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Research Article

Predictors of Natural Disaster Preparedness Among Healthcare Providers

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Abstract

Aims: Preparedness of medical personnel in dealing with disasters is strongly influenced by several factors, one of which is knowledge, attitude, role and organization in disaster management. Nowadays, healthcare professional is facing frequent natural disaster, thus identification on their disaster preparedness is imperative. To identify factors related to the preparedness of medical personnel in handling natural disasters at the Regional General Hospital dr. Slamet, Garut Regency, West Java.

Methods: This type of research was a cross-sectional study using an online survey. The sample technique used is convenience sampling with a total number of research subjects as many as 245 nurses and 54 doctors with a total of 299 respondents. The multivariate test uses simple linear regression.

Results: The mean score of disaster preparedness among nurse was 137.33 (SD=16.79) and doctor was 136.07 (SD=17.40), dengan p-value 0.799. There was a significant relationship between preparedness and knowledge ($r = 0.658$, p-value = 0.000), attitude ($r = 0.602$, p-value = 0.0000), role ($r = 0.541$, p-value = 0.000), and organization ($r = 0.610$, p-value 0.000). Knowledge ($B = 1.40$ (95% CI = 0.62 - 2.19, p-value = 0.00), role ($B = 0.94$ (95% CI = 0.50 - 1.38, p-value = 0.001), and organization ($B = 1.01$ (95% CI = - 0.1 - 2.13, p-value = 0.035) had a significant relationship with the preparedness of medical personnel for natural disaster management with a R^2 value of 0.58. Knowledge, roles, and organization were the dominant factors that significantly correlate with the preparedness of medical personnel for natural disaster management.

Conclusion: Medical personnel at General Public Hospital Dr. Slamet Garut have good preparedness for natural disasters. They have good knowledge about disaster management but lack detailed planning. Attitudes towards disaster management are good, but improvement is lacking. The role of medical personnel is good, but leadership is lacking. Organizational factors, planning, policy, and professional development are significant factors affecting preparedness.

Keywords:

Disaster preparedness, healthcaew, knowledge, attitude, role, organization.

INTRODUCTION

Disaster is a series of events that threaten and disrupt people's lives and livelihoods caused both by natural factors and/or non-

natural factors as well as human factors resulting in human casualties, environmental damage, loss of property, and psychological impacts. Indonesia is a very disaster-prone country, located on the

Pacific Ring of Fire (a region with a lot of tectonic activity) at risk of volcanic eruptions, earthquakes, floods and tsunamis (1). According to the 2019 West Java BPBD, West Java province is a disaster laboratory because all natural disasters in the world are in West Java, starting from landslides, volcanic eruptions, tornadoes, floods, forest fires, earthquakes and tsunamis/tidal waves, recorded throughout January - September 2019 as many as 1,274 natural disaster events occurred in West Java. Garut Regency is the second area that is very prone to natural disasters after Cianjur Regency. Natural disasters often occur in the Garut Regency area, such as earthquakes, landslides, tsunamis, and flash floods.

In 2016 the Garut district experienced a flash flood, this disaster was caused by rain with high intensity and a relatively long duration that flushed Garut District, causing the Cimanuk River to overflow.

RSUD Dr. Slamet Garut is a type B hospital owned by the Garut Regency government which is the reference for all health facilities in the East Priangan region. However, in the last period, there have been significant efforts made by the Indonesian government to expand and improve the standard of health service delivery, including improvements at RSUD Dr. Slamet Garut, for example, through training and infrastructure repair by making evacuation routes, clarifying the triage system. However, despite these efforts, the health system is still underdeveloped. Despite the increasing role of the private sector, this growth is not an investment to improve public health services but instead leads to the development of infrastructure supporting the economy. It was reported that health services covered only 67.0% of the population, mostly in urban areas, and only 35.0% of rural communities. Limitations of health services in disaster management are one of the causes of increased mortality and morbidity (2).

