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Original Article

Indonesian nurses' perception of disaster management preparedness

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ABSTRACT

Purpose: Using a quantitative approach, this study aims to assess Indonesian nurses' perception of their knowledge, skills, and preparedness regarding disaster management.
Methods: This study was a descriptive comparison in design. The research samples are Indonesian nurses working in medical services and educational institutions. The variables of nurses' preparedness to cope with disaster victims were measured using the Disaster Preparedness Evaluation Tool (DPET), which was electronically distributed to all nurses in Indonesia. Data were analyzed using a statistical descriptive one-way Analysis of Variance (ANOVA) and *t*-test with a significance level of 95%.
Results: In total, 1341 Indonesian nurses completed this survey. The average scores of preparedness to cope with disasters, the ability to recover from disaster, and evaluation of disaster victims were 3.13, 2.53, and 2.46, respectively. In general, nurses surveyed in this study are less prepared for disaster management, and do not understand their roles either during the phase of disaster preparedness or in coping with a post-disaster situation.
Conclusion: Nurses' preparedness and understanding of their roles in coping with disasters are still low in Indonesia. Therefore, their capacity in preparedness, responses, recovery, and evaluation of disasters needs improvement through continuing education. The efforts needed are significant due to potential disasters in Indonesia.

Introduction

Building resilience and minimizing loss following natural hazards are priorities of all governments across the world. Data from the International Federation of Red Cross and Red Crescent Societies revealed the five most common disasters in the world during 2005–2014, respectively floods, storms, heat waves, and droughts. Of all these natural hazards, 48% occurred in Asia, and Indonesia related more than 85% of casualties.[1]

Indonesia is well known for being in the ring of fire.[2] Geographically and geologically, Indonesia is highly prone to disasters, since it is located above tectonic plate spanning throughout the Indonesia archipelago with systemic activities causing Indonesia to be highly vulnerable to earthquake, flood, landslide, tsunami, and other forms of natural disasters. Labrague et al.[3] in 2015 reported that when coping with natural disaster in Philippines, 80% of nurses were not fully prepared. Also, it is reported that more than 57.7% of nurses did not understand disaster management protocols in their workplace. In Hong Kong, it is reported that nurses were less prepared to cope with disasters, but were aware of the importance of preparation.[4] While for Jordanian nurses, continual reinforcement are needed to improve self-efficacy in managing disasters.[5] Recent studies conducted in one province in Indonesia showed that the disaster preparedness level among Community Health Nurse Coordinators needed to be leveraged.[6] Another study focused on disaster risk reduction by relying on community-based initiative addressed the lack of resources faced by communities.[7] Knowledge among adolescents on tsunami-vulnerable coastal areas needs to be improved through education and training.[8]

Further study suggested that disaster-related training and continuing education is one of prominent strategies in building nurses' preparation toward disaster.[9] All of these studies were done in specific region which hindered the generalizability of the finding. Disasters may happen at any time without any prediction. Efforts to

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anticipate disasters have been made, with varying degrees of adversities. The effects of a disaster can be harmful to human life as well as the environment. The tsunami in 2004 resulted in 227,000 deaths in Asia and 1.7 million people were evacuated.[10] Meanwhile, Jayasuriya and McCawley (2010) reported that more than 220,000 adults and children in developing countries in Asia died associated with tsunami wave in 2004.[11] Other studies revealed that disasters are serious disturbances to communities and societies which may cause material, physical, social, economic, and environmental damage and exceedingly affect people's capability to sustain themselves.[12,13]

Efforts in dealing with disasters should be the responsibilities of governmental agencies, nongovernmental organizations, and society. Indonesia in recent years has changed its disaster management strategies, from emphasizing emergency response and preparedness to disaster management preparedness. Cornier explained that the key factors of an effective emergency management plan for disasters include public knowledge, healthcare involvement, comprehensive training, protocol, technology, and effective communication. Therefore, participation and assuming responsibility by intersectoral entities is vital including governmental agencies, nongovernmental organizations, and the public along with the health care providers, particularly nurses, are essential.[12]

Human resources for health care provides is an important element in Indonesia especially for the professional nurses.[14–16] Nurses play an important role in disaster preparedness such as educating the public to reduce disaster vulnerability and working in a disaster situation. Thus, when disaster happens, nurses need to have adequate skills related to disaster preparedness and disaster management. However, the research suggests that nurses are often not sufficiently prepared to deal with disaster-related responsibilities.[3,12] Using a quantitative approach, this study aims to explain nurses' perception of their knowledge, skills, and preparedness in coping with disasters that may occur in Indonesia.

