried out by village officials but the entire community, equipment and basic necessities such as the contents of disaster preparedness bags as well as information and community awareness in efforts of preparedness. In developing and maintaining a level of preparedness, various efforts need to be made to implement the following important elements: (1) the ability to coordinate all actions (there is a fixed coordination mechanism), (2) operational facilities and systems, (3) equipment and supplies for basic needs or supply, (4) training, (5) public awareness and education, (6) information, and (7) ability to accept increased burdens in emergency/crisis situations (McAdoo et al., 2006; Menard et al., 2011).

In this study, it was found that as many as 88 respondents (88%) knew that disaster preparedness was an activity carried out to anticipate disasters through appropriate and efficient steps. However, in terms of respondents' knowledge of the equipment and supplies for basic necessities that were prepared when a disaster occurred, only 25 respondents (25%) chose disaster preparedness bags. Regarding the knowledge of the types of disasters that might occur in Lambung Village, the majority of respondents were able to answer questions well, namely 61 respondents (61%) of the earthquake and 30 respondents (30%) of the tsunami. In this study also obtained respondents' knowledge of early warning in Lambung Village in the event of a disaster, namely 78 respondents (78%) the majority of respondents answered tsunami sirens.

The early warning system is also not always effective for all types of hazards. Some types of hazards do not even have an early warning, such as earthquake hazards. Thus the development of a disaster warning system needs to pay real attention to the types of disaster threats that can provide early warning. It should be noted that several types of disaster threats that have a very low frequency of occurrence in the early warning system will have problems how to maintain and maintain the early warning system in a very long time so that it can always function reliably. For this reason, a very in-depth study is needed, especially in giving priority to the development of a disaster warning system which requires a very large investment cost and requires a high level of maintenance to ensure its reliability (Kearns et al., 2013; Calderon, 2006).

This good knowledge, according to researchers, is due to the integration of disaster education in the people of Lambung Village, such as the existence of workshops and training on disasters which are carried out regularly every year. Respondents in this study also showed a fairly good knowledge of the direction of disaster evacuation, namely the escape building. The results of this study were supported by Notoatmodjo (2003), who stated that the more information and experiences that were obtained someone has, the higher the knowledge that person has, which is generally in accordance with the context of the culture, education and the environment around that person.

The results of this study are also in line with previous research conducted by Priyanto (2006) that the participants' knowledge of earthquakes is related to their level of preparedness to face disasters. This finding implies that if programs take current knowledge into account and seek to eliminate misconceptions of knowledge, it will increase the capacity of the population to prepare themselves with an earthquake or other disaster. In accordance with the results of LIPI's research, it shows that the greatest influence in calculating the level of preparedness of Acehnese rural communities is the level of knowledge that is considered good enough for individuals / households (Hidayati et al., 2006).

Attitude is a kind of readiness to react to an object in certain ways. Readiness is a potential tendency to react in a certain way when the individual is faced with a stimulus that requires a response. An attitude is a constellation

of cognitive, affective and conative components that interact with each other in understanding, feeling and behaving towards an object. It can be concluded that attitude is an individual's tendency to understand, feel, react and behave towards an object which is the result of the interaction of cognitive, affective and conative components (Pfefferbaum & Shaw, 2013; Carley, 2005). Attitude is a form of evaluation or feeling reaction where the attitude shows the connotation of a suitable reaction to stimulation in everyday life that is emotional to social stimuli. Disaster preparedness attitudes are actions that enable individuals to be able to respond to a disaster situation quickly and appropriately.

In this study, it was found that the majority of respondents had moderate attitudes, namely 69%. Based on these results, the community shows a good attitude in disaster preparedness such as involvement in disaster preparedness plans, knowing preparedness efforts, maintaining the function of natural resources, having simple rescue and evacuation equipment, evacuating to a rescue building (escape bulldozing) and not panicking when a disaster occurs. This is in accordance with Nirmalawati's statement, that the better a person's self-concept that comes from his knowledge will form a good attitude towards that person in this case related to disaster preparedness (Nirmalawati, 2011).

Based on experiences in disaster management in various parts of the world, in the last 20 years it has been felt the importance of increasing community preparedness, not only at the level of government of a country or a region, but also at the level of communities who directly feel and have to face disasters themselves, especially before aid or assistance arrives from an official disaster relief or management agency or agency (Al Khalaileh et al., 2011; Kafle & Murshed, 2006).

Preparedness is a form of disaster management and management which reduces disaster risk. The earthquake and tsunami that occurred in Aceh, the earthquake in Padang, the avalanche of garbage in Leuwigajah, the flood in South Bandung and other natural disasters, have opened our eyes and hearts together that disaster management in our country is still far from being expected. It is felt that so far, understanding of disaster management is fading, because it is considered not a priority and disasters only come from time to time. It can be ascertained that the basic understanding of disaster management is not mastered or not understood by many bureaucrats, the public, and the private sector (Quero, 2012; Zahari et al., 2013).

The community is very important to know disaster preparedness because they are the largest component in the stakeholders who play an important role in preparedness. According to Tri Utomo, less knowledge of disasters will have an impact on one's attitudes and behavior in disaster management and disaster preparedness. This is also in accordance with Priyanto's research that the level of knowledge is one of the important factors that can influence attitudes where good attitudes result from good knowledge. A good attitude will be carried out by individuals who have good knowledge because the insights possessed by these individuals become considerations and reasons for determining an attitude (Triutomo et al., 2007; Priyanto, 2006).

