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STUDENTS' PREPAREDNESS LEVEL TO FACING AN EARTHQUAKE DISASTER IN YOGYAKARTA, INDONESIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Sleman Regency has areas prone to natural disasters such as volcanic eruptions, droughts, earthquakes, and landslides. Faculty of Health Sciences Universitas Respati area has never been assessed for earthquake disaster preparedness, even though it is not exempt from disaster threats. With high preparedness it is hoped that it can minimize the risks due to disasters. **Purpose:** To find out the level of preparedness of students in dealing with earthquake disasters. **Methods:** The research design was cross-sectional, with a population of all Faculty of Health Sciences Universitas Respati Yogyakarta students. Samples were taken using the Proportionate Stratified Sampling technique, so a sample of 95 respondents was obtained. The research instrument was from the LIPI/UNESCO questionnaire, 2006. Data analysis used univariate with a quantitative descriptive approach. **Results:** The index value of earthquake disaster preparedness for students of the Faculty of Health Sciences, University of Respati Yogyakarta has an index value of 84 which is included in the high category. **Conclusion:** The level of earthquake disaster preparedness among students of the Faculty of Health Sciences, Respati University, Yogyakarta. generally included in the high category with several aspects of preparedness still in the low category such as disaster warning and the ability to mobilize resources.

Keywords: disaster, earthquake, preparedness

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INTRODUCTION

People around the world face a wide range of risks associated with health anxiety and disasters. These include infectious disease outbreaks, natural hazards, conflict, unsafe food and water, chemical and radiation incidents, building collapses, transport accidents, lack of water and electricity supplies, air pollution, antimicrobial resistance, the effects of climate change, and other sources of risk. Small-scale dangerous incidents with few health effects happen frequently, but other incidents can lead to anxiety or natural disasters with serious effects on public health, wellbeing, and health development. In the short and long term, these catastrophes can have catastrophic health, economic, political, and societal repercussions (World Health Organization, 2019). Indonesia is susceptible to disasters due to its physical, demographic, and sociocultural circumstances (Wardyaningrum, 2014).

Disasters usually strike quickly, but it can take years to recover from the impact of the disaster. In addition, disasters can cause serious psychological disorders in some individuals who experience them. The impact of this disaster on a person is very much a risk and the resilience of the person. According to (Ikhsani, 2023), natural disasters can impact public health in two categories: short-term and long-term. Short-term impacts include infectious diseases and physical health problems such as injuries. The types of disasters faced can cause quite a variety of infectious diseases. Respiratory tract infections, gastrointestinal infections, vector-borne diseases, and skin diseases are some of the infectious diseases that may occur during floods, such as diarrhea, dermatitis, leptospirosis, cholera, typhoid fever, as well as other diseases transmitted by water and vector-borne diseases, such as malaria and dengue fever. Even according to research (Tatontos & Urip, 2023) in addition to malaria, cases of malnutrition in infants or toddlers can also occur. In post-disaster conditions, research results (Almira & Hidajah, 2020) showed that as many as 52% of the total patient visits to the Gangga Health Center are women. The largest age group is 18-45 years. The most cases reported were infectious diseases with the potential for an epidemic, namely Acute Respiratory Infection (ARI) as much as 23% of the total cases and diarrhea as much as 15% of cases. There was one suspected measles and four suspected chickenpox. As of August 31, 2018, the total deaths reported at the Gangga Health Center were 89 cases. Disaster threats according to Law Number 24 of 2007 are events or incidents that can cause disasters. Vulnerability to the impact or risk of disasters is a condition or biological, geographical, social, economic, political, cultural and technological characteristics of a community in an area for a certain period of time that reduces the community's ability to prevent, mitigate, achieve readiness, and respond to the impacts of certain hazards (BNPB, 2007).

Earthquakes can occur suddenly and without warning. Earthquakes are sharp and sharp earthquake shocks caused by movement between tectonic plates along a fault line in the earth's crust. Earthquakes can cause ground shaking, land liquidation, earthquakes, cracks, oceans, fires and tsunamis (World Health Organization, 2017). According to (World Health Organization, 2017) health threats from earthquakes can vary depending on the size of the earthquake, the nature of the built environment, and secondary effects of earthquakes such as tsunamis or earthquakes.