Methods

Research design

A descriptive cross-sectional survey was used to explore the perception of Indonesian nurses about their preparedness for disaster management. Using an online survey, we surveyed nurses working all over Indonesia. Potential participants were recruited from social media and any online groups related to Indonesian nurses over four months. The survey was anonymous and self-administered; invitation message for the study was sent to the social media site containing the link. Inclusion criteria for this study included nurses working in healthcare service institutions and educational institutions agreeing to take part in this research and registered as nurses in Indonesia. The survey was piloted amongst a small sample of Indonesian nurses in order to repeat the procedures and the questionnaires.

Research instruments

Data for this research were collected using a survey questionnaire adapted from the Disaster Preparedness Evaluation Tool (DPET).[12,17] Translation of the questionnaires from English to Indonesian was carried out by professional translator and experts in disaster management. DPET is an evaluation tool designed to measure three phases of disaster management, including (1) preparedness with Cronbach's alpha internal consistency reliability of 0.879, (2) mitigation and response with Cronbach's alpha internal consistency reliability of 0.940, and (3) evaluation with Cronbach's alpha internal consistency reliability of 0.940. The translated questionnaire consisted of 46 questions using a 6-point Likert scale. The scoring system for favorable questions uses the following criteria: 6 for 'strongly agree', 5 for 'agree', 4 for 'doubtful/neither agree nor disagree', 3 for 'less agree', 2 for 'disagree', and 1 for 'strongly disagree'. Cronbach's alpha internal consistency reliability for the original instrument was reported 0.91.[17]

Statistical test

The statistical tests used for analyzing nurses' perception of disaster management preparedness were a descriptive statistical test, a one-way ANOVA, and a *t*-test with significance level of 95%.

Ethical considerations

The study was approved by the Ethics Committees at the Faculty of Nursing, Universitas Airlangga (615-KEPK). Participation on the study was voluntary and respondents were maintained anonymity.

Results

Of the 1481 subjects completing the online questionnaires, 1341 responded and met the criteria (90.55%), while 140 (9.45%) were eliminated due to incomplete responses and/or did not meet the criteria. Therefore 1341 nurses were enrolled in this study. Distribution of general information included 67.3% female; 59.4% at the age of 26–32 years; 91.3% graduated from diploma in nursing; 52.9% working for 5–10 years; and 98.4% receiving some training in disaster emergency (Table 1).

Testing of normality was conducted by Kolmogorov Smirnov statistical test, which showed the data were normally distributed (knowledge $\rho = 0.219$; skills $\rho = 0.258$; evaluation $\rho = 0.128$). The results of one-way ANOVA test are presented in Table 2, which reveals that education contributed to significant differences in perception of preparedness to cope with disaster skills. Meanwhile, length of employment did not show any differences in perception based on knowledge, skills, and evaluation.

Table 1
Demographic characteristics ($n = 1341$).

Characteristics	*n*	%
Sex		
Male	438	32.7
Female	903	67.3
Age (years)		
21-25	406	30.3
26-32	797	59.4
33-37	30	2.2
38-44	54	4.0
45-50	37	2.8
51-56	17	1.3
Education		
Diploma in nursing	1224	91.3
S1	67	5.0
S2	44	3.3
S3	6	0.4
Length of employment (years)		
<5	515	38.4
5-10	709	52.9
11-15	27	2.0
16-20	52	3.9
21-25	18	1.3
26-30	9	0.7
>30	11	0.8
Experiences on previous training in emergency		
Yes	1320	98.4
No	21	1.6

Table 2
Differences in nurses' perception of preparedness based on age, education, and length of work.

