Health Disaster Capacity and Preparedness in the Case of Tsunami and Earthquake Disaster

Setya Haksama[1*], Irwan Meilano[2], Euis Sunarti[3], Cecep Pratama[4], Muhammad Farid Dimjati Lusno[1], Sunarto[5], Shyamkumar Sriram[6], Syadza Zahrah Shedyta[7], Diansanto Prayoga[8], Syahprevi Rayyan Zeinsar[7], Abdullah Al Mamun[9], Rozan Asyrofi Rakyan Risang Aji[10], Heru Santoso Wahito Nugroho[5]

[1]Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia
[2]Faculty of Earth Science Technology, Institut Teknologi Bandung, Bandung, Indonesia
[3]Faculty of Human Ecology, Institut Pertanian Bogor, Bogor, Indonesia
[4]Faculty of Engineering, Universitas Gajah Mada, Yogyakarta, Indonesia
[5]Health Department, Poltekkes Kemenkes Surabaya, Indonesia
[6]College of Health and Public Services, University of North Texas, Denton, USA
[7]Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia
[8]Faculty of Health, Medicine and Natural Sciences, Universitas Airlangga, Banyuwangi, Indonesia
[9]Knowledge Dynamics, Rangpur, Bangladesh
[10]Faculty of Medicine, Universitas Surabaya, Indonesia

Abstract

The health system has a very important role in reducing hazards, exposure and vulnerability, especially in disaster conditions. In this case, the health system can be viewed from various sides, two of which are capacity and preparedness in health disasters. Therefore, research is needed that aims to describe the capacity and preparedness based on the case of the earthquake and tsunami disaster in Palu. This descriptive study was conducted based on the case of the earthquake and tsunami disaster in Palu, Central Sulawesi, Indonesia. Disaster management capacity and preparedness in facing disasters were measured by filling out an online questionnaire. Furthermore, descriptive data analysis was carried out. For disaster management capacity, the results of the assessment of each indicator were: provision of health services = low, human resources = low, financing = low, materials and governance = high, institutional structure and health information systems = low; 6) medicines and health supplies = high and community and environmental conditions = high. For disaster preparedness, the results of the assessment of each indicator were: fulfilment of basic health needs = high and reduction in disease severity through health services = low. In general, it is concluded that based on the case of the earthquake and tsunami disaster in Palu, the capacity and preparedness of disasters in the health sector are still relatively low.

Keywords: Capacity, Disaster, Earthquake, Health, Mitigation, Tsunami.

Introduction

Indonesia is one of the countries with high disaster potential, with one of the vulnerable areas being Sulawesi Island, especially Palu City, Central Sulawesi Province, with a disaster that caused many victims. This incident occurred on September 28, 2018, at 18:02 Central Indonesian Time, with a strength of 7.4 on the Richter Scale, with the epicentre located around 26 kilometres north

of Donggala and 80 kilometres northwest of Palu City, at a depth of 10 kilometres. In addition, the earthquake was also followed by secondary hazards, namely tsunamis and liquefaction. This causes various impacts on the community, namely economic losses, fatalities, and the danger of surface deformation due to fault shifts, the danger of earthquake shaking, and aftershocks including tsunamis, liquefaction, and landslides. In addition, there are also other risks, namely damage and destruction of health facilities, disruption of health programs, loss of health staff, and excessive burden on clinical services. It was recorded that 55,102 houses were damaged, either severely damaged, moderately damaged, or lightly damaged [1]; 4,194 human victims, namely 2,132 people died, 570 people were missing and 1,016 people were buried without being identified [2]. In addition, the number of refugees reached 62,359 people spread across 147 points [3].