Earthquakes can have immediate and long-term impacts on health. Secondary infections from untreated wounds; increased morbidity and risk of complications associated with pregnancy and childbirth due to disruption of obstetric and neonatal services; potential risk of infectious diseases, especially in areas affected by fatigue; increased chronic diseases and risk of complications due to discontinuation of treatment; increased psychosocial needs; potential environmental contamination by chemical / radiological agents following the destruction of industrial infrastructure.

Disaster preparedness is an effort that allows communities (individuals, groups, organizations) to cope with the dangers of natural events, through the establishment of systematic emergency response structures and mechanisms. The goal is to minimize loss of life and damage to public service facilities. Disaster Preparedness (Akin *et al*., 2017) includes efforts to reduce the level of risk, formulate a Disaster Emergency Plan (Disasters Plan), manage community resources, and train residents in disaster-prone locations (Gedhe, 2020). For students, preparedness is important because students have tasks other than studying,

students also have the responsibility to act as agents of change or reformers. It is hoped that they can bring about changes that are beneficial to society, their families, and themselves. So that to carry out their role as agents of change, students can be an example for the community on how to act appropriately when facing a disaster. For this reason, students need to have adequate knowledge about disaster preparedness (Pertiwi *et al*., 2021)

Previous research showed that Binawan University students do not yet have a good level of knowledge which may be caused by the uneven distribution of the curriculum on disaster preparedness in all study programs (Pertiwi *et al.*, 2021). Research conducted by Sari & Ridhwan (2019) explained that in terms of gender differences, the level of knowledge of disaster preparedness of students is in the low category and there is an influence of gender on disaster preparedness. Previous research conducted by Agnesia & Nopianto (2022) explains that there is an influence between low or inadequate knowledge and negative attitudes towards disaster preparedness in students.

Sleman Regency is one of the regencies in the Special Region of Yogyakarta which has areas prone to natural disasters such as volcanoes, droughts, earthquakes, and landslides. The threat of earthquake disasters per village in Sleman Regency in 2017, it can be seen that in Sleman Regency there are 9 villages that are included in the high level of earthquake disaster threat, 56 villages with medium threat, and 21 villages with low threat (Firmansyah, 2022).

The high threat of earthquake disasters includes Bokoharjo Village, Jogotirto Village, Kalitirto Village, Madurejo Village, Maguwoharjo Village, Purwomartani Village, Sendangadi Village, Sumberrejo Village, and Tegaltirto Village. In 2022, an earthquake also occurred on September 19, 2022, shaking Jogja, Sleman and its surroundings, the earthquake was felt at around 23.35 WIB. The location of the lecture is in Maguwoharjo Village which is included in an area prone to earthquakes (Firmansyah, 2022). Especially for the campus area which is indeed included in an area that has an earthquake threat, and students at Universitas Respati Yogyakarta, especially the Faculty of Health Sciences, have never been assessed for earthquake disaster preparedness. By observing the disaster phenomena that may occur in Indonesia, particularly in Sleman Regency, Special Region of Yogyakarta, preparedness becomes an important aspect to be measured to analyze the preparedness index, which is assessed based on various parameters (knowledge, activity plans, early warning, and resource mobilization).

METHOD

Research Design

This study used a quantitative research approach with a descriptive research type from primary data sources.

Population and Sample

The population consisted of the students of the Faculty of Health Sciences at the Universitas Respati, Yogyakarta. The number of samples in this study was 95 students obtained by random sampling.

Ethical Clearance

This research has been registered and assessed by the Ethics Commission of Universitas Respati Yogyakarta and has received an ethical clearance letter with number 0127.3/FIKES/PL/VI/2023.

Variables

The variables in this study were preparedness measured by four parameters: disaster Knowledge (K), Emergency Planning (EP), disaster Warning System (WS), Resource Mobilization Capacity (RMC).

