

PREDICTORS OF EARTHQUAKE DISASTER PREPAREDNESS AMONG HEALTH SCIENCES STUDENTS: A CROSS-SECTIONAL STUDY IN INDONESIA

Dirhan ^{1*}, Agusrianto ², Ade Herman Surya Direja ³, Ririn Lestari ⁴,
Yusnita ⁵, Romadhani Tri Purnomo ⁶ and Suriyati ⁷

¹ STIKES Tri Mandiri Sakti, Bengkulu.

*Corresponding Author Email: dirhamdirhan9998999@gmail.com

² Poltekkes Kemenkes Palu, Central Sulawesi. Email: ners.agus73@gmail.com

³ STIKES Tri Mandiri Sakti, Bengkulu. Email: adehermansuryadireja@gmail.com

⁴ Universitas Galuh, West Java. Email: ririn.lestari@unigal.ac.id

⁵ Universitas Muhammadiyah Pringsewu, Lampung. Email: yusnita@umpri.ac.id

⁶ Universitas Muhammadiyah Klaten, Central Java. Email: roma@umkla.ac.id

⁷ Universitas Bengkulu, Bengkulu. Email: suriyati@unib.ac.id

DOI: [10.5281/zenodo.10983503](https://doi.org/10.5281/zenodo.10983503)

Abstract

Earthquakes are indeed a significant disaster threat in Indonesia due to the country's location along the Pacific Ring of Fire, a region known for its high seismic and volcanic activity. Indonesia is prone to earthquakes as it sits on the boundary of several tectonic plates, including the Eurasian, Pacific, Australian, and Philippine Sea plates. The interactions between these plates result in frequent seismic events, making Indonesia one of the most seismically active regions in the world. This cross-sectional study aims to identify and analyze the predictors that influence earthquake disaster preparedness among students in Indonesia. This study uses a cross-sectional research design, which allows for the collection of data at a single point in time. A structured questionnaire was used to gather information from a sample of students across different educational institutions in Indonesia. The research employed a stratified random sampling technique to ensure representation from various regions and educational levels, the number of respondents who contributed to this research was 442 respondents. Descriptive statistics are used to summarize demographic characteristics and key variables. Inferential statistics was employed to identify significant predictors of earthquake disaster preparedness among health sciences students. The results of the research showed that of the 8 variables, there are 2 variables based on statistical tests that have a p-value smaller than the alpha value, meaning that there is a significant relationship, namely the variable of having a curriculum or courses on disaster management, p-value: $0.047 < 0.05$ (Pearson Chi-Square Test), and the presence of symbols or signs of disaster on campus, p-value: $0.022 < 0.05$ (Fisher's Exact Test). There are 6 variables based on statistical tests that have a p-value greater than the value α (0.05), meaning there is no significant relationship, namely the gender variable with p-value: $0.235 > 0.05$ (Fisher's Exact Test), the Occupation variable with p-value: $0.499 > 0.05$ (Fisher's Exact Test), Disaster Drill variable with p-value: $0.600 > 0.05$ (Pearson Chi-Square Test), Student Organization on Disaster Management variable with p-value: $0.779 > 0.05$ (Pearson Chi-Square Test), The Existence of Disaster Volunteers variable with p-value: $0.554 > 0.05$ (Pearson's Chi-Square Test), and the Existence of Disaster Management Vision and Mission variable with p-value: $0.431 > 0.05$ (Pearson's Chi-Square Test).

Keywords: Predictors, Earthquake Disaster Preparedness, Health Sciences Students, Cross-Sectional Study.

BACKGROUND

Earthquakes are geological events that result from the movement of the Earth's plates and the resulting stress changes in the Earth's crust, often occurring along existing fault lines (Subedi & Hetényi, 2021). These seismic events can vary in magnitude, with some segments of tectonic plates being mature enough to host great earthquakes with a magnitude of 8 or higher (Bilham, 2019). The National Disaster Management Agency (BNPB) in Indonesia has been actively monitoring and responding to various natural

disasters, including earthquakes. According to data from BNPB, Indonesia experienced 240 earthquakes with significant magnitudes and 14 tsunamis between 2004 and 2018, impacting over 4 million people (Salsabila et al., 2023). In 2022 alone, Indonesia faced approximately 2,111 natural disasters, encompassing extreme weather, landslides, droughts, earthquakes, fires, tidal waves, abrasions, and floods (Sideng et al., 2023). In recent years, Indonesia has seen a surge in earthquake occurrences, with destructive earthquakes causing significant damage and disruptions to livelihoods. The BNPB reported that from 2008 to 2020, there were 163 destructive earthquakes, with 8,258 earthquake-related incidents in 2020 alone. The earthquakes in Indonesia are recurring events, with each major earthquake (>5 on the Richter Scale) leading to substantial damages and disruptions (Herlianto, 2023).