Hospitals and other health care facilities classify disasters as internal and external

disasters. Internal disasters cause disruption of hospital functions due to injuries or deaths of hospital staff or damage to hospital infrastructure, such as hospital fires, power outages, or chemical spills (3). External disasters are disasters that do not affect the hospital infrastructure but deplete hospital resources due to the number of patients or the type of injury (4). In these conditions, an early response is needed to save as many lives as possible and provide care to meet urgent needs and reduce the long-term health impacts of disasters (5). Hospitals have a central role in disaster management in saving lives and treating injured victims (6). According to WHO (7) the role of the hospital; The intra-hospital disaster management includes planning when facing a disaster and always evaluating it, coordinating with agencies outside the hospital and between work units within the hospital, as well as conducting ongoing periodic training for all hospital personnel.

The preparedness phase in hospitals is important to improve because it is the spearhead of health services when a disaster occurs. Preparedness is a series of activities carried out to anticipate disasters through organizing and through appropriate and efficient steps. Disaster preparedness is any activity before a disaster occurs that aims to develop operational capacity and facilitate an effective response when a disaster occurs. Hospital preparedness in a state of disaster is required to be able to manage daily services, service victims due to disasters, and actively assist in saving the lives of disaster victims (8). In a disaster situation, hospitals and other health service facilities, such as health centers, must be safe, easily accessible and function with maximum capacity to save victims and must continue to provide health services as they should and must be organized with the planning of hospitals and other health service facilities. In a study in Thailand emphasized that hospitals must prioritize disaster preparedness to fulfill their responsibilities

during crisis situations and improve disaster preparedness (9).

Medical personnel are increasingly faced with the constant threat of facing both natural and man-made disasters. Preparedness is very important for medical personnel because they are the front line in disaster management. The critical role of nurses during disasters is emphasized in health policies aimed at preparing nurses adequately for disaster response locally and internationally.

Preparedness activities should be based on knowledge about the potential impact of disaster hazards on health and safety, knowledge is the main factor and is the key to preparedness (10).

Knowledge possessed can usually influence attitude and concern for preparedness in anticipating disasters. Attitudes greatly influence nurses in disaster management, especially when they become disaster management officers, besides that attitude can support nurses' willingness to increase knowledge (11) Research in Saudi Arabia that emergency doctors and nurses have a positive attitude in disaster preparedness (12). A positive attitude can show the readiness of health workers to learn about disaster management and their desire to be prepared for disasters (13). The readiness of medical personnel to respond to disaster events is influenced by their competence, concerns about personal safety and concern for their families (14).

METHODS

The method used in this study is a quantitative research with a descriptive analytic design with a cross-sectional method and using an online survey. This research was conducted at Dr Slamet Garut Hospital using a non-probably sampling technique, namely convenience sampling, the samples taken must meet the inclusion criteria, namely nurses with a minimum education of DIII, doctors with a minimum education in the medical profession (S1), minimum 6 months of work experience. The

exclusion criteria were medical personnel who were used as samples for validity and reliability tests. Ethical permission was obtained before data collection (KE/065/2023).

The instrument used in this research is the Disaster Preparedness Evaluation Tool (15–17). DPET, designed to capture nurses' disaster knowledge, skills and disaster management and response. This instrument has also been used in Indonesia in the research of (18) entitled Disaster Preparedness and learning needs among community health nurse coordinators in south Sulawesi Indonesia which has been analyzed, modified, validated and translated into Indonesian by three translators from Hassanudin University. This translator is a nurse who earned a postgraduate degree.

The DPET instrument, which has been translated into Indonesian, is divided into two parts. The first part is demographic data (age, gender, education level, length of work, and experience in disaster-related training). And the second part is a statement related to the DPET instrument which consists of 47 statement items. However, the (18) removes 9 statement items related to man-made disasters and biological disasters to focus on statements on natural disasters.