Field	Sum of squares	df	Mean square	*F* value	*p* value
Age					
Knowledge					
Between groups	41.608	64	0.650	0.686	0.972
Within groups	1209.485	1276	0.948		
Total	1251.093	1340			
Skills					
Between groups	51.069	46	1.110	1.197	0.174
Within groups	1200.024	1294	0.927		
Total	1251.093	1340			
Evaluation					
Between groups	15.290	18	0.849	0.909	0.568
Within groups	1235.803	1322	0.935		
Total	1251.093	1340			
Education					
Knowledge					
Between groups	13.340	64	0.208	1.018	0.440
Within groups	261.342	1276	0.205		
Total	274.682	1340			
Skills					
Between groups	13.473	46	0.293	1.451	0.027
Within groups	261.208	1294	0.202		
Total	274.682	1340			
Evaluation					
Between groups	2.935	18	0.163	0.793	0.710
Within groups	271.747	1322	0.206		
Total	274.682	1340			
Length of Work					
Knowledge					
Between groups	40.336	64	0.630	0.644	0.987
Within groups	1248.069	1276	0.978		
Total	1288.404	1340			
Skills					
Between groups	51.072	46	1.110	1.161	0.216
Within groups	1237.332	1294	0.956		
Total	1288.404	1340			
Evaluation					
Between groups	13.007	18	0.723	0.749	0.761
Within groups	1275.397	1322	0.965		
Total	1288.404	1340			
Experience in joining training					
Knowledge					
Between groups	0.751	64	0.012	0.991	0.498
Within groups	15.103	1276	0.012		
Total	15.854	1340			
Skills					
Between groups	.962	46	0.021	1.818	0.001
Within groups	14.891	1294	0.012		
Total	15.854	1340			
Evaluation					
Between groups	0.078	18	0.004	0.361	0.994
Within groups	15.776	1322	0.012		
Total	15.854	1340			

Table 3 shows training about emergency did not contribute to different perception of nurses' preparedness, particularly in terms of knowledge ($p = 0.774$) and evaluation ($p = 0.289$). However, training itself associated with their skills ($p = 0.030$).

Table 4 reveals that a reliability test on nurses' perception resulted in an overall inter-item correlation score of 0.88 (knowledge = 0.901, skills = 0.895, and evaluation = 0.802).

Table 5 shows that the 25 items on the DPET can be divided into three sub-categories, respectively (i) knowledge, (ii) disaster management skills, and (iii) family preparedness; the average score measured with a 6-point Likert scale was 3.13. Correlation among items in this part was 0.20 (Cronbach's alpha = 0.856).

Table 3
Independent sample *t*-test results of the differences in nurses' perception of disaster preparedness based on emergency training experiences.

Field	*F*	SD	*t* value	*p* value
Knowledge	0.565	10.501	0.294	0.774
Skills	2.769	6.445	2.465	0.030
Evaluation	0.003	4.100	1.112	0.289

Table 4
The results of an inter-item correlation test of nurses' perception of disaster preparedness (6-point Likert scale).

Perception	Mean	Variance	SD	Item (*n*)	Score
Knowledge	125.03	206.172	13.178	25	0.901
Skills	76.31	260.964	10.753	15	0.895
Evaluation	30.77	469.504	4.426	6	0.802
Total				46	0.776

Table 5
The results of a correlation test for each survey items of nurses' preparedness in coping with disaster ($n = 1341$).