Conclusions

The study concludes that there is a relationship between public knowledge and disaster preparedness attitudes in Lumbang Village, Banda Aceh. It is hoped that the government will evaluate and monitor the disaster preparedness system in the community related to the lack of public knowledge. This requires better dissemination of information on disaster management as a step towards increasing knowledge about disaster preparedness. The need for further research on disaster preparedness behavior in the community as an effort towards disaster preparedness society that can reduce disaster risk.

Acknowledgments

The authors express the deepest thanks to the participants who took part in this study.

References

- Al Khalailah, M. A., Bond, E., & Alasad, J. A. (2012). Jordanian nurses' perceptions of their preparedness for disaster management. *International emergency nursing*, 20(1), 14-23.
- BNPB. (2008). Regulation of the Head of the National Disaster Management Agency Number 4 of 2008 on Guidelines for Preparing Disaster Management Plans.
- Calderon, L. J. P. (2010). Importance of investing on emergency and disaster preparedness at country level. *Procedia-Social and Behavioral Sciences*, 2(5), 7130-7136.
- Carley, S. (2005). *Major Incident Medical Management and Support – The Practical Approach in the Hospital*. New York: Blackwell Publishing Ltd.
- Carter, W. N. (2008). *Disaster Management in Philippines*: Asian Development Bank.
- Dahlan, M. S. (2010). *Statistik Untuk Kedokteran dan Kesehatan*. Jakarta: Salemba Medika.
- Esteban, M., Tsimopoulou, V., & Mikami, T. (2013). Recent Tsunamis Events and Preparedness: Development of Tsunami Awareness in Indonesia, Chile and Japan. *Internasional Journal of Disaster Risk Education*. 10(1016): 84-87.
- Hidayati, D., Permana, H, Pribadi, K., Ismail, F., Meyers, K., & Bustami, D. (2006). *Kajian Kesiapsiagaan Masyarakat dalam Mengantisipasi Bencana Gempa Bumi & Tsunami di Indonesia*. Sopaheluwakan, J, editor. Jakarta: Lembaga Ilmu Pengetahuan Indonesia (LIPI).
- Kafle, S. K., & Murshed, Z. (2006). *Community-Based Disaster Risk Management for Local Authorities*. Bangkok: Asian Preparedness Center.
- Kearns, R. D., Holmes IV, J. H., Skarote, M. B., Cairns, C. B., Strickland, S. C., Smith, H. G., & Cairns, B. A. (2014). Disasters; the 2010 Haitian earthquake and the evacuation of burn victims to US burn centers. *Burns*, 40(6), 1121-1132.
- Law of the Republic of Indonesia (UU-RI) Number 24 of 2007 concerning Disaster Management. Jakarta.
- Matura, M. (2011). *Pedoman Nasional Manajemen Bencana di Indonesia*. 2nd ed. Sumatmadja, editor. Yogyakarta: Gama Media: 70-77.
- McAdoo, B. G., Dengler, L., Prasetya, G., & Titov, V. (2006). How an Oral History Saved Thousands On Indonesia's Simelue Island during the December 2004 and March 2005 Tsunamis. *Eartquake Spectra*. 22: 661-669.
- Menard, A., Slater, R. O., & Flaitz, J. (2011). Disaster Preparedness and Educational Attainment. *Journal of Emergency Management*. 10(5055): 1-8.
- Nirmalawati, N. (2011). Pembentukan Konsep Diri dalam Memahami Mitigasi Bencana. *Jurnal Smartek*. 9(1):61-69.
- Notoatmodjo, N. (2003). *Pendidikan dan Prilaku Kesehatan*. Jakarta: Rineka Cipta.
- Pangesti. (2012). *Gambaran Tingkat Pengetahuan dan Aplikasi Kesiapan Bancana Pada Mahasiswa Fakultas Ilmu keperawatan Universitas Indonesia Jakarta: Thesis*. UI.
- Pfefferbaum, B., & Shaw, J. A. (2013). Practice Parameter on Disaster Preparedness. *Journal of The American Academy of Child & Adolescent Psychiatry*. 52(11): 1224-1235.
- Priyanto. (2006). *Promosi Kesehatan pada Situasi Emergensi*. Jakarta: EGC: 50-100.
- Quero, R. A. (2012). *Reframing Coordination Challenges for Public-Private Partnership in Disaster Preparedness*. Science Direct. 10(1016): 440-447.
- Rinaldi, R. (2009). Kesiapan Menghadapai Bencana pada Masyarakat Indonesia. *Jurnal Penelitian Psikologi*. 14(1).
- Sunaryo, R. (2004). *Disaster Manajemen di Negeri Rawan Bencana*. Cetakan Pertama ed. Jakarta: PT Aksara Grafika Pratama.
- Sutton, J. (2006). *Disaster Preparedness: Concepts, Guidance, and Research*. Institute of Behavioral Science. University of Colorado.

- Triutomo, S., Harjadi, P., Ratag, M. A., Karnawati, D., Rizal, S., Surono, S., et al. (2007). *Pengenalan Karakteristik Bencana dan Upaya Mitigasinya di Indonesia*. Jakarta: Badan Koordinasi Nasional Penanganan Bencana (Bakornas PB).
- Zahari, R. K., Ariffin, R. N. R., Asmawi, M. Z., & Ibrahim, A. N. (2013). Impacts of the 2004 Tsunami: Preparedness of the Malaysian coastal communities. *Procedia-Social and Behavioral Sciences*, 105, 569-576.