Instruments related to knowledge and attitudes use instruments developed by (19). The knowledge questionnaire consists of 13 statements related to disaster management, which are measured on a Likert scale where each is made using a scale of 1-5. , 5: understand. The results of this questionnaire research itself consist of high and low. The attitude questionnaire consists of 6 statements, which are measured on a Likert scale where each is made using a scale of 1-5 categories of answers strongly agree, agree, undecided, disagree and strongly disagree.

Instruments related to the role of nurses in disasters use instruments developed by (20). This instrument consists of 12 statements which are measured on a Likert

scale, where each is made using a scale of 1-5 categories of answers strongly agree, agree, undecided, disagree and strongly disagree which focuses on the role of nurses in providing care, psychological assistance and triage, are also described in local hospital emergency and disaster preparedness plans. In this section the organizational questionnaire includes statements regarding the existence of a Hospital Disaster Plan, policies and staff development programs related to disasters and emergencies in hospitals as well as outreach and evaluation to hospital health workers. This section consists of 6 item

statements, which are measured on a 5-point Likert scale where each is made using a scale of 1-5 answer categories where 1: don't really understand, 2: don't understand, 3: understand a little, 4: understand, 5: understand.

RESULT

A description of the characteristics of medical staff respondents at RSUD Dr. Slamet Garut based on age, gender, education level, profession, years of service, work status, work unit, and work history in disaster management and emergency training.

Table 1. Frequency Distribution of Respondent Characteristics and Description of Predictors of Medical Personnel Preparedness for Natural Disasters at RSUD dr. Slamet Garut

Variable	Total n=299 (%)
Age, Mean±SD	36.61±7.51
gender	
Man	152 (50,8)
Woman	147 (49,2)
Education	
D III	95 (31,8)
S1	87 (29,1)
Profesi	70 (23,4)
S2	15 (5,0)
Spesialis	32 (10,7)
Working Periode, Mean±SD	2,48±0,99
Employment Status	
PNS	
BLU permanent employee	132 (44,1)
Contract employees	78 (26,1)
	89 (29,8)
Work unit	
ER	58 (19,4)
Inpatient	99 (33,1)
Outpatient	86 (28,8)
Operating room	26 (8,7)
ICU	30 (10,0)
Has been involved in disaster management	
Yes	123 (41,1)
No	176 (58,9)
Have attended emergency training	
Yes	213 (71,2)
No	86 (28,8)

Preparedness	137, 21±16,79
Knowledge	40,23 ± 4,24
Attitude	22,47±2,43
Role	48,25±5,21
Organization	26,12±2,76

Based on table.1 it was found that the average age of medical personnel was 36.61 with a range of 23 to 58 years. As many as 50.8% were male, with a Diploma III degree in nursing (31.8%), with an average working period of approximately 3 years. Most of them had civil servant status (44.1%), worked in inpatient care (33.1%), and had been involved in disaster management as many as 123 (41.1%). Of the total respondents, data was also obtained as much as 71.2% of medical staff had attended emergency training activities. The results of the univariate analysis found that the average score for preparedness was 137.21 with the lowest score being 95 and the highest score being 186. This shows that on average medical personnel have good preparedness in disaster management. Meanwhile, the average knowledge is 40.23 (SD=4.24) with the lowest score being 30 and the highest score being 52. This shows that medical personnel have good knowledge about disaster preparedness. The mean value of attitude is 22.47 (SD=2.43) with the lowest score being 15 and the highest being 29. This shows that medical personnel have an adequate attitude towards disaster preparedness. The average value of the role is 48.25 with the lowest score being 29 and the highest being 60. This shows that the role of medical personnel is sufficient in disaster preparedness. In addition, the average score of the organization is 26.12 with the lowest score of 18 and the highest score of 35. This shows that the readiness of the organization is in the middle range in terms of disaster preparedness.