Survey items		Mean	SD
Disaster knowledge			
1	I would be interested in educational classes on disaster preparedness that relate specifically to my community situation.	5.68	0.625
2	I am aware of classes about disaster preparedness and management that are offered, for example, at my workplace, the university, or in the community.	5.72	0.636
3	I find that the published works of research on disaster preparedness are understandable.	4.04	1.109
4	I know the limits of my knowledge, skills, and authority as a nurse to act in disaster situations, and I would know when I exceed them.	4.28	0.931
5	Finding relevant information about disaster preparedness related to my community needs is an obstacle to my level of preparedness.	3.88	1.716
6	I am aware of what the potential vulnerabilities in my community are (e.g. earthquake, floods, terror).	3.24	1.004
7	In the case of a disaster situation, I think that there is sufficient support from local officials or state level.	3.23	1.107
8	I know where to find relevant research or information related to disaster preparedness and management to fill in gaps in my knowledge.	3.95	1.104
9	I have a list of contacts in the medical or health community in which I practice who know referral contacts in case of a disaster situation (e.g. health department).	2.19	0.948
10	I find that the published works of research on disaster preparedness and management are easily accessible.	2.97	1.096
11	I participate in one of the following educational activities on a regular basis:continuing education classes, seminars, or conferences dealing with disaster preparedness.	4.92	1.243
12	I am familiar with the local emergency response system for disasters.	4.07	1.048
13	I know who to contact (chain of command) in disaster situations in my community.	2.09	1.032
14	I read journal articles related to disaster preparedness.	2.99	1.094
15	I participate/have participated in creating new guidelines, emergency plans, or lobbying for improvements on the local or national level.	1.72	1.312
16	I have participated in emergency plan drafting and emergency planning for disastersituations in my community.	1.84	1.273
Disaster skills			
1	I am familiar with accepted triage principles used in disaster situations.	3.14	1.038
2	I participate in disaster drills or exercises at my workplace (e.g. clinic, hospital) on a regular basis.	3.26	1.054
3	I consider myself prepared for the management of disasters.	3.01	1.117
4	In the case of a bioterrorism attack, I know how to use personal protective equipment.	1.36	0.982
5	I would be considered a key leadership figure in my community in a disaster situation.	2.91	1.178
6	In the case of a bioterrorism, I know how to perform isolation procedures so that I minimize the risks of community exposure.	1.89	1.202
7	In the case of a bioterrorism, I know how to execute decontamination procedures.	1.90	1.165
Family preparedness for a disaster			
1	I have personal/family emergency plans in place for disaster situations.	2.03	1.148
2	I have an agreement with loved ones and family members on how to execute our personal/family emergency plans.	2.00	1.219

Table 6 shows that 15 items of questions focused on two sub-categories, i.e. patient's knowledge and skills; the average score measured using the 6-point Likert scale was 2.53. Correlation among items in this part was 0.43 (Cronbach's alpha = 0.918).

Table 7 indicates that from 6 items comprising two categories, knowledge and management, the average score obtained measured using the 6-point Likert scale was 2.46. Correlation among items in this part was 0.50 (Cronbach's alpha = 0.846).

Table 6
Nurses' responsive ability in coping with disaster ($n = 1341$).

Responsive ability		Mean	SD
Knowledge-specific response			
1	I am able to describe my role in the response phase of a disaster in the context of my workplace, the general public, media, and personal contacts.	2.39	1.222
2	I am familiar with the organizational logistics and roles among local, and state agencies in disaster response situations.	2.99	1.161
3	I am familiar with psychological interventions, behavioral therapy, cognitive strategies, support groups, and incident debriefing for patients who experience emotional or physical trauma.	2.73	1.204
Patient management during response			
1	I can manage the common symptoms and reactions of disaster survivors that are of affective, behavioral, cognitive, and physical nature.	3.36	0.982
2	I would feel confident providing patient education on stress and abnormal functioning related to trauma.	2.91	1.178
3	I can identify possible indicators of mass exposure evidenced by a clustering of patients with similar symptoms.	2.89	1.202
4	As a nurse, I would feel confident as a manager or coordinator of a shelter.	2.90	1.165
5	I feel reasonably confident that I can treat patients independently without supervision of a physician in a disaster situation.	2.01	1.040
6	I would feel confident working as a triage nurse practitioner and setting up temporary clinics in disaster situations.	2.94	1.142
7	As a nurse, I would feel confident in my abilities as a direct care provider and first responder in disaster situations.	2.28	0.949
8	I would feel confident implementing emergency plans, evacuation procedures, and similar functions.	2.18	1.055
9	As a nurse, I would feel reasonably confident in my abilities to be a member of a decontamination team.	2.13	0.949
10	I am familiar with biological weapons (e.g. anthrax, plague, botulism, smallpox), their signs and symptoms, and effective treatments.	2.16	0.925
11	I feel confident discerning deviations in health assessments indicating potential exposure to biological agents.	2.14	0.951
12	In the case of a bioterrorism, I know how to perform focused health history and assessment, specific to the bio-agents that are used.	1.97	1.111