Data Analysis

The analysis began with a univariate analysis of the characteristics of the respondents, presented using frequency distribution tables. This was followed by the calculation of an index for each of the disaster preparedness parameters. The index items in question were from indicators or parameters of community preparedness for earthquake disasters, which are then calculated from the respondents' answers to obtain the result, where the result describes the state of community preparedness in question.

The index per parameter for students in this study used index numbers. The determination of the index value for each parameter was calculated based on the formula:

Index = $\frac{Total\ Real\ Parameters\ Score}{Maximum\ Parameter\ Score}$ x 100

Once the weight of each parameter was discovered, the index value can be added using the formula, according to LIPI-UNESCO, 2006:

Student Readiness = 0.83*K index + 0.08*EP index + 0.04 WS index + 0.04*RMC index

Notes:

K: Knowledge

EP: Emergency Planning

WS: Warning System

RMC: Resource Mobilization Capacity

The level of community preparedness in this study was categorized into three categories as in the following Table.

Table 1. Index and Categories Score

Number	Index Score	Category
1	80-100	High readiness
2	60-79	Moderate readiness
3	<60	Low readiness

Source: LIPI – UNESCO/ISDR, 2006

RESULT

The age of the respondents in this study ranged from 18-25 years old. They are students of the Faculty of Health Sciences, Universitas Respati, Yogyakarta. The number of respondents taken as research subjects was 100 students, male and female. The distribution of respondents based on age and gender can be seen in Table 2 below.

Table 2. Frequency Distribution of Respondents' Age and Gender

Respondents' Characteristics	Category	F	%
Age	18-19	16	16,0
	20-21	40	40,0
	22-23	40	40,0
	24-25	4	4,0
Gender	Male	27	27,0
	Female	73	73,0

Based on Table 2, out of 100 respondents, most of the respondents were aged 20-21 as 40 (40%) and 22-23 as 40 (40%). The other largest age of respondents is 18-19 as 16 (16%) and 24-25 as 4 (4%). Furthermore, it was discovered that female was more (73 or 73%) than male (48 or 48%) respondents.

Characteristics of Research Data Univariate Analysis

Disaster Knowledge Level

Table 3. Category of Respondents' Disaster Knowledge

No	Category	Respondent	
		F	%
1	High	67	67.0
2	Moderate	28	28.0
3	Low	5	5.0
Total		100	100.0
Disaster knowledge index value	84 (High)		

Questions number 1-9 are designed to measure the respondents' knowledge. Based on Table 3, 67 (67%) students had a high level of knowledge. There were 28 (28%) of them who were included as moderate level of knowledge, and 5 (5%) respondents who have low knowledge. Therefore, the index value obtained by respondents is 84% included in the high category.

Disaster Activity Plan Level

Table 4. Category of Respondents' Disaster Activity Plan Level

No	Category	Respondent	
		F	%
1	High	37	37.0
2	Moderate	42	42.0
3	Poor	21	21.0
Total		100	100.0
Disaster Knowledge Index Value		76 (Moderate)	

Based on Table 4, 37 (37%) students had a high level of disaster activity plan. Students who had a moderate disaster activity plan were 42 (42%). Students who had a low level of disaster activity plan were 21 (21%). Therefore, the index value obtained was 76, as in the moderate category.

Table 5. Disaster Activity Plan Level Analysis

No	Indicator	Question number	Obtained score	Total Score	%	Category
1	Preparation prior to the earthquake	10	329	400	82	High
2	Items saved during the earthquake	11	274	400	68	Moderate
3	Material about earthquake	12	133	200	66	Moderate
4	Evacuation equipment on campus	13	329	400	82	High

Based on Table 5, the disaster activity plan used four indicators. The measurement of preparation before the earthquake was at number 10 with an achievement score of 329 (82%), thus it is included in the high category. Question number 11 measured the student indicator in saving goods during an earthquake with an achievement score of 274 (68), thus it was included in the moderate category. In addition, question number 12 measured student indicators related to earthquake materials obtained an achievement score of 133 (66) which was included in the moderate category. Finally, the achievement score on question number 13 regarding the evacuation equipment indicator on campus was 329 (82%), which was included in the high category.