Table 2. Characteristic demographic differences and between nurses and doctors at RSUD Dr. Slamet Garut

Variable	Nurse n=245(%)	Doctor n=54 (%)	p-value
Age, Mean±SD	36,26±7,18	39,84±0,66	0,103
gender			0,573
Man	121 (49,4)	27(50)	
Woman	124 (50,6)	27 (50)	
Education			0,034
D III	95 (57,6)	0 (0)	
S1	87 (35,5)	0 (0)	
Profesi	58 (23,7)	12 (22,2)	
S2	5 (2,0)	10 (18,5)	
Spesialis	0 (0)	32 (59,3)	
Working Period, Mean±SD	2,34±0,85	3,77±1,30	0,002
Employment Status			
PNS	111 (45,4)	20 (37,1)	
BLU permanent employee	67 (27,3)	23 (42,5)	0,123
Contract employees	67 (27,3)	11 (20,4)	
Work unit			
ER	50 (20,4)	5 (14,8)	0,127
Inpatient	80 (32,7)	19 (35,2)	
Outpatient	74 (30,6)	12 (22,2)	
Operating room	20 (8,2)	6 (11,1)	
ICU	21 (8,6)	9 (16,7)	

Has been involved in disaster management			
Yes	98 (40)	25 (46,3)	0,437
No	147 (60)	29 (53,7)	
Have attended emergency training			0,053
Yes	168 (68,6)	45 (83,3)	
No	77 (31,4)	9 (16,7)	
Preparedness	137,33±16,79	136,07±17,40	0,799
Knowledge	40,21±4.20	40,23±4,76	0,992
Attitude	22,47±2.40	22,38±2,81	0,895
Role	48,43±5,03	46,69±6,67	0,255
Organization	26,21±2,76	25,31±2,66	0,265

In table 2 above there are significant differences between nurses and doctors in terms of years of service, level of education, and employment status ($p < 0.005$). In this study, the average length of service for nurses was less than that of doctors, namely 2.34 (SD=0.85) versus 3.77 (SD=1.30) with p -value=0.002. As for education level, most of the nurses graduated from Diploma III and most of the doctors graduated from specialist programs (57.6% Diploma III in nursing and 59.3% specialists, p -value = 0.034). There was no significant difference for experience in disaster management and participation in emergency training ($p > 0.05$). The average value of preparedness for nurses is 137.33 (SD=16.79) and that of doctors is 136.07 (SD=17.40), with a p -value of 0.799. While the average value of knowledge is 40.21 (SD=4.20) for nurses and 40.23 (SD=4.76) for doctors with a p -value of = 0.992. The mean role value for nurses was 48.43 (SD=5.03), while for doctors it was 46.69 (SD=6.67), p -value=0.255. Furthermore, the average organizational score for nurses was 26.21 (SD=2.76) and for doctors was 25.31 (SD=2.66), p -value=0.265. From the results of the bivariate analysis, it was found that there were no significant differences between nurses and doctors in disaster preparedness, knowledge, attitudes, roles, and organization ($p > 0.05$).

Table 3. The relationship between knowledge, attitudes, roles and organization with the preparedness of medical personnel for natural disaster management at Dr.Slamet Garut Hospital

		Preparedness	Knowledge	Attitude	Role	Organization
Preparedness	r	1	0,658**	0,602**	0,541**	0,610**
	p-value		0,000	0,000	0,000	0,000
Knowledge	r	0,658**	1	0,711**	0,362**	0,692**
	p-value	0,000		0,000	0,000	0,000
Attitude	r	0,602**	0,711**	1	0,437**	0,604**
	p-value	0,000	0,000		0,000	0,000
Role	r	0,541**	0,362**	0,437**	1	0,428**
	p-value	0,000	0,000	0,000		0,000
Organization	r	0,610**	0,692**	0,604**	0,428**	1
	p-value	0,000	0,000	0,000	0,000	

Based on Table 3, it was found that there was a significant relationship between preparedness and knowledge ($r=0.658$, $p\text{-value}=0.000$), attitude ($r=0.602$, $p\text{-value}=0.0000$), role ($r=0.541$, $p\text{-value}=0.000$), and organization ($r=0.610$, $p\text{-value}=0.000$).

