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Article

Functional Disaster Preparedness at Community Health Centers in Mount Merapi Yogyakarta Disaster Prone Areas

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ABSTRACT

Mount Merapi is one of the most active volcanoes in the world. The major eruptions happened in 1768, 1822, 1849, 1872, and the most recently in 2010. Three health centers are situated at the foot of Mount Merapi, with a high risk of potential disasters, ranging from eruptions and cold lava flows to landslides. To maintain service quality and effective disaster response, this study aimed to provide evaluation material for optimizing service quality and assessing the readiness level of these health centers. The research used a quantitative analysis method, collecting numerical data to outline the preparedness level of the three health centers: Puskesmas Pakem, Puskesmas Turi, and Puskesmas Cangkringan. The results, achieved through manual calculations, indicated that Puskesmas Pakem exhibited the highest functional preparedness with a score of 0.45, categorized as "moderate." Puskesmas Turi scored 0.40, also categorized as "moderate." On the other hand, Puskesmas Cangkringan scored 0.24, falling into the "low" category. In conclusion, two health centers fell into the "moderate" category, which means the risks to the safety of staff and patients persisted, necessitating future interventions. Meanwhile, one health center fell into the "low" category, signifying its inability to function optimally during disasters and requiring immediate interventions.

INTRODUCTION

Indonesia is an archipelagic country located between 3 colliding world plates, including the Eurasian plate in the north, the Australian plate in the south, and finally the Pacific plate in the east [1,2]. Apart from that, Indonesia is also included in the Ring of Fire

region, which means that the Indonesian territory is surrounded by active volcanoes all around it [3]. Based on this background, Indonesia is a country that is very vulnerable to potential disasters. One of the regions in Indonesia that is vulnerable to disasters in Indonesia is the Yogyakarta region [4]. This is because Yogyakarta has an open coast in the southern region, which has the potential for tsunami incidents, while in the northern part of the region, there is an active volcano which is one of the most active volcanoes in the world, the mountain is Mount Merapi [5]. Based on historical data, Merapi has experienced major eruptions, namely in 1768, 1822, 1849, 1872, and most recently in 2010, this was an eruption event that had quite an impact on communities throughout Indonesia, especially in the Yogyakarta area and its surroundings [6].

The impact of this eruption was damage to structures and infrastructure in the area around Mount Merapi and it made a big impression on the residents' minds [6]. One aspect that is greatly affected is the community health center, this is because the community health center is a concrete agency that has an organizational structure, buildings and services that will be disrupted if a disaster is not handled properly. The community health center itself is the first-level health facility that will handle casualties at the regional level affected by disasters. Disruption of the function and services at the community health center will greatly affect the survival rate of victims when a disaster occurs. Therefore, it is important to measure the level of disaster preparedness in community health centers, especially in community health centers, which have a high risk because they are close to areas prone to natural disasters[7,8,9].

One instrument that can be used to measure preparedness in community health centers is the small-medium hospital safety index checklist issued by WHO [9]. Small medium Hospital Safety Index (HSI) consists of three assessment aspects: structural, non-functional, and functional aspects [10]. The functional aspect consists of elements of emergency response organizations, emergency plans, and also drug stocks and preparedness instruments [11]. The three elements contained consist of a checklist of questions, which will be calculated as a total score depending on each category found [12,13,14]. Next, the three elements will be added up and divided evenly to get concrete results related to functional disaster preparedness at the community health center that you want to research [15–17]. The categories obtained will determine the category of functional preparedness, this can be used as material for evaluating and optimizing services according to the categories obtained by the relevant health center [18]. Therefore, it is hoped that services and handlers when a disaster occurs can be more optimal and have a high safety rate for victims, patients, and the community health center staff themselves.

METHODS

This research will analyze the preparedness of the Community Health Centers (Puskesmas) surrounding Merapi Mountain, which are Puskesmas Turi, Puskesmas Pakem, and Puskesmas Cangkringan. The study was conducted in July 2023. The person who fills out a questionnaire is the person who is responsible for the decision related to preparedness in Puskesmas (Head of Occupational Safety and Health Division, Head of Disaster Management, and Pharmacist). In this research, numerical data was collected using the Small Medium Hospital Safety Index (HSI) checklist to assess various aspects that reflect resilience and functional preparedness in first-level health facilities such as community health centers or clinics. The research was also deductively based on the measurement framework in the small-medium HSI. Analysis and data processing techniques, it will be carried out using a manual calculation method to conclude the final score and determine the preparedness category at the health centers studied. The interpretation of HSI scores was 0.00-0.35, which is low, 0.36-0.65, which is medium, and 0.66-1, which is high. Furthermore, this research is an objectivist ontology that assesses facts by evaluating the level of disaster preparedness in community health centers in a structured manner.