Table 7
Nurses' evaluation levels in dealing with disaster ($n = 1341$).

Disaster victim evaluation ability		Mean	SD
Recovery knowledge			
1	I am familiar with what the scope of my role as a nurse in a post-disaster situation would be.	3.15	1.138
Recovery management			
1	I am able to discern the signs and symptoms of acute stress disorder and post-traumatic stress disorder (PTSD).	2.15	0.860
2	I participate in peer evaluation of skills on disaster preparedness and response.	3.06	1.129
3	I would feel confident providing education on coping skills and training for patients who experience traumatic situations so they are able to manage themselves.	2.35	0.809
4	I am familiar with how to perform focused health assessment for PTSD.	2.01	0.986
5	I feel confident managing (treating, evaluating) emotional outcomes for acute stress disorder or PTSD following disaster or trauma in a multidisciplinary way such as referrals and follow-ups, and I know what to expect in ensuing months.	2.05	0.920

Discussion

Demographic characteristics

The study results indicate that age and length of employment did not result in different perceptions of nurses in Indonesia when coping with disasters, particularly in the categories of knowledge, skills, and evaluation. The findings are consistent with those of Najafi et al.[18] who reported age did not relate to disaster preparedness. Gladston and Nayak[19] reported similar results of no association between age, marital status, education, and length of work on knowledge and perception of preparedness in managing disasters.

Levels of education and experience coupled with training on disaster response and preparedness showed significant differences in "skills" but did not have any effect on knowledge and evaluation in dealing with disasters. The findings of the research correspond to the results of study by Muttarak and Pothisiri[20] that educational qualifications and experience of training and disaster management can improve disaster preparedness actions. Moreover, there are minimal evidence that education qualifications can improve cognitive ability related to emerging preparedness.

Preparedness level

The 25 question items on the survey adapted from the DPET survey[17] can be divided into three sub-categories, i.e. (i) knowledge on disaster (16 items), (ii) disaster management skills (7 items), and family preparedness (2 items); the average score for the test obtained with the 6-point Likert scale is 3.13.[17] From the online survey distributed, the average score of sub-category of knowledge on disasters is 3.55. Adequate knowledge on disaster preparedness relates to the fact that nurses have experienced training on disaster management in their places of work, conducted by either hospital or healthcare education institutions. Furthermore, some had education in their basic nursing curriculum that integrated disaster management. The information is a component in the national curriculum for healthcare services, particularly health polytechnics in Indonesia. Nurses' education experiences can enhance their positive knowledge on disaster management preparedness.

The results of the survey on knowledge about disaster align with the findings of Alrazeeni[21] regarding the integration of a course on disaster management in the emergency medical services (EMS) curriculum; along with practical training, this will help prepare students in EMS to better comprehend disaster management. Further, students of EMS assert the needs of the integration of disaster management in the curriculum for the undergraduate program. Similar findings are revealed in Duong's[22] study that nurses' preparedness and trust regarding responses on disasters are influenced by their previous experiences, education, and training on disaster management.

However, nurses in Indonesia validate and reaffirm that they are not fully prepared for handling real disaster situations since most have not performed duties under these extreme conditions. There is no disaster planning program that has been approved by medical service centers at primary and hospital level, even though most of the nurses received training on disaster management. The findings are consistent with previous data from World Health Organization, reporting that preparedness of nurses working in primary medical services is considered a low priority.[23] Further, it is reported that nurses do not fulfill most of their roles at optimum level associated with the lack of preparation at all associated institutions.[24] The findings are supported by research in the Philippines by Labrague et al.[3] and Öztekin et al.[12] indicating that nurses are not fully prepared to handle disasters because they do not understand disaster management protocol in their workplace.