Earthquakes can lead to a range of devastating impacts, including structural damage, loss of life and injury, tsunamis, landslides, and environmental damage. The interconnected nature of these impacts highlights the complexity of earthquake events. Studies have shown that the displacement caused by earthquakes plays a critical role in generating tsunamis, as observed in the 2018 Palu, Sulawesi earthquake (Caruso et al., 2023). Efforts in handling crises and health problems are crucially focused on actions taken before a disaster strikes, emphasizing prevention, mitigation, and preparedness. The Health Crisis Management Framework incorporates key phases such as prevention, preparedness, response, and recovery to effectively address major global public health crises like Covid-19 (Burkle et al., 2020). Recommendations include enhancing disaster risk governance, strengthening community-level preparedness, and providing mental health support for healthcare workers to ensure adaptive working conditions and crisis preparedness across the health system (Burkle et al., 2020). The importance of engaging in community-based initiatives and improving health literacy is highlighted to enhance prevention, preparedness, and response efforts in the face of public health crises (Roberts et al., 2021).

Earthquakes are unpredictable natural disasters that can have devastating impacts, especially on schools and campuses. Disaster preparedness plays a crucial role in reducing the effects of earthquakes (Widdyusuf et al., 2022). To mitigate these impacts, early disaster preparedness is crucial, especially among students on campuses. Research indicates that taking scientific and reasonable earthquake preparedness measures can effectively reduce casualties and economic losses caused by earthquakes. Disaster preparedness, including among students, is highlighted as a key action to reduce the impact of disasters, particularly earthquakes (Ao et al., 2022). Moreover, it has been identified that nursing students often lack competence in disaster situations, emphasizing the need for improved training in this area (Kaviani et al., 2021). However, with appropriate training, coordination, and integration with emergency department workflows, medical students can make a significant contribution to disaster management in emergency departments (Ponampalam et al., 2021).

Disaster education for nursing students has demonstrated positive outcomes in terms of knowledge acquisition, willingness, and perceived ability to handle disasters effectively (Hung et al., 2021). Students play a crucial role in disaster management, being involved in operational activities before, during, and after a disaster. Research has shown that students' willingness to engage in disaster management is influenced by factors such as anticipatory disaster stress, motivation, knowledge, attitudes, and skills (Liou et al., 2020; Koca & Arkan, 2020). Studies emphasize the importance of

enhancing students' awareness, preparedness, response participation willingness, and competency in disaster management (Gillani et al., 2020). It has been found that students' preparedness for disasters is significantly influenced by their knowledge, attitudes, and self-efficacy (Kinanthi et al., 2023). Moreover, the level of knowledge students possess regarding disasters is crucial in determining their preparedness and response behaviors (Patel et al., 2020). Preparedness parameters in this research include age, gender, occupation, curriculum, student organizations related to disasters, disaster courses, disaster simulations, disaster guidance symbols, presence of disaster volunteers, general knowledge of earthquake disasters, student attitudes towards disaster management, motivation to Participate in disaster management training and experience participating in disaster management activities.

Factors such as gender, homeownership, marital status, education level, previous disaster experience, knowledge, fatalism beliefs, risk perception, earthquake awareness, factual knowledge of preparedness, importance of preparedness, disaster literacy, and self-efficacy have been found to influence students' preparedness for earthquakes (Rostami-Moez et al., 2020; Aksa et al., 2020; Yildiz et al., 2020; Kesumaningtyas et al., 2022). Additionally, the role of knowledge, attitudes, infrastructure, and Comprehensive Indonesian Education (CIE) has been highlighted as important factors affecting disaster preparedness among students (Yusniawati & Suantika, 2020). In conclusion, a combination of factors such as knowledge, attitudes, self-efficacy, fatalism beliefs, risk perception, and previous disaster experience play crucial roles in determining students' readiness and preparedness for earthquake disasters. Age alone may not have a direct significant association with disaster preparedness among students (Kishoyian et al., 2021). Educators and policymakers should consider these factors when designing interventions to enhance disaster preparedness among students. Based on the background, researchers are interested in studying in more depth the predictors of earthquake disaster preparedness among health sciences students in Indonesia.

RESEARCH METHOD

The research employed a cross-sectional design to investigate the predictors of earthquake disaster preparedness among health sciences students in Indonesia. The study was conducted in several stages, beginning with the identification of the target population and the sampling strategy. The target population consisted of students enrolled in various educational institutions across Indonesia from 5 Provinces and 6 Campuses (STIKES Tri Mandiri Sakti Bengkulu, Universitas Muhammadiyah Pringsewu, Universitas Muhammadiyah Klaten, Universitas Bengkulu, Poltekkes Kemenkes Palu, Universitas Galuh Ciamis). A stratified random sampling technique was utilized to ensure representation from different regions and types of educational institutions.

Data collection was carried out through a structured questionnaire, which included sections on demographic information, having a curriculum or courses on disaster management, the presence of symbols or signs of disaster on campus, gender, occupation, Disaster Drill, Disaster Management Student Organization, the Existence of Disaster Volunteers, the Existence of Disaster Management Vision and Mission and Earthquake Disaster Preparedness.

Data collection took place through online mode and was distributed through the WhatsApp media platform. The collected data were analyzed using statistical software, including descriptive statistics to summarize demographic characteristics and inferential statistics such as correlation analysis to examine the relationships between predictor variables and the outcome variable. Ethical considerations were strictly adhered to throughout the research process, including obtaining informed consent from participants and ensuring confidentiality and anonymity of responses. The findings of the study provide valuable insights into the factors that influence earthquake disaster preparedness among students in Indonesia, which can inform targeted interventions and policy recommendations to enhance disaster resilience in educational settings.