RESULTS

The research was conducted at 3 community health centers that are in the Mount Merapi disaster-prone area in the Sleman district of Yogyakarta. These community health centers include Puskesmas Pakem, Puskesmas Turi, and Puskesmas Cangkringan. The checklist related to functional preparedness carried out in the research consists of 3 elements containing 33 checklists. Table 1 presents data related to functional preparedness related to the organization of disaster committees in the three community health centers, which consist of 5 checklists.

Table 1. Analysis of organizational aspects of community health center disaster committees

Organizational aspects of community health center disaster committees	***Puskemas Pakem***			***Puskemas Turi***			***Puskemas Cangkringan***		
Score.	***H***	***M***	***L***	***H***	***M***	***L***	***H***	***M***	***L***
1 Community Health Center Emergency/Disaster Committee									
2 Committee member responsibilities and training									
3 Emergency Operational Center (EOC)									
4 Directory of external stakeholders and other contacts									
5 Job cards are available to all personnel									

Based on Table 1, the resulting data is presented in the form of a description of the preparedness of the three health centers to find out the most points with low scores from the three related health centers. The data is presented in a colored Table to categorize aspects of functional disaster preparedness. There are 3 colors, which are divided into GREEN, which is in the "high" category; YELLOW, which is in the "medium" category; and RED, which is in the "low" category. An Organizational aspect of community health center disaster committees shows the Puskesmas Pakem has a score of 0.40 in the (B) "MEDIUM" category. The Puskesmas Turi shows a of 0.30, which is in the (B) "LOW" category, and the Puskesmas Cangkringan shows a score of 0.10, which makes it into category (B) "LOW." Table 2 presents the results of functional preparedness analysis on aspects of emergency response plans in the three health centers consisting of 21 checklists.

Table 2. Analysis of the Community Health Center's Emergency Response or Disaster Response Plan

	Community health center emergency response or disaster response plan	***Puskesmas Pakem***			***Puskesmas Turi***			***Puskesmas Cangkringan***		
	Aspect	***H***	***M***	***L***	***H***	***M***	***L***	***H***	***M***	***L***
1	Emergency or disaster response plan at Puskesmas									
2	Special sub-plan for health center hazards									
3	Strengthening essential services at Puskesmas									
4	Procedure to activate and deactivate the plan									
5	Special administrative procedures for disasters									
6	Financial resources for emergencies and disasters									
7	Expansion of space that can be used for mass casualty incidents									
8	Procedures for admitting and caring for patients during an emergency									
9	Triage, resuscitation, stabilization, and treatment									
10	Transportation in an emergency									
11	Coordination mechanisms and collaborative arrangements with local health service networks and other institutions									
12	Linkage to local emergency response plans									
13	Patient referral system									
14	Procedures for communicating with the public and the media									
15	Mobilization and recruitment of personnel during emergencies or disasters									
16	Evacuation plan									
17	Staff availability and preparedness									
18	Emergency warning systems are defined and tested									
19	The alarm system is specified and tested									
20	Exercise emergency and disaster response plans, evaluations and corrective actions									
21	Preparedness program to strengthen emergency and disaster response and recovery									

Table 3 will provide data information related to functional preparedness analysis on the aspect of availability of medicines, supplies and disaster instruments, which in total consists of 7 checklists. Based on the data presented in Table 3, it showed an overview of aspects of the availability of medicines and disaster instruments at the three health centers. It is known that in the aspect of availability of medicines, supplies, instruments and equipment for disaster situations, the same score was obtained from each community health center (Puskesmas). The Puskesmas Pakem shows a score of 0.50 in the (B) "MEDIUM" category, and the Puskesmas Turi shows a similar score of 0.50 which is in the (B) "MEDIUM" category, and the Puskesmas Cangkringan also shows a score of 0.50 which is making it into category (B) "MEDIUM".

Table 3. Analyze the availability of medicines, supplies, and disaster instruments

Availability of medicines, supplies, instruments, and equipment for disaster situations	***Puskesmas Pakem***			***Puskesmas Turi***			***Puskesmas Cangkringan***		
Aspect.	***H***	***M***	***L***	***H***	***M***	***L***	***H***	***M***	***L***
1 Medicines and supplies for emergency response									
2 Sterilized instruments and equipment for emergency response									
3 Life support equipment for emergencies									
4 Personal protective equipment and isolation for infectious and epidemic diseases									
5 Surveillance procedures, infection prevention and control									
6 Food and drinking water during emergencies									
7 Duties assigned to personnel for emergency or disaster response and recovery									

