



The Effect of Knowledge and Skills of Hospital Staff on the Hospitals' Alertness and Security in Encountering Earthquake in Palu City, Central Sulawesi, Indonesia

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Abstract

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INTRODUCTION: Indonesia is one country that particularly experiences disasters, especially natural disasters.

AIM: The current research was carried out aiming to determine the effect of knowledge and skills of hospitals staff on the hospital alertness and security in encountering earthquake.

METHODS: This study applied an analytical survey method involving 184 health workers from three major hospitals in Palu City, Indonesia. In this case, data were collected through interviews and questionnaires which were then analyzed using the t-test and f-test to determine the partial and simultaneous effect of the independent on the dependent variable.

RESULTS: Based on the analysis of the data collected from 184 questionnaires involving voluntary, contracted, and civil servant health workers, it was revealed that the knowledge of health workers significantly affected the effectiveness of preparedness and security for hospitals in encountering multiple disasters in Palu City with $p < 0.01$ and T value of $3.467 > T$ table value 2.60326. Meanwhile, the health workers' skills on the effectiveness of preparedness and security in hospitals facing multiple disasters in Palu City obtained $p < 0.00$ and a T value of $4.771 > T$ table value 2.60326. Meanwhile, the effect of knowledge and skills of health workers simultaneously and significantly affected the effectiveness of preparedness and security of the hospitals in encountering multiple disasters with an F value of $47.459 > F$ table value 3.89.

CONCLUSION: The findings revealed in the current research provided useful basic information indicating the need for regular disaster-related education and training programs for emergency health workers so that they can effectively handle disaster situations and carry out their duties confidently and professionally. Such training and education are aimed to improving the health workers' knowledge and skills so that they can be more alert and prepared when disaster occurs.

Introduction

Disaster is one of the contemporary issues in international relations that demand a special concern because it causes the community to suffer due to human casualties, property losses, and environmental damage [1], [2]. Indonesia is a nation that is prone to disasters due to its geographical location which is passed by two mountainous routes of the Mediterranean in the west and the Pacific-Circum in the east. This causes Indonesia to have many active volcanoes and is prone to disasters. Natural disasters that often occur in Indonesia are long droughts, tsunamis, earthquakes, volcanic eruptions, landslides, floods, and tornadoes [3]. In 2018, Central Sulawesi Province, Particularly Palu

City, experienced multiple disasters simultaneously, those are earthquakes, tsunamis, and liquefaction, which resulted in very large losses [4]. According to National Agency Disaster Management, the earthquake and tsunami that occurred caused the mortality of 2256 people, of which 1703 people were from Palu City, 171 people were from Donggala City, 366 people were from Sigi, 15 people were from Parigi Moutong, and one person from Pasangkayu. Meanwhile, in terms of infrastructure, many buildings were damaged by the earthquake and tsunami. These building include 68,451 houses, 327 places of worship, 265 schools, 78 offices, 362 shops, 168 roads, seven bridges, and so on. Damage and losses caused by this disaster reached 13.82 trillion rupiah [5].

Furthermore, disaster can also reduce the

people's quality of life in terms of various public health problems that emerge. In this case, the short-term effects caused by the disasters are death, serious injuries requiring intensive care, increased risk of infectious diseases, damage to health facilities, and water supply systems [6], [7], [8]. Meanwhile, the long-term effects are increased insufficient food availability which affects the level of fulfillment of the nutritional needs of disaster victims. On the other hand, health services also experience problems due to damage to health facilities, inadequate number and types of drugs, inadequate medical equipment, limited health personnel, and operational funds [9]. Therefore, preparedness significantly determines the quality and quantity of services during a disaster.

Alertness toward the occurrence of disaster must be anticipated by the government, the private sector, and the community elements. Crisis alertness due to disaster requires the government to make various efforts, starting from developing regulations, preparing programs, funding, and developing a network of disaster alertness institutions or organizations [10]. Hospitals, as a referral health service facility, particularly for emergency cases, should be better prepared in handling the effect of disasters both inside and outside the hospital. In handling a disaster situation, hospitals are required to be capable of managing their daily services, disaster victims services, and actively supporting in saving the lives of disaster victims. In this case, as the spearhead of medical services during the occurrence of a disaster, a hospital must take an active role, particularly in the context of hospital's Integrated Emergency Management System (SPGDT) to referrals between hospitals [11].