RESULTS

This research was conducted to determine predictors of earthquake disaster preparedness among health sciences students in Indonesia. Respondents who participated in this research were 442 people, consisting of Midwifery, Nursing, Pharmacy, Public Health, Medical Laboratory Technology, and other Allied Health Sciences Students from 7 Universities or Colleges and 5 Provinces in Indonesia, who met the criteria desired by the researchers and had various characteristics. The research results are seen from demographic data as follows:

Table 1: Characteristics of Respondents in Research on Predictors of Earthquake Disaster Preparedness among Health Sciences Students in Indonesia (N=442)

No	Variables	Frequency	Percentage
1	Gender		
	Male	67	15,15 %
	Female	375	84,85 %
	Total	442	100 %
2	Occupation		
	Working	49	11,08 %
	Not Working	393	88,92 %
	Total	442	100%
3	Study Program		
	Nursing	262	59,27 %
	Midwifery	74	16,74 %
	Public Health	54	12,21 %
	Pharmacy	38	8,59 %
	Medical Laboratory Technology	14	3,16 %
	Total	442	100%
4	University/College		
	STIKES Tri Mandiri Sakti, Bengkulu	172	38,91 %
	Universitas Muhammadiyah Pringsewu	109	24,66 %
	Universitas Muhammadiyah Klaten	49	11,08 %
	Universitas Bengkulu	40	9,04 %
	Poltekkes Kemenkes Palu	38	8,59 %
	Universitas Galuh Ciamis	34	7,69 %
	Total	442	100%

Based on Table 1, it is known that of the 442 respondents, there were 67 respondents (15.15%) male and 375 respondents (84.85%) female. 49 respondents had working (11.08%) and 393 people were not working (88.92%). Characteristics of respondents

based on study program, namely nursing 262 people (59.27%), Midwifery 74 people (16.74%), Public Health 54 people (12.21%), Pharmacy 38 people (8.59%), Medical Laboratory Technology 14 people (3.16%). There were 6 Universities/College participating in this research, namely STIKES Tri Mandiri Sakti, Bengkulu 172 respondents (38.91%), Universitas Muhammadiyah Pringsewu 109 people (24.66%), Universitas Muhammadiyah Klaten 49 people (11.08%), Universitas Bengkulu 40 people (9.04%), Poltekkes Kemenkes Palu 38 people (8.59%) and Universitas Galuh Ciamis 34 people (7.69%).

Table 2: Relationship between Predictors Variables with Earthquake Disaster Preparedness among Health Sciences Students in Indonesia (N=442)

Variables	Disaster Preparedness among Health Sciences Students		Total	p
	Not Prepared	Well Prepared		
Gender				
Female	18	357	375	0,235
male	6	61	67	
Occupation				
Not Working	23	370	393	0,499
Working	1	48	49	
Disaster Drill				
Participated	11	169	180	0,600
Not Participated	13	249	262	
Curriculum Availability				
Not Available	10	99	109	0,047
Available	14	319	333	
Symbol/Instruction of Disaster				
Not Available	9	68	77	0,022
Available	15	350	365	
Student Organizations on Disaster Management				
Not Available	9	145	154	0,779
Available	15	273	288	
The Existence of Disaster Volunteers				
Not Exist	8	116	124	0,554
Exist	16	302	318	
The Existence of Vision and Mision on Disaster Management				
Not Exist	9	125	134	0,431
Exist	15	293	308	

Based on the table above, shows that of the 8 variables, there are 2 variables based on statistical tests that have a p-value smaller than the alpha value, meaning that there is a significant relationship, namely the variable of having a curriculum or courses on disaster management, p-value: $0.047 < 0.05$ (Pearson Chi-Square Test), and the presence of symbols or signs of disaster on campus, p-value: $0.022 < 0.05$ (Fisher's Exact Test). There are 6 variables based on statistical tests that have a p-value greater than the value a (0.05), meaning there is no significant relationship, namely the gender variable with p-value: $0.235 > 0.05$ (Fisher's Exact Test), the Job variable with p-value: $0.499 > 0.05$ (Fisher's Exact Test), Disaster Drill variable with p-value: $0.600 > 0.05$ (Pearson Chi-Square Test), Disaster Management Student Organization variable with p-value: $0.779 > 0.05$ (Pearson Chi-Square Test), The Existence of Disaster Volunteers variable with p-value: $0.554 > 0.05$ (Pearson's Chi-Square Test), and the Existence of Disaster Management Vision and Mission variable with p-value: $0.431 > 0.05$ (Pearson's Chi-Square Test).

DISCUSSIONS

Relationship between Gender and Occupation with Earthquake Disaster Preparedness

After conducting statistical tests on the variables related to earthquake disaster preparedness among health sciences students in Indonesia, it was found that the variables Gender and Occupation did not show a significant relationship with disaster preparedness. The p-values for both variables were greater than the significance level ($\alpha = 0.05$), indicating that these variables may not be strong predictors of earthquake disaster preparedness among health sciences students. Contrary to the findings in Indonesia, a study on household disaster preparedness in South Korea revealed that gender, ethnic groups, age, medical conditions, healthcare access, number of children, income level, and evacuation experience significantly influenced disaster preparedness attitudes (Z. Jiang et al., 2023).