Disaster Warning Level

Table 6. Disaster Warning Level Categories of Respondents

No	Category	Respondents	
		F	%
1	High	15	15.0
2	Moderate	26	26.0
3	Low	59	59.0
Total		100	100.0
Disaster Knowledge Index Value	54 (Low)		

Based on Table 6, the level of understanding of disaster warnings in students who were in the high category was only 15 respondents (15%). Furthermore, 26 respondents were students who had a moderate understanding of disaster warnings (26%). Finally, there were 59 respondents who have a low understanding of disaster warnings are 59 respondents (59%). Therefore, the index value obtained by respondents was 54, which resulted in the low category.

Table 7. Analysis of disaster warning levels among respondents

No	Indicator	Question number	Obtained Score	Total Score	%	Category
1	Earthquake warning signs	14 & 16	177	300	59	Low
2	Disaster warning training	15	39	100	39	Low

Based on Table 7, measuring the level of disaster warning is done using 2 indicators. Questions number 14 and 16 are used to measure earthquake warning signs, with the achievement score obtained being 177 (59%), which is included in the low category. Question number 15 is used to measure indicators on disaster warning training indicators, with the achievement score produced being 39 (39%), which is included in the low category.

Resource Mobilization Level

Table 8. Resource Mobilization Level Categories of Respondents

No	Category	Respondent	
		F	%
1	High	29	29.0
2	Moderate	20	20.0
3	Low	51	51.0
Total		100	100.0
Disaster knowledge index value	51 (Low)		

Based on Table 8, 29 (29%) respondents had high resource mobilization capabilities. Furthermore, respondents who had moderate resource mobilization capabilities were 20 (20%) respondents, and those who had low resource capabilities were 51 (51%). The index value obtained was 51, meaning that the resource mobilization capabilities of students were categorized as low.

Table 9. Analysis of Respondents' Resource Mobilization Level

No	Indicator	Question number	Obtained score	Total Score	%	Category
1	Exercise/meeting/activity	17	105	200	52	Low
2	Communicating knowledge and skills	18	47	100	47	Low

Based on Table 9, measuring Resource Mobilization in students can be undertaken using two indicators. Question number 17 was used to measure the indicator of students who had participated in training or activities such as meetings about disasters and evacuation simulation exercises. The achievement score obtained was 105 (52%), resulting in the low category. Furthermore, the second indicator was used to measure whether respondents had communicated their knowledge and skills of preparedness to friends or family, with an obtained score of 47 (47), resulting in the low category.

DISCUSSION

In the study, it is known that the index value at the knowledge level obtained a score of 84, which is included in the high category because respondents have understood the prediction of earthquakes where the indicator obtained a high score. Most respondents stated that the days and hours of earthquakes could not be predicted, and most respondents stated that earthquakes could also occur in the campus environment. According to BMKG, earthquakes cannot be predicted by any side, when, where, and how strong they are. In the research of (Palupi *et al*., 2023), the occurrence of earthquakes cannot be predicted with certainty when they will occur, and earthquakes come suddenly without any signs from nature.

Indicators that obtained high categories were also located in the characteristics of earthquakes where respondents already knew that strong earthquakes could cause dizziness, cause strong shaking so that people cannot stand up, earthquake vibrations occur long enough and are followed by aftershocks and strong earthquakes can cause buildings to crack or collapse. In line with research (Pertiwi & Marniati, 2023) on knowledge about earthquakes, most respondents also experienced a significant increase in knowledge about tsunami disasters where most respondents indicated that they knew that underwater earthquakes (90.7%), underwater volcanic eruptions (79.1%) and underwater landslides (76.7%) could cause tsunamis.

The indicator that obtained a high category lies in the knowledge of the actions to be taken during an earthquake, where

respondents already know that when an earthquake occurs respondents can leave the room regularly, go to an open field, and the actions that need to be prepared before an earthquake occurs, namely increasing knowledge about earthquakes and participating in self-rescue training. The answers of the respondents in this study are in line with the research of Maharani, which stated that the actions that must be taken during an earthquake are to find a place that is considered safe until the shaking stops (Maharani, 2020).