The readiness of hospital's Integrated Emergency Management System, particularly in responding and handling the emergency patients, can be carried out quickly, accurately, and according to standards [11], [12]. However, hospitals are often seen to not have adequate preparedness in the field when dealing with disasters. One of the reasons for the unpreparedness of hospitals in dealing with disasters is the skills and knowledge of the health workers who are not ready to handle problems during disasters [13], [14]. Several studies have shown that the factors that affect the skills and knowledge of health workers in disaster preparedness are disaster knowledge, skills, families' preparedness for earthquake disasters, special response knowledge, and emergency patient management [15], [16], [17], [18], [19], [20]. Therefore, research is necessary to evaluate the knowledge and skills of health workers on the alertness and security of hospitals in encountering multiple disasters, including natural disasters that occur simultaneously, such as earthquakes, tsunamis, and liquefaction in Palu City and its surroundings. This is done to determine the level of hospital preparation for with disasters that occur so that services can be carried out optimally and maximally. Based on the description above, researchers

are interested in evaluating the preparedness and skills of health workers on the effectiveness of hospitals' alertness and security in encountering multidisaster in Palu City.

Methods

The population involved in the current research were all health workers who worked in government and private hospitals in the capital city of Central Sulawesi. In this study, data were collected from October to December 2021. Research samples according to Table 1 are 184 people, which are the health workers, were selected through non-probability sampling method using a purposive sampling technique. Meanwhile, the data were collected through questionnaires and interviews. The questionnaire distributed is divided into two parts. The first part contains data of the respondents, including education, occupational status, income, ethnicity, address, and gender. Meanwhile, the second part contains statements related to the construction of the research. The measurement technique in this questionnaire uses a Likert scale of 1–5, where the lowest to the highest value of the Likert scale is (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly disagree. Furthermore, the data collected were then processed using SPSS software.

Table 1: Respondents' demography

Characteristics	Frequency	Percentage
Age (years old)		
<30	26	14
>30	158	86
Gender		
Female	158	86
Male	26	14
Education		
D3	101	54.9
S1	69	37.5
S2	13	7.1
S3	1	0.5
Status		
Married	148	80.4
Single	36	19.6
Domicile		
Palu city	151	82.1
Outside Palu city	31	17.0
Position		
Volunteer	4	2.2
Contract	129	70.1
Civil servant	51	27.7
Income (Rupiah)		
<2,000,000	117	63.6
2,000,000–4,000,000	49	26.6
6,000,000–8,000,000	10	5.4
>8,000,000	8	4.3
Ethnicity		
Bugis	63	34.2
Java	17	9.2
Kaili	57	31.0
Chinese	2	1.1
Manado	6	3.3
Toraja	11	6.0
Bali	11	6.0
Others	17	9.2

Validity and reliability tests were carried out on the question items contained in the questionnaire to see

the correlation between the questions and the consistency of the questionnaire. The validity test was conducted using the Pearson product moment correlation formula at the significant level of 95% ($\alpha = 0.05$). In this case, the validity (correlation) was tested by comparing the value of r arithmetic and r table value of 0.1439. Based on the results obtained, the r values are all greater than r tables, thus indicating that all instruments are valid. Based on Table 2, all seven sub-variables with a total of 60 questions (items) have Cronbach's alpha above 0.6, meaning that these variables have good reliability. Therefore, it can be eventually concluded that the instrument employed in this study is reliable. Based on the calculation, it is further revealed that the calculation of multicollinearity between variables meets the specified criteria, which is variance inflation factor (VIF) < 10 . Therefore, it can be summed up that all variables have met the requirements for further research.

Table 2: Instrument reliability

Variables	(n)	Cronbach's alpha value	Description
Knowledge of disaster	16	0.951	Good
Skills in disaster	7	0.951	Good
Alertness in family toward earthquake	2	0.952	Good
Special response knowledge	3	0.951	Good
Patient management during emergency	12	0.951	Good
Knowledge/recovery management	5	0.950	Good
Readiness to work in disaster situations	14	0.951	Good
Total	60	-	-

Results

Based on Table 2, the research questionnaire distributed, 184 questionnaires were obtained. Furthermore, concerning the demography of the respondents, several results were found. In this case, most of the respondents involved are female by 86%, at the aged of 30 years old by 158 respondents, and are married by 80.4%. This age shows that the respondents are experienced health workers and medical personnel.

Based on Table 1, most of the respondents' education is bachelor (S1) with an income of less than IDR 2,000,000 this is because the majority of respondents are hospital contract employees. Furthermore, most of the respondents live in Palu City by 151 respondents and the most of them have Bugis and Kaili ethnicity which are the original ethnicity of Palu City.

Table 3 reveals that the health workers' knowledge about disasters on the effectiveness of hospital preparedness and security in dealing with disasters is very strong and influential. The higher and the more knowledge owned by the health workers, the more prepared they will be in dealing with disasters. This result is the same as the effect of health workers' skills on disaster which is very strong on the effectiveness of hospital preparedness and security in dealing with disasters. The results of the analysis prove that the more skilled health workers are, the more prepared they are in

dealing with disaster solutions.