Table 4. Predictors of medical personnel preparedness for natural disaster management at Dr.Slamet Garut Hospital

Variable	B (SE)	95% CI	p-value
Knowledge	1,40 (0,39)	0,62 – 2,19	0,001
Attitude	0,89 (0,63)	-0,35 – 2,13	0,157
Role	0,94 (0,22)	0,50 – 1,38	0,001
Organization	1,01 (0,54)	-0,1 – 2,13	0,035

Catatan: $R^2=0,58$; Adujsted $R^2=0,54$

Based on Table 4 it was found that knowledge ($B=1.40$ (95% $CI=0.62 - 2.19$, $p\text{-value}=0.00$), role ($B=0.94$ (95% $CI=0.50 - 1.38$, $p\text{-value}=0.001$), and organization ($B=1.01$ (95% $CI=-0.1 - 2.13$, $p\text{-value}=0.035$) are significantly related to medical personnel preparedness for natural disaster management by the R^2 value is 0.58, which means that these variables have a contribution of 58% to the preparedness of medical personnel.

DISCUSSION

Preparedness of medical personnel against natural disasters

The results of this study found that the average score for preparedness was 137.21 with the lowest score being 95 and the highest score being 186. This shows that on average medical personnel have good preparedness in disaster management. The results of this study differ from studies conducted in America and China using the same instrument which reported that in the United States that more than 80% of health workers were not prepared to respond to disaster events (21). The good preparedness of medical personnel at RSUD Dr. Slamet could be caused by the experience of the flash flood disaster in 2016 which caused severe damage to the hospital itself. Even though at that time, the readiness of the hospital, both medical personnel and infrastructure, was inadequate, after the incident there were

significant efforts by the hospital to increase the preparedness of medical personnel, specifically through routine training and improvement of the disaster management system. Hospital preparedness in dealing with disasters must be properly planned by the hospital management. Therefore, a hospital disaster plan or disaster management plan in a hospital is really needed by the hospital, because with the planning and procedures for disaster management, when a disaster occurs the hospital is ready and there is no chaos and the implementation will be more efficient, effective and rational.

The relationship between knowledge and medical personnel preparedness for natural disaster management

The results of this study report that the average knowledge is 40.23 ($SD=4.24$) with the lowest score being 30 and the highest score being 52. This shows that medical personnel have good knowledge about disaster preparedness. In addition, there is a significant relationship between preparedness and knowledge ($r=0.658$).

This knowledge will greatly help overcome panic when a disaster occurs (22). Knowledge of disasters owned by health workers can influence awareness to be prepared in anticipating disasters (LIPI – UNESCO/ISDR, 2006). Based on research by (23) explained that lack of knowledge will also cause confusion when dealing with disasters in hospitals so that health workers

do not know what role they have during a disaster. An individual's preparedness can change according to the experience of a disaster that he has experienced which changes his perception of a disaster. Perception can be driven from oneself intrinsically to be able to take actions that will encourage someone to achieve certain goals. Experience is a source of knowledge, or experience is a way to obtain true knowledge. Nurses who have experience related to disasters will increase their knowledge, skills and preparedness higher than nurses who are less experienced. Disaster-related experience and knowledge are important factors that affect the competence of nurses when experiencing a disaster (24). The readiness of health workers to respond to disaster events is influenced by their competence, concerns about personal safety and concern for their families.

The relationship between attitude and preparedness of medical personnel for natural disaster management

The mean attitude is 22.47 (SD=2.43) with the lowest score being 15 and the highest being 29. This shows that medical personnel have an adequate attitude towards disaster preparedness. There is a significant relationship between preparedness and attitude ($r=0.602$). In a study by (11) stated that attitudes greatly influence nurses in disaster management, especially when they become disaster management officers, besides that attitudes can support nurses' willingness to increase knowledge. Meanwhile, research conducted by (25) in Saudi Arabia found that doctors and nurses in the emergency room had a positive attitude in disaster preparedness with a percentage score of 68.87% and around 12 (6.3%) participants not interested in knowing emergency (disaster) operational plans, and about 21 (11%) agreed that disaster management and planning is only for a few people in the hospital. A positive attitude can show the readiness of health workers in learning about disaster management and the desire

to be prepared for disasters, besides that long experience does not affect professional attitudes towards disaster management.