This outcome is in line with (Al-Ziftawi et al., 2020), who noted that there was no significant difference in disaster preparedness levels between genders. Similarly, Ibrahim et al., (2022) demonstrated that gender had a low-to-moderate effect on readiness to practice disaster management among healthcare students. These studies collectively suggest that gender may not have a substantial impact on predicting disaster preparedness levels. Furthermore, the lack of significance between Occupation and disaster preparedness among health sciences students aligns with existing literature. For example, Wulandari et al., (2023) identified a relationship between knowledge and disaster preparedness among undergraduates but did not specifically address the role of occupation.

This implies that while knowledge may influence preparedness, occupation might not be a significant factor in determining disaster readiness among students. In summary, the statistical analysis of earthquake disaster preparedness variables among health sciences students in Indonesia indicated that Gender and Occupation were not significantly linked to disaster preparedness levels. These results emphasize the necessity for further research to uncover other potential predictors that could better elucidate variations in disaster preparedness among this demographic.

Relationship between Disaster Drill with Earthquake Disaster Preparedness

Disaster drills and simulations are essential for enhancing preparedness for earthquakes and other disasters. While some studies may not find statistically significant relationships between certain factors and preparedness levels, the overall consensus supports the importance of regular drills in improving response efficiency during actual disasters (Sun & Xue, 2020; Sun & Xue, 2020; (Tercan & Şahinöz, 2021). These drills help individuals, including students, become familiar with emergency procedures, which can be invaluable in real-life crises (Rany & Mundilarto, 2021; Herowati, 2022).

Moreover, disaster preparedness is influenced by various factors such as self-efficacy, experience, knowledge, and training (Jiang et al., 2022; Rostami-Moez et al., 2020). Studies have shown that factors like gender, education, previous disaster experience, and participation in drills can significantly impact preparedness levels (Tariq et al., 2019; Yong et al., 2020). Additionally, the level of preparedness can vary among different groups, such as professionals versus the general public, highlighting the need for tailored approaches to training and education (Wei et al., 2019).

While some research may not find statistically significant relationships between certain variables and preparedness levels (Mawarni et al., 2020; Emaliyawati et al., 2022), the overall body of evidence emphasizes the positive impact of disaster drills and education on enhancing preparedness. It is essential to continue promoting and conducting drills to ensure that individuals and communities are well-prepared to respond effectively to earthquakes and other disasters.

Relationship between Curriculum Availability with Earthquake Disaster Preparedness

Incorporating disaster management and earthquake preparedness courses into the health sciences curriculum is crucial based on the statistically significant relationship between having such courses and preparedness capabilities (Shofa et al., 2021). Studies emphasize the need to integrate disaster knowledge into curricula to enhance preparedness, with a focus on planning, response, and practical training simulations for students (Sultan et al., 2023). Prompt realization of the necessity for disaster education is highlighted to prepare individuals for incidents like earthquakes and to foster disaster preparedness (Sok et al., 2019; Gu et al., 2019).

Educators and policymakers are urged to establish robust disaster medicine management and preparedness curricula to equip future healthcare professionals adequately (Gillani et al., 2020). By integrating disaster education into formal school curricula, knowledge about disasters can be effectively disseminated (Syahputri et al., 2022). The evolution of disaster education in Japan's curriculum, transitioning from scientific knowledge models to broader societal, economic, and political contexts, underscores the importance of adapting education to changing needs (Hakim et al., 2020).

Various international bodies recommend including disaster medicine in medical education curricula to ensure healthcare professionals are competent in managing disasters (Biçakçi et al., 2022). Training on disaster risk management for school managers has been shown to influence disaster risk management in educational institutions (Munyiri et al., 2019). Approaches like incorporating local wisdom into disaster mitigation curricula are suggested to provide relevant and effective disaster education (Musthofa & Indartono, 2020). In conclusion, the integration of disaster management and earthquake preparedness courses into educational curricula, particularly in health sciences, is essential for enhancing preparedness and response capabilities. By prioritizing comprehensive disaster education, institutions can better equip students with the knowledge and skills needed to effectively manage disasters and emergencies.

Relationship between Symbol/Instruction of Disaster with Earthquake Disaster Preparedness

Enhancing earthquake preparedness among students is crucial for ensuring their safety in the event of a disaster. Research has shown that factors such as visible and informative disaster signs or symbols on campus can significantly influence students' earthquake preparedness. These signs can include evacuation routes, emergency contact information, and disaster response protocols. Studies have indicated that the presence of symbols or signs of disaster on campus is associated with improved earthquake preparedness among students (Bhandari et al., 2023).

Furthermore, the interaction between students and teachers during and after an earthquake has been found to enhance students' disaster resilience (Bikar et al., 2021). Teachers play a vital role in enabling students to be resilient in times of disaster, which can help distract students from fear and improve their preparedness. Additionally, self-efficacy and knowledge have been identified as significant factors that affect students' earthquake preparedness behavior (Kinanthi et al., 2023). It is essential to note that the level of knowledge students have in preparedness for earthquake disasters varies, with some studies showing that students' understanding of earthquake disaster preparedness needs improvement (Alim et al., 2020). Implementing educational interventions can be effective in enhancing students' understanding of disaster preparedness (Ismail et al., 2021). In conclusion, maintaining visible and informative disaster signs or symbols on campus, fostering positive interactions between students and teachers, and improving students' knowledge and self-efficacy are crucial steps in enhancing earthquake preparedness among students.