Table 3: Regression and hypotheses

Variable	T Table	T value	Interpretation	Information
DK→PSE	2.60326	3.467*	Strong	Accepted
DS→PSE		4.771**	Very Strong	Accepted

* $p < 0.01$; ** $p < 0.00$; DK: Disaster knowledge; DS: Disaster skills; PSE: Preparedness and security effectiveness; T table and T value column explain partial hypothesis testing; interpretation column explains impact status; information column explains hypotheses constructed status.

Based on Table 4, the knowledge and skills of health workers about disasters significantly affect the effectiveness of hospital preparedness and security in dealing with disasters. This is proven by the results of the F value obtained which is greater than the F table, which is 47.459 with a significance of 0.00. This means that knowledge and skills significantly affect the effectiveness of hospital preparedness and security in dealing with disasters. In this case, the higher the knowledge and skills of the hospital workers, the more prepared they are in dealing with disasters.

Table 4: Regression and hypotheses (2)

Variable	F Table	F value	Interpretation	Information
DK and DS → PSE	3.89	47.459**	Very strong	Accepted

** $p < 0.00$; DK: Disaster knowledge; DS: Disaster skills; PSE: Preparedness and security effectiveness; F table and F value column explain simultaneous hypothesis testing; interpretation column explains impact status; information column explains hypotheses constructed status.

Discussion

The effect of the health workers' knowledge about disasters on the effectiveness of hospital preparedness and security in dealing with disasters is in accordance with the conditions in the field that every health worker who carries out their task during emergency incidents has sufficient knowledge so that they are professional in carrying out their duties and responsibilities. The wide knowledge about disaster is owned by the hospital health workers because they often participated in training on improving disaster skills and also often read literature on how to be prepared to deal with disasters so that they can remain professional in carrying out their duties. When a multidisaster occurred in Palu, the hospital availability was very inadequate, so health workers had to utilize the lack of medical equipment availability while remaining professional. This result is in accordance with the research conducted by Bistaraki *et al.* [21] while remaining to increase knowledge of health workers significantly affects the health workers' preparedness in dealing with disasters. Furthermore, similar results were also obtained through another study carried out by Mirzaei *et al.* [22] that training increases the health workers' knowledge so that health workers can be more professional. In the literature, the health workers' skills in disaster preparedness have been measured and evaluated based on their perception of their skills and knowledge in disaster preparedness [17], [23], [24], [25]. In this case, knowledge about disasters is one of the important factors that affect disaster preparedness in efforts to reduce disaster risk [26].

The effect of health workers' skills on disasters is very strong on the effectiveness of hospital preparedness and security in dealing with disasters. The health workers' skills are very influential with the preparedness during a disaster. According to what happened in the field during tsunamis, earthquakes, and liquefaction, the health workers' skills significantly determined the quality of emergency services at that time. When a disaster happens, health workers must have relevant skills, such as communication skills in coordinating health services. Coordination of rooms, medical equipment, stock of drugs, and others are very important when a disaster occurs because all supplies are limited. These findings are in line with the previous research conducted by Rüter *et al.* [27], where good health worker skills will lead to proper and timely decisions during major incidents and disasters. Good and proper service decisions when a disaster occurs are very important because it involves patient safety. This is further supported by Brinjee *et al.* [28] and Park and Kim [29] that health workers must have adequate skills in treating patients properly during a disaster. The core skills of health workers during disaster are critical for emergency health workers, who must provide urgent medical services to large numbers of patients when disaster occurs.

The knowledge and skills of health workers about disasters significantly affect the effectiveness of hospital preparedness and security in dealing with disasters. It is a fact that when a disaster occurs, the number of patients increases and health facilities decrease. However, health workers must be able to provide first aid in emergency conditions, able to serve in limited circumstances, able to become extensive workers and counselors for patients, and able to provide proper nursing care. The results of this study are supported by research conducted by Putra *et al.* [30] that the performance of Public Health Center during a disaster is affected by the level of knowledge and skills of the nurses. Therefore, the government and stakeholders need to work cooperatively in improving the health workers' knowledge and skills so that they can be professional in carrying out their duties during a disaster. Health workers will use the knowledge and skills they have acquired during college and on the job. These results are consistent with previous research conducted by Liou *et al.* [31] that good skills are supported by good knowledge of health workers so that emergency services carried out is optimal.

Conclusion

The current research provides several important things that need to be considered by the government, hospital owners, leaders, and related stakeholders that the health workers knowledge and skills significantly

affect the preparedness of hospital during disasters. In addition, this research also provides useful basic information indicating the need for regular disaster-related education and training programs for emergency health workers so that they can deal with disaster situations effectively and carry out their roles confidently.

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