Emergency conditions can hamper the development of public health and other sectors for a certain period [4]. Disasters cause spikes in mortality, morbidity, disability, and other emergency conditions, disrupting the health system [5]. The earthquake in Palu caused damage to the Anutapura Palu Hospital, Poso Regency Hospital, and Undata Palu Hospital, and the remaining buildings were tilted and several structural elements were severely damaged. In addition, six health centres were also damaged, namely the Talise, Bulili, Mamboro, Lere, Nosara, and Singgani Health Centers. This can hamper the health service process because the service process is carried out in the hospital yard. Patients at the Bhayangkara Hospital in Palu are placed in the yard of the Central Sulawesi Regional Police Office [3].

The health system has a very important role in reducing hazards, exposure and vulnerability [6]. Capacity building is carried out to prevent hazards from occurring or reduce the consequences of hazardous events that may occur that cause emergencies. These capacities include primary care, disease surveillance, pre-hospital care, mass casualty management, chemical and radiological safety, mental health, and risk communication [7]. Of course, the health system must be able to ensure that additional capacities to manage non-routine risks, such as event-based surveillance, special emergency health teams, standards for infrastructure in high-risk areas, emergency response, and simulation exercises can be used and are useful [8]. In addition, efforts are needed to minimize disaster risks and disaster preparedness by increasing the ability to deal with disaster threats by reducing vulnerability levels and increasing capacity [9-11].

Based on the background above, research is needed that aims to describe the capacity and disaster preparedness in the health sector based on the case of the tsunami and earthquake disasters in Palu, Indonesia.

Materials and Methods

This study was conducted with a quantitative approach and was a descriptive study, which focused on describing the capacity and preparedness of the health sector in dealing with disasters in the case of the earthquake and tsunami in Palu, Central Sulawesi, Indonesia. Capacity and preparedness were measured by both the central government and the regional government of Central Sulawesi Province. This study was conducted from November to December 2021 in areas that had been affected by the earthquake and tsunami, namely Palu City and its surroundings, which are part of Central Sulawesi Province, Indonesia. This study involved samples selected using accidental sampling techniques so that finally, 80 respondents could be recruited from elements of the community, volunteers, community health centre staff, Disaster

Management Agency staff and health service staff.

There were two variables measured in this scientific study, namely disaster management capacity and disaster preparedness. Both of these variables were measured by filling out an online questionnaire. The questionnaire on disaster management capacity consisted of 7 indicators, namely:

1. Provision of health services
2. Human resources
3. Financing
4. Materials and methods/governance
5. Institutional structure and health information system
6. Medicines and health supplies
7. Community and environmental conditions

Meanwhile, the questionnaire on disaster preparedness consisted of 2 indicators, namely:

1. Fulfillment of basic health needs
2. Reduction in disease severity. The collected data were then analyzed descriptively and presented in tabular form.

This research was conducted by upholding research ethics, such as maintaining the confidentiality of respondents' identities, having informed consent, avoiding all things that are detrimental or dangerous to respondents, providing benefits to respondents, and being fair to respondents in the broadest sense.

Results

Based on Table 1, it was known that the maximum score for disaster management capacity was 160. In the first indicator (provision of health services), the scores for the service process and availability of officers were still low, namely 135 and 157. In the second indicator (human resources), the scores for the majority of aspects were still low, namely disaster management capabilities, ownership of disaster management certification, the intensity of disaster training participation, and rapid health assessment (RHA) teams with scores of 139, 139, 144, and 154, respectively. In the third indicator (financing), all scores were still low, both the adequacy of disaster management costs, allocation of investment in disaster management equipment, and allocation of officer training costs, with scores of 138, 121, and 128, respectively. In the fourth indicator (materials and methods), all aspects were good. In the fifth indicator (institutional structure and information system), there were still aspects with low scores, namely the availability of information systems, the availability of health impact information systems based on disaster types, and the availability of reporting systems, recording, and real-time data collection. In the sixth indicator (medicine and health supplies), all aspects were good. In the seventh indicator (community and environmental conditions), all aspects were good.