In the indicator of activity plans from disasters, respondents fell into the medium category. To see the level of activity plans from disasters, indicators that obtained high categories were in indicators 1 and 4 where respondents already knew what was prepared before an earthquake and evacuation equipment on campus. In this indicator it can be seen that respondents know how to evacuate. This research is in line with research (Ariyanti *et al*., 2022), it was found that understanding and knowledge of disaster awareness culture and evacuation of victims in disaster conditions before being given education was mostly in the sufficient category (57%), and after being given education almost all were in the good category (76%). Based on research (Utia & Fauzi, 2020), students who were respondents in the study mostly did not have disaster anticipation planning initiatives, only about 6.25% were in the ready category.

The results showed that the value of the disaster warning index in students of the Faculty of Health Sciences, Universitas Respati Yogyakarta is 54 which is classified in the low category. Each indicator obtained a low score, where respondents did not know the disaster warning signs on campus and many had not participated in disaster warning training. The results of this study contradict Lestari & Husna's research on disaster warning systems in rusunawa dormitories found that 124 people (40.8%) were in the ready category. While in this study the level of disaster warning is still in the low category, because most respondents do not know the existence of disaster warning signs both traditional such as, bells, drums etc. and national disaster warnings such as sirens. In addition, most respondents have never participated in disaster warning training and simulations. In addition, it is possible that students do not have the proper risk communication capacity, where risk communication should be very important in disaster preparedness. According to (Dagatan *et al*., 2024) risk communication is strongly related to earthquake disaster preparedness.

The result of the respondent's resource mobilization index value is 51, which is still in the low category. Where most respondents have not participated in disaster evacuation activities and simulations and respondents who have carried out these activities have not shared the skills they have gained with friends, family and others. According to (LIPI-UNESCO/ISDR, 2006) good mobilization can increase preparedness in the event of a disaster. Other forms of resources that need to be considered are facilities and infrastructure as well as funding to support preparedness, therefore resource mobilization is an important factor. The advantage of this research is that the use of the LIPI/UNESCO 2006 questionnaire provides validity to the measuring instrument used to measure disaster preparedness, making the research results more reliable.

Based on the value of each parameter, the level of preparedness obtained using the Lipi calculation formula obtained an index value of 79.7. This research is consistent with previous research conducted by Fitriyani et all in 2021 entitled Overview of the level of preparedness in facing earthquake disasters in nursing faculty students at Padjajaran University, Garut Campus, the results of this study show that the level of preparedness of respondents is 66.9 which is included in the moderate category. The level of preparedness has something to do with experience in dealing with disasters, such as the results of the study. Measuring preparedness only among students, without involving staff, lecturers, or the surrounding community who could also potentially be affected by an earthquake. In addition, there is no data on how student preparedness changes over time or after certain interventions are carried out.

CONCLUSION

The level of knowledge about natural disasters in students can be concluded to be in the high category with an index value of 84. The level of activity plans from disasters in students has an index value of 76 so that it can be concluded to be included in the medium

category. The level of disaster warning in students has an index value of 54 so it can be concluded that it is included in the low category. The level of students' ability to mobilize resources as an index value of 51, so that it can be concluded that it falls in the low category. The level of earthquake disaster preparedness among students of the Faculty of Health Sciences, Universitas Respati Yogyakarta is known to have an index value of 79.7 so that it can be concluded that it falls into the moderate category.

SUGGESTION

For universities to train emergency response in students, provide disaster warning training so that students are trained in responding to disaster warnings and evacuation training and simulations on campus are carried out programmatically at least once a year.

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CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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AUTHOR CONTRIBUTION

Sri Sahayati conducted data collection, data processing, discussion and manuscript preparation, Merita Eka Rahmuniyati conducted data processing and discussion preparation, Sindy Mardani conducted data collection, discussion preparation and documentation.

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