Relationship between Student Organizations on Disaster Management with Earthquake Disaster Preparedness

Encouraging collaboration and engagement with student organizations focused on disaster management can be highly beneficial in promoting earthquake preparedness. While some studies may not directly show a significant relationship between student organizations and disaster preparedness, there is evidence to suggest that such collaborations can play a vital role in enhancing awareness, organizing training sessions, and mobilizing resources during emergencies (Koca & Arkan, 2020; Wiedyaningsih et al., 2023; Hung et al., 2021; Liou et al., 2020).

Research has indicated that students' motivation for disaster engagement can be high, even if their disaster nursing competence levels are low (Liou et al., 2020). Moreover, previous studies have highlighted that students' preparedness for disasters is significantly influenced by their knowledge and attitudes (Imdat & Tastan, 2023). Training programs on disaster management have been shown to improve students' knowledge, skills, and beliefs in responding to disasters (Kamanyire et al., 2021).

Furthermore, it has been emphasized that a positive attitude toward disaster management should be actively encouraged among students in various disciplines, such as pharmacy and nursing (Wiedyaningsih et al., 2023). Additionally, the effectiveness of disaster education courses in improving students' disaster knowledge, willingness, and perceived ability has been demonstrated (Hung et al., 2021). While the direct relationship between student organizations and disaster preparedness may not always be evident, the involvement of students in disaster management activities can contribute significantly to overall preparedness efforts. By fostering collaboration with student organizations, educational institutions can harness the potential of students to raise awareness, conduct training sessions, and mobilize resources, thereby enhancing earthquake preparedness within the community.

Relationship between The Existence of Disaster Volunteers with Earthquake Disaster Preparedness

The statistical analysis revealed that the variable "Existence of Disaster Volunteers" did not exhibit a significant relationship with earthquake disaster preparedness among the participants (p -value: 0.554, Pearson's Chi-Square Test). This finding suggests that the presence of disaster volunteers may not directly impact the preparedness

levels of health sciences students for earthquake disasters (Emaliyawati et al., 2021). This suggests that there may not be a direct impact of the existence of disaster volunteers on the preparedness levels of health sciences students for earthquake disasters. However, this finding does not diminish the importance of disaster volunteers or their potential impact on disaster preparedness.

Although some studies have indicated a positive relationship between disaster volunteers and disaster preparedness (Emaliyawati et al., 2021), the specific research in this context did not find a significant association. Factors such as prior disaster experience, education, altruism, personal development, social interaction, and family volunteering have been shown to impact the level of volunteerism among youth for disaster preparedness (Arshad et al., 2022). Additionally, the willingness of disaster volunteers to participate in disaster preparedness is influenced by their social background variables (Ma et al., 2021). Furthermore, the study results align with findings that highlighted the importance of ongoing communication and interprofessional collaboration for improved disaster preparedness (Phan et al., 2023). It is essential to consider various factors such as competency, skills, and critical thinking in disaster preparedness (Raisa et al., 2022).

Additionally, family-based education is effective in enhancing disaster preparedness levels (Sari et al., 2022). In conclusion, while the presence of disaster volunteers may not directly impact earthquake disaster preparedness among health sciences students in this study, various other factors such as prior experience, education, family-based education, and critical thinking play significant roles in influencing disaster preparedness levels among individuals and communities.

Relationship between The Existence of Vision and mission on Disaster Management with earthquake disaster preparedness

Incorporating clear goals and objectives related to disaster preparedness in the vision and mission statements of institutions can provide a guiding framework for developing comprehensive disaster management strategies. While the existence of a vision and mission statement alone may not show a significant relationship with earthquake preparedness, setting clear goals can enhance disaster resilience (Imperiale & Vanclay, 2020). Studies have shown that disaster knowledge and attitudes significantly influence community preparedness for earthquakes (Hariyanto et al., 2022). Additionally, subjective norms and trust in stakeholders play a role in predicting individuals' intentions to engage in earthquake preparedness activities (Vrselja et al., 2022; Ao et al., 2022). Moreover, experience, knowledge, and self-efficacy have been found to explain a considerable portion of students' earthquake disaster preparedness behaviors (Kinanthi et al., 2023). It is essential to note that disaster preparedness is a continuous learning process (Sutopo, 2022). While exposure to disasters can improve preparedness in the short term, the long-term effects on preparedness remain uncertain (Habibi & Feld, 2020).

Furthermore, the relationship between non-destructive earthquake experiences and preparedness intentions may not always be statistically significant (Sun & Xue, 2020). In conclusion, by integrating disaster preparedness goals into their vision and mission statements, institutions can lay a foundation for robust disaster management strategies. This proactive approach, coupled with a focus on enhancing knowledge, attitudes, self-efficacy, and trust, can contribute to improving community and individual readiness for earthquakes and other disasters.