Table 1. Disaster Management Capacity Assessment Results (Score, Cut-Off Point and Difference)

No	Indicators of capacity	Score	Cut of point	Difference	%
1	Health service provision				
	Health service provision process	135	160	-25	84.4
	Availability of health service personnel	157	160	-3	98.1
	Victim handling	171	160	11	106.9
	Hospital referral guidelines	177	160	17	110.6
2	Human resources				
	Availability of health personnel	162	160	2	101.3
	Disaster management capability of health	139	160	-21	86.9

	personnel				
	Having disaster management certification	139	160	-21	86.9
	Participation in disaster management training.	144	160	-16	90.0
	Availability of rapid health assessment	154	160	-6	96.3
	Coordination in disaster management implementation	161	160	1	100.6
3	Financing				
	Allocation of disaster management financing	138	160	-22	86.3
	Allocation of investment in disaster management equipment	121	160	-39	75.6
	Allocation of disaster management officer training	128	160	-32	80.0
4	Materials and methods/governance				
	Availability of disaster management facilities and infrastructure	227	160	67	141.9
	Availability of disaster management planning	179	160	19	111.9
	Availability of contingency planning	177	160	17	110.6
	Availability of disaster management collaboration	168	160	8	105.0
	Availability of disaster management monitoring and evaluation	181	160	21	113.1
	Availability of disaster management SOP	166	160	6	103.8
5	Machine/institutional structure and health information system				
	The existence of disaster management institutions	217	160	57	135.6
	The existence of a disaster management organizational structure	219	160	59	136.9
	Availability of information system	143	160	-17	89.4
	Availability of comprehensive health impact information system based on disaster type	140	160	-20	87.5
	Availability of reporting monitoring system, recording, and real-time data collection.	139	160	-21	86.9
6	Medicine and health supplies				
	Availability of guidelines for managing medicine and health logistics	181	160	21	113.1
	Availability of reserve medicines and medical devices that can be used at any time.	179	160	19	111.9
	Availability of ambulances that can be operated during a disaster	183	160	23	114.4
7	Community and environmental conditions				
	Community understanding of disaster conditions in their area	217	160	57	135.6
	Community knowledge of disaster management	216	160	56	135.0
	The existence of potential disasters due to natural conditions	233	160	73	145.6
	Existence of potential disasters that occur simultaneously	230	160	70	143.8

Based on Table 2, related to disaster preparedness, it was known that in the first indicator (fulfilment of basic health needs) a good score of 174 was obtained. Meanwhile, in the second indicator (decrease in disease severity and basic health services), a low score of 139 was obtained.

The aggregate or overall assessment is shown in Table 3. It appears that the disaster management capacity score was 5321, which is then included in the category of low capacity to deal with disasters. Meanwhile, the preparedness score was 313, which is then included in the category of low disaster preparedness.

Table 2. Disaster Preparedness Assessment Results (Score, Cut-Off Point and Difference)

Indicators of preparedness	Score	Cut of point	Difference	%
Fulfillment of basic health needs	174	160	14	108.8
Reducing the severity of disease through basic health services	139	160	-21	86.9

Table 3. Results of the Overall Assessment of Capacity and Preparedness in Facing Disasters

Variables	Overall score	Interpretation	Category
Capacity	5321	Low capacity	Very low: 2480-4340, low: >4340-6200, high: >6200-8060, very high: >8060-9920
Preparedness	313	Low preparedness	Very low: 160-280, low: >160-400, high: >400-520, very high: >540-640

Discussion

Based on the results of descriptive data analysis, it can be described that overall, the disaster management capacity in the health sector is still in the low category. The first indicator is that the provision of health services is still in a low condition. This can happen because the health service facility building is damaged or even destroyed so that health services are disrupted. Hospitals are health facilities that are needed when a disaster occurs and function to provide health services, the main source of handling, evacuation, and care for disaster victims [12], so damage to the hospital causes obstacles to health services. In addition, hospitals must also prepare themselves when a disaster occurs through a disaster management plan that is compiled in the Hospital Disaster Plan (HDP) document and must be understood by all components in the hospital [13].