These findings are different from the results by Tzeng et al.[9] which indicated that the majority of nurses in military hospitals in Taiwan, China are prepared in coping with disaster. This was attributed to the experiences of disaster management training, disaster preparedness, and emergency/intensive care.

Response level

The second part of the DPET survey[17] on nurses' responding ability consisted of two sub-categories of (i) specific responses on knowledge (3 items) and (ii) patient management during responses (12 items). The findings are scored 3.00 with a 6-point Likert scale, which revealed that nurses have not fully understood their roles during the disaster preparedness phase, and fully organizational coordination, and lack confidence in their ability at handling patients having both physical and emotional trauma, and to effectively manage their condition. This is due to conflicts of interest at the workplace, limited frequency of training in disaster response and preparedness provided by hospitals and educational institutions. Also, methods and sources of teaching disaster management are not sufficiently related to in real situations of disaster. Efforts should be made to strengthen disaster response and preparedness involving participation of many sectors systematic and well-planned program and learning experiences should include simulation for disaster management. Such efforts provide experience and insight on disaster management and can strengthen nurses' self-confidence in coping with disaster and providing support in a disaster situation.

Those recommendations are supported by Duong[22] who reported a significant correlation between training frequency for nurses and their confidence. In other words with more training on disaster management they have higher confidence in their ability with disaster management. Nurses are more confident that they can support people in a real disaster situation. Similar

recommendations are offered by Basnet et al.[25] who reported that disaster management training should be provided for all nurses, particularly those working at non-governmental hospitals, who have not received any training on disaster management, to enhance their knowledge in responding to possible disaster. This study emphasizes that nurses should be equipped with relevant training in disaster management and integrated with nurses' activities in the future agenda.

Evaluation level

The second part of the DPET survey[17] related to evaluation. Information about nurses' evaluation skills consisted of two subcategories, including questions on knowledge of recovery (1 item) and questions on recovery management (5 items). The obtained scores of this part are less than 3.00.

The result indicates that nurses in Indonesia do not fully understood their roles in a post-disaster situation, such as identification of signs and symptoms, and strategies in managing post-traumatic stress. Research using the DPET by Öztekin et al.[12] had revealed similar results that nurses in Japan cannot respond victims admitted to various disaster situations. In another study were operating at less than optimum levels on quickly evaluate health conditions in the disaster situation. This finding from this study shows that the ability of Indonesian nurses in evaluation activity needs further improvement.

As one of the world's disaster-prone areas and risk to multiple hazards, Indonesia should be able to prepare the health workforce in disaster situation, particularly nurses. Nurses as a front-line health professional can make an important contribution in disaster preparedness of multiple-hazards situation. The study offers some valuable insights into the development of specific training materials for Indonesian nursing profession. Considering the roles, responsibilities, and competency of nurses in disaster management need to be discussed among stakeholders. There is abundant room for further progress in examining Indonesian nurses' perception of their knowledge, skills, and preparedness in different settings both clinical and community.

Conclusion

Nurses play significant a role in disaster preparedness, response/recovery and evaluation, especially in reducing vulnerability and minimizing risk in a disaster. Indonesian nurses require continuous training related to disaster management. Training for disaster management simulation and distribution of nursing personnel in disaster areas must to be considered with preparedness. Defining nurses' roles both in disaster preparedness and post-disaster preparedness must be taken into account with continuous training at various levels, including professional organization, governmental agencies, private organization, and the community.

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Nil.

Ethical statement

The study was approved by the Ethics Committees at the Faculty of Nursing, Universitas Airlangga (615-KEPK). Participation on the study was voluntary and respondents were maintained anonymity.

Conflicts of interest

The authors declare that they have no competing interests.

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