CONCLUSIONS

The study aimed to investigate predictors of earthquake disaster preparedness among health sciences students in Indonesia. Eight variables were considered: Gender, Occupation, Disaster Drill, Curriculum Availability, Symbol/Instruction of Disaster, Student Organizations on Disaster Management, The Existence of Disaster Volunteers, and The Existence of Vision and Mission in Disaster Management. Based on the statistical analysis, two variables showed a significant relationship with earthquake disaster preparedness among health sciences students. Firstly, the presence of a curriculum or courses on disaster management was found to be significantly associated with higher levels of preparedness (p-value: 0.047, Pearson Chi-Square Test). Secondly, the presence of symbols or signs of disaster on campus was also significantly related to increased preparedness (p-value: 0.022, Fisher's Exact Test). However, six variables did not show a significant relationship with disaster preparedness. These included Gender (p-value: 0.235, Fisher's Exact Test), Occupation (p-value: 0.499, Fisher's Exact Test), Disaster Drill (p-value: 0.600, Pearson Chi-Square Test), Student Organizations on Disaster Management (p-value: 0.779, Pearson Chi-Square Test), and The Existence of Disaster Management Vision and Mission (p-value: 0.431, Pearson's Chi-Square Test). These findings suggest that educational interventions, such as incorporating disaster management courses into the curriculum and implementing visible symbols or signs of disaster on campus, can significantly enhance earthquake disaster preparedness among health sciences students in Indonesia. Further research and interventions focusing on these aspects are recommended to improve overall disaster readiness and response in educational settings.

RECOMMENDATIONS

Based on the cross-sectional study conducted on predictors of earthquake disaster preparedness among health sciences students in Indonesia, several recommendations can be made to enhance disaster preparedness programs and policies:

- 1. Integration of Disaster Management Courses:** The statistically significant relationship between having a curriculum or courses on disaster management and earthquake preparedness suggests the importance of integrating such courses into the health sciences curriculum. Institutions should prioritize offering comprehensive disaster management education to enhance students' preparedness and response capabilities.
- 2. Enhancement of Campus Disaster Preparedness:** The presence of symbols or signs of disaster on campus has shown a significant association with earthquake preparedness among students. Therefore, it is recommended to enhance and maintain visible and informative disaster signs or symbols across campuses. This can include evacuation routes, emergency contact information, and disaster response protocols.
- 3. Promotion of Disaster Drills:** Although the study did not find a statistically significant relationship between disaster drills and earthquake preparedness, it is still crucial to promote regular disaster drills and simulations. These drills can help students familiarize themselves with emergency procedures and improve their response efficiency during actual disasters.

4. **Engagement with Student Organizations:** While the study did not show a significant relationship between student organizations focused on disaster management and earthquake preparedness, it is advisable to encourage collaboration and engagement with such organizations. They can play a vital role in promoting awareness, organizing training sessions, and mobilizing resources during emergencies.
5. **Incorporation of Vision and Mission on Disaster Management:** Although the existence of a vision and mission statement related to disaster management did not show a significant relationship with earthquake preparedness in this study, institutions should still consider incorporating clear goals and objectives regarding disaster preparedness in their vision and mission statements. This can serve as a guiding framework for developing comprehensive disaster management strategies.
6. **Further Research and Evaluation:** Given the mixed results regarding certain predictors' significance, further research and evaluation are recommended. Future studies can explore additional variables, such as individual attitudes towards disasters, socioeconomic factors, and previous disaster experiences, to gain a more comprehensive understanding of earthquake preparedness predictors among health sciences students.

By implementing these recommendations, educational institutions and policymakers can contribute to enhancing earthquake disaster preparedness among health sciences students in Indonesia, ultimately improving overall disaster resilience and response capabilities.

Bibliography

- 1) Aksa, F. I., Utaya, S., Bachri, S., & Handoyo, B. (2020). The Role of Knowledge and Fatalism in College Students Related to the Earthquake-Risk Perception. In *Jambá Journal of Disaster Risk Studies*. <https://doi.org/10.4102/jamba.v12i1.954>
- 2) Al-Ziftawi, N. H., Elamin, F., & Ibrahim, M. I. M. (2020). Assessment of Knowledge, Attitudes, and Readiness to Practice Regarding Disaster Medicine and Preparedness Among University Health Students. In *Disaster Medicine and Public Health Preparedness*. <https://doi.org/10.1017/dmp.2019.157>
- 3) Alim, A. N. A. H., Rahmayanti, H., Husen, A., Ichsan, I. Z., Marhento, G., Alamsyah, M., Susilo, S., Babu, R., & Rahman, M. M. (2020). Environmental Disaster Education at University: An Overview in New Normal of COVID-19. In *International Journal for Educational and Vocational Studies*. <https://doi.org/10.29103/ijevs.v2i8.2655>
- 4) Ao, Y., Tan, L., Tan, L., Zhong, J., Zhang, H., Wang, Y., & Wang, T. (2022). Households' Earthquake Disaster Preparedness Behavior: The Role of Trust in and Help From Stakeholders. In *Frontiers in Environmental Science*. <https://doi.org/10.3389/fenvs.2022.926432>
- 5) Arshad, M. R. M., Rizal, N. A. A. M., & Zamzam, N. F. (2022). Youth Volunteering for Disaster Preparedness in Port Dickson, Negeri Sembilan, Malaysia. In *Jurnal Intelek*. <https://doi.org/10.24191/ji.v17i2.18014>
- 6) Bhandari, A. K. C., Rahman, M., & Takahashi, O. (2023). Enhancing Earthquake Preparedness Knowledge and Practice Among Nepalese Immigrants Residing in Japan. In *Scientific Reports*. <https://doi.org/10.1038/s41598-023-31729-y>
- 7) Biçakçi, N., Biçakçi, S., & Çetin, M. (2022). Evaluation of Disaster Medicine Knowledge Level and Educational Approaches of Future Health Professionals. In *Namik Kemal Tıp Dergisi*. <https://doi.org/10.4274/nkmj.galenos.2021.51422>