The relationship between the role and the preparedness of medical personnel for natural disaster management

The results of this study show the relationship between roles and preparedness in disaster management. Based on the results of a systematic review of 68 articles conducted by (26) it was reported that the general and specific roles of nurses include: In general, nurses must provide care in a very different context than in their usual practice during a disaster. Furthermore, it is very important that nurses are able to continue working to provide care to additional patients. Nurses are key players in emergency response to assist in a disaster, they are the most vital resource in dealing with disasters, they have been part of disaster response as long as nurses have existed, nurses will continue to be key players and when nurses have not been involved in aspects of care disaster, involvement should become mandatory. In particular, nurses working in disaster-prone areas need to know their professional role in disasters.

Organizational relationship (planning, policy and professional development) with medical personnel preparedness for natural disaster management

The results of this study show the relationship between organization and preparedness in natural disaster management. A study conducted in Texas, USA, found that rural hospitals face many challenges in disaster preparedness due to lack of staff, training facilities and limited resources. It emphasizes the need to increase regional collaboration to overcome these obstacles. The authors further recommend that hospitals adopt table top exercises which can offer a simple, inexpensive and effective tool to enhance medical preparedness. The limited number and quality of resources often sacrifices hospital preparedness for disasters. This

means that the element of adequacy of the various resources needed for emergency conditions becomes very necessary. Therefore, disaster management system planning in hospitals must be able to overcome these problems to achieve optimal preparedness in dealing with disasters. Furthermore, the establishment of a hospital command center that communicates, manages reports, equipment and supplies in emergency conditions is also necessary. The disaster management system at the hospital, in this case, must also include a communication system plan, internal traffic management, external traffic management, security, visitor management, and volunteers (27)

Dominant factors related to the preparedness of medical personnel in natural disaster management

Knowledge, roles, and organization are the dominant factors significantly related to the preparedness of medical personnel for natural disaster management with an R2 value of 0.58, which means that these variables have a contribution of 58% to the preparedness of medical personnel. In Hong Kong, researchers conducted a questionnaire survey on disaster preparedness among 164 registered nurses who were studying a master's degree program at a university (28). Also, all believed that the training course would increase their readiness, and more than 80% of them were willing to take the course.

CONCLUSION

On average, medical personnel have good preparedness in dealing with natural disasters at the Regional General Hospital dr. Slamet, Garut Regency, West Java. The level of knowledge of medical staff about disaster management is good, but knowledge about detailed disaster planning is still lacking. There is a significant relationship between knowledge and the preparedness of medical personnel in natural disaster management at the

Regional General Hospital dr. Slamet, Garut Regency, West Java. The attitude of medical staff towards disaster management is good, but the attitude towards improving disaster management is still lacking. There is a significant relationship between attitudes and the preparedness of medical personnel in natural disaster management at the Regional General Hospital dr. Slamet, Garut Regency, West Java. The role of medical personnel in disaster management is good, but the role as a leader in disaster management is still lacking. There is a significant relationship between the role and the preparedness of medical personnel in natural disaster management at the Regional General Hospital dr. Slamet, Garut Regency, West Java. The perception of medical personnel towards organizations in disaster management is good, but some are still considered lacking in terms of continuous dissemination of guidelines or procedures. There is a significant relationship between the organization (planning, policy and professional development) and the preparedness of medical personnel in natural disaster management at the Regional General Hospital dr. Slamet, Garut Regency, West Java. Knowledge, roles, and organization are the dominant factors that are significantly related to the preparedness of medical personnel for disaster management at the Regional General Hospital dr. Slamet, Garut Regency, West Java.

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