Table 4 presents the total score results related to the analysis of functional preparedness in the three community health centers as an illustration of the comparison of the preparedness category results obtained by each community health center. In Table 4, score data is presented that compares the results of the three community health centers. This aims to determine the readiness of each community health center and also determine the average score obtained from the three community health centers as a conclusion regarding the preparedness category of community health centers in the disaster-prone area of Sleman, Yogyakarta. It is known that of the three community health centers studied, Pakem community health center has the highest score with a value of 0.45 which is included in category (B) "MEDIUM", while Turi community health center is in second place in disaster preparedness functional aspects of community health centers with a score of 0.40 and is

also in category (B) "MEDIUM", and in third place, the Cangkringan health center is the health center with the lowest score with a number of 0.24 and is in category (C) "LOW". This shows that the Pakem community health center and the Turi community health center already have better functional preparedness with category (B) "MEDIUM" when compared to the functional preparedness of the Cangkringan community health center which is in category (C) "LOW". However, from each community health center there were still points with low scores which indicated that it was necessary to evaluate and optimize disaster preparedness in certain aspects.

Table 4. Comparison & Index of total research scores

No	Aspect	Puskesmas Pakem		Puskesmas Turi		Puskesmas Cangkringan	
		Indeks	Category	Indeks	Category	Indeks	Category
1.	Organizational aspects of disaster committees at Puskesmas	0.40	Medium	0.30	Low	0.10	Low
2.	Emergency response or disaster response plan at Puskesmas	0.47	Medium	0.40	Medium	0.14	Low
3.	Availability of medicines, supplies, instruments, and equipment for disaster situations	0.50	Medium	0.50	Medium	0.50	Medium
	Mean	**0.45 MEDIUM (B)**		**0.40 MEDIUM (B)**		**0.24 LOW (C)**	

DISCUSSION

Based on the data presented in Table 1. Data is presented in the form of a description of functional preparedness in the organizational aspect of the disaster committee at the three community health centers. Two puskesmas of 3 of total has LOW score. It stated in Putra's (2018) research that the disaster committee team has a very important role for the community and a health facility, so that all aspects of it are very important and influence each other [19]. Based on research data, it is also known that there are points with low results from the three health centers, these points are "action cards for all personnel". Action cards are cards used by community health center officers when a disaster occurs. These cards contain tasks, responsibilities and positions from the organizational structure that has been created [19]. If the action card is not available, it is feared that there will be confusion regarding duties and responsibilities which will lead to vacancies in certain posts, which of course can reduce the quality of service and security flow for victims and patients at community health centers [19].

In line with research conducted by Amaliah (2021), it is known that a committee team is a team that coordinates with each other to monitor performance, provide feedback and provide solutions to each other [20]. This is an aspect that requires overall coordination so that, without team coordination, there will be failures in the knowledge, communication and support systems for less experienced team members [21]. Therefore, urgent intervention is needed for health agencies that still have low scores on organizational aspects and disaster committee assessments in certain areas [9].

In the data presentation, Table 2 shows information data in the form of a description of functional preparedness in the emergency response plan aspect of Puskesmas Pakem, Puskesmas Turi and Puskesmas Cangkringan, which showed that 1 puskesmas has low category. Some aspect that has low score in 3 puskesmas are in points; a) Financial resources for emergencies and disasters, b) Referral system, and c) Alarm system determined and tested. Financial resources themselves are a very important aspect when a disaster occurs [22]. This is because when there is a surge in patients, it is very possible that there will be a shortage of medicine supplies and also food supplies that must be met immediately, without a budget reserve this cannot be resolved properly, and will have an impact on the operational side [23]. Furthermore, regarding the referral system, we will discuss the flow and steps that will be implemented when there are patients who require treatment at a higher level [20]. This is an emergency and can cause an increase in fatalities if not handled quickly, so the referral system itself is an important aspect which is the main factor in minimizing fatalities [24,25]. Regarding the alarm system being tested, it is a signaling system when a disaster occurs which will sound and provide information regarding the presence of danger indications and has been tested within a predetermined time period. This is important regarding evacuation efforts for victims and patients inside the health center building, so that if the system is not available then there is a large potential for patients to be trapped in a building that is being hit by a disaster.

Based on Choirrini's (2018) research, it was found that community health centers and hospitals in facing disasters require planning and action to improve safety, management and hospital disaster preparedness [26]. Implementation of emergency response plans requires regular optimization of the use of available health infrastructure and health supplies, as well as utilizing human resources from central and regional governments, business entities, non-governmental organizations and the community [27,28]. This is in line with research conducted by Hashim which states that the impact that may occur if the emergency response planning at the health center is less than optimal, there is the potential for major dangers to arise, such

as work accidents, damage to facilities and infrastructure, environmental damage as well as material and non-material losses [29].

CONCLUSION

In this research, it was discovered that of the three health centers, only two were in the category of being in functional preparedness, these health centers were the Pakem and Turi health centers. Meanwhile, the third community health center, namely the Cangkringan community health center, is still in the low category in terms of functional disaster preparedness. The improvement of preparedness is crucial for public health facility especially in vulnerable disaster region.

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