- 8) Bikar, S. S., Rathakrishnan, B., Kamaluddin, M. R., Nasir, N. C. M., & Nasir, M. A. M. (2021). Social Sustainability of Post-Disaster: How Teachers Enable Primary School Students to Be Resilient in Times of Ranau Earthquake. In *Sustainability*. <https://doi.org/10.3390/su13137308>
- 9) Bilham, R. (2019). Himalayan Earthquakes: A Review of Historical Seismicity and Early 21st Century Slip Potential. In *Geological Society London Special Publications*. <https://doi.org/10.1144/sp483.16>
- 10) Burkle, F. M., Bradt, D. A., Green, J., & Ryan, B. J. (2020). Global Public Health Database Support to Population-Based Management of Pandemics and Global Public Health Crises, Part II: The Database. In *Prehospital and Disaster Medicine*. <https://doi.org/10.1017/s1049023x20001363>
- 11) Caruso, M., Pinho, R., Bianchi, F., Cavalieri, F., & Lemmo, M. T. (2023). Multi-Criteria Decision-Making Approach for Optimal Seismic/Energy Retrofitting of Existing Buildings. In *Earthquake Spectra*. <https://doi.org/10.1177/87552930221141917>
- 12) Emaliyawati, E., Ibrahim, K., Trisyani, Y., Mirwanti, R., Ilhami, F. M., & Arifin, H. (2021). Determinants of Nurse Preparedness in Disaster Management: A Cross-Sectional Study Among the Community Health Nurses in Coastal Areas. In *Open Access Emergency Medicine*. <https://doi.org/10.2147/oaem.s323168>
- 13) Emaliyawati, E., Satiadi, D., Sutini, T., Jamaludin, H. N. N., Khofifah, I. N., Manika, L. R., Fauziyah, S. M., & Siagian, E. T. (2022). The Effect of Disaster Education on Increasing Earthquake Disaster Preparedness: A Narrative Review. In *Jurnal Keperawatan Komprehensif*. <https://doi.org/10.33755/jkk.v8i4.407>
- 14) Gillani, A. H., Ibrahim, M. I. M., Akbar, J., & Fang, Y. (2020). Evaluation of Disaster Medicine Preparedness Among Healthcare Profession Students: A Cross-Sectional Study in Pakistan. In *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph17062027>
- 15) Gu, M., Kim, R., Lee, H., & Sok, S. R. (2019). Factors Influencing Disaster-Incident-Related Impacts on Korean Nursing Students. In *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph16245111>
- 16) Habibi, H., & Feld, J. (2020). The Effects of Earthquake Exposure on Preparedness in the Short and Long Term: A Difference-in-Differences Estimation. In *Natural Hazards*. <https://doi.org/10.1007/s11069-020-04227-x>
- 17) Hakim, A. R., Inten, D. N., & Mulyani, D. (2020). *The Literation of Disaster Mitigation for Early Childhood*. <https://doi.org/10.2991/assehr.k.200225.060>
- 18) Hariyanto, T., Abubakar, Y., & Zainun, I. (2022). The Impact of Disaster Knowledge and Attitudes on Community Preparedness in Facing Earthquakes. In *Kne Social Sciences*. <https://doi.org/10.18502/kss.v7i16.12154>
- 19) Herlianto, M. (2023). Early Disaster Recovery Strategy: The Missing Link in Post-Disaster Implementation in Indonesia. In *Influence International Journal of Science Review*. <https://doi.org/10.54783/influencejournal.v5i2.138>
- 20) Herowati, D. K. (2022). *Augmented Reality-Based Media to Improve Disaster Preparedness for Junior High School Students*. <https://doi.org/10.2991/assehr.k.220129.030>
- 21) Hung, M. S. Y., Lam, S. K. K., Chow, M. C. M., NG, W. W. M., & Pau, O. K. (2021). The Effectiveness of Disaster Education for Undergraduate Nursing Students' Knowledge, Willingness, and Perceived Ability: An Evaluation Study. In *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph181910545>
- 22) Ibrahim, M. M., Shi, L., Gillani, A., Omer, S., & Fang, Y. (2022). Should We Focus More on Teaching and Training Disaster Management in Health-Care Colleges? An Insight Into the Students' Knowledge, Attitude, and Readiness to Practice. In *Journal of Pharmacy and Bioallied Sciences*. https://doi.org/10.4103/jpbs.jpbs_420_21
- 23) Imdat, T., & Tastan, S. (2023). Disaster Preparedness of Nursing Students in Northern Cyprus: Descriptive Cross-Sectional Study. In *Disaster Medicine and Public Health Preparedness*. <https://doi.org/10.1017/dmp.2023.199>