The second indicator of capacity, namely human resources, also shows results in the low category, especially in the ability of health workers in the field of disaster management, ownership of disaster management certificates, and participation in disaster training. This condition is related to limited human resources and the possibility that health workers will also become victims of disasters that occur in their work areas. Responsible health service institutions, namely the local health office or hospital, should have good data and information systems related to the health worker monitoring system so that officers who are active and can be active in helping disaster victims or working in health service institutions can be detected [14]. The inability of human resources can occur due to limited funds for training and participation in disaster capacity-building seminars. Therefore, this aspect needs to be reviewed and considered carefully and thoroughly so that there is no gap in service. Human resources are the only resources that have reason, feelings, desires, skills, knowledge, drive, power and work. Of course, this potential affects the achievement of organizational goals [15].

The third indicator of capacity, namely financing, also shows a low score, especially in the aspect of disaster management cost allocation, investment in disaster management equipment and officer training. Financing is an important aspect of the disaster management mechanism, therefore, its availability is absolute because all operational activities and procurement of facilities require costs. The government should create an innovative disaster risk financing framework to meet the budget needs for large amounts of natural disaster management funds [16]. For this reason, the government can use contingency financing instruments as a complement to the routine budget to cover disaster risks with moderate to high loss impacts [17].

The fourth indicator, namely materials and methods/governance, shows a good score. This indicator is important and is a mandatory requirement in disaster conditions, so the role of the government is to provide and support the equipment needed as completely as possible. Governance is a procedure and standard for administrative and management activities that are structured in an organizational structure so that aspects of equipment and governance must be completed because they are procedures, standards and requirements that must be met [18].

The fifth indicator, namely machine/institutional structure and health information system, still shows a low score, especially in the aspect of the availability of information systems, health impact information systems based on disaster types, and real-time reporting, recording, and data collection monitoring systems. This indicator is an absolute must because it is an organizational structure found in disaster management institutions such as national and regional disaster management agencies, health services, and other related regional apparatuses at the provincial and district/city levels. The information system has a very vital role related to data availability, the use of

various applications for mapping and conditions of disaster areas, and can be used to develop data-based programs from the information system provided. In addition, a good information system is needed to prevent and overcome disasters, one of which is the importance of a geographic information system that can provide a spatial picture of disaster potential and mitigation and can also identify important geographic trends used to support the decision-making process [19].

The sixth indicator, namely medicine and health supplies, generally has a good score. This shows that the facilities have been well taken care of considering that medicine and supplies are very important supporting facilities in community services and care in disaster conditions, where many people are sick and injured after the disaster [20].

The seventh indicator, namely the condition of the community and environment, has also shown good conditions. This shows that the condition of the community and environment has been a concern for all related parties. This is very logical because aspects of the community and environment are some of the aspects that are immediately detected by anyone, both by the community and stakeholders, so that they will get attention more quickly [21].

In terms of disaster preparedness, the first indicator, namely the fulfilment of basic health needs, has met the requirements for preparedness in the sense that it has a good score. However, on the other hand, the second indicator, namely reducing the severity of the disease by providing health services, has a low score. This shows that services to reduce the severity of the disease still require careful improvement efforts. According to Law of the Republic of Indonesia Number 24 of 2007 concerning Disaster Management, in the post-disaster stage, improving health services is one of the mandatory things that must be done as a form of rehabilitation effort. Improving the provision of health services is also related to

the capacity of the region. If the capacity aspects are met properly, then the readiness to provide services will also increase [22-27].

Conclusion

Based on the case of the earthquake and tsunami disaster in Palu, Central Sulawesi, Indonesia, it can be concluded that in general, the capacity and preparedness for disasters in the health sector are still relatively low, especially in terms of providing health services, human resources, financing, institutional structures and information systems, and health services to reduce the severity of disease.

Conflict of interest

There is no conflict of interest related this research and publication

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