- 24) Imperiale, A. J., & Vanclay, F. (2020). The Mechanism of Disaster Capitalism and the Failure to Build Community Resilience: Learning From the 2009 Earthquake in L'Aquila, Italy. In *Disasters*. <https://doi.org/10.1111/disa.12431>
- 25) Ismail, R., Mustika, F., & Akbari, M. (2021). Application of the E-Learning Model in Earthquake Learning to Improve Students' Understanding of Earthquake Disaster Preparedness. In *Greece*. <https://doi.org/10.20961/ge.v7i2.50037>
- 26) Jiang, M., Sun, M., Zhang, X., Luan, X., & Li, R. (2022). Disaster Nursing Competency of Intensive Care Nurses in Jinan, China: A Multicenter Cross-Sectional Study. In *Journal of Nursing Research*. <https://doi.org/10.1097/jnr.0000000000000492>
- 27) Jiang, Z., Chen, Y., Yang, T.-Y., Ji, W., Dong, S., & Ji, R. (2023). *Predicting Household Disaster Preparedness: An Integrated Machine Learning and Simulation Framework*. <https://doi.org/10.20944/preprints202303.0063.v1>
- 28) Kamanyire, J. K., Wesonga, R., Achora, S., Labrague, L. L., Malik, A., Al-Shaqsi, S., & Alhabsi, J. A. (2021). Nursing Students' Perceived Disaster Preparedness and Response. In *Sultan Qaboos University Medical Journal [Squmj]*. <https://doi.org/10.18295/squmj.5.2021.074>
- 29) Kaviani, F., Aliakbari, F., Sheikhbardsiri, H., & Arbon, P. (2021). Nursing Students' Competency to Attend Disaster Situations: A Study in Western Iran. In *Disaster Medicine and Public Health Preparedness*. <https://doi.org/10.1017/dmp.2021.263>
- 30) Kesumaningtyas, M. A., Hafida, S. H. N., & Musiyam, M. (2022). Analysis of Disaster Literacy on Student Behavioral Responses in Efforts to Reduce Earthquake Disaster Risk at SMA Negeri 1 Klaten. In *IOP Conference Series Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/986/1/012013>
- 31) Kinanthi, R., Wikan, P., & Anasfisya, V. (2023). *Enhancing Students' Earthquake Disaster Preparedness Through Self Experience, Knowledge, and Self-Efficacy*. <https://doi.org/10.4108/eai.5-11-2022.2326512>
- 32) Kishoyian, G. M., Kioko, J., & Muindi, E. (2021). Fire Disaster Preparedness Among Students in Kenya Medical Training Colleges in Eastern Kenya. In *Journal of Health Medicine and Nursing*. <https://doi.org/10.47604/jhmn.1301>
- 33) Koca, B., & Arkan, G. (2020). The Effect of the Disaster Management Training Program Among Nursing Students. In *Public Health Nursing*. <https://doi.org/10.1111/phn.12760>
- 34) Liou, S.-R., Liu, H.-C., Lin, C.-C., Tsai, H.-M., & Cheng, C. (2020). An Exploration of Motivation for Disaster Engagement and Its Related Factors Among Undergraduate Nursing Students in Taiwan. In *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph17103542>
- 35) Ma, Y., Zhu, W., Zhang, H., Zhao, P., Wang, Y., & Zhang, Q. (2021). The Factors Affecting Volunteers' Willingness to Participate in Disaster Preparedness. In *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph18084141>
- 36) Mawarni, I., Suyadi, T., Pamungkas, S. R., & Mutiawati, V. K. (2020). The Effect of Earthquakes and Tsunamis Preparedness on Anxiety Levels: A Case Study of Alue Naga Village, Banda Aceh. In *International Journal of Disaster Management*. <https://doi.org/10.24815/ijdm.v3i2.18720>
- 37) Munyiri, I. N., Thinguri, R., & Edabu, P. (2019). Influence of School Managers' Training on Disaster Risk Management in Public Secondary Schools Within Nairobi City County Kenya. In *American Journal of Educational Research*. <https://doi.org/10.12691/education-7-12-9>
- 38) Musthofa, Z., & Indartono, S. (2020). *Disaster Mitigation Curriculum-Based on Local Wisdom to Support Sustainable Development Programs*. <https://doi.org/10.2991/assehr.k.200130.021>
- 39) Patel, R. K., Kermanshachi, S., & Namian, M. (2020). *A Socioeconomic-Based Analysis of Disaster Preparedness, Awareness and Education*. <https://doi.org/10.3311/cc2020-058>
- 40) Phan, Q., Geller, D. E., Broughton, A. S., Swan, B. A., & Wells, J. (2023). Evaluating a Low-Cost Disaster Preparedness Simulation for Prelicensure Nursing Students. In *Disaster Medicine and Public Health Preparedness*. <https://doi.org/10.1017/dmp.2022.280>

- 41) Ponampalam, R., Pong, J. Z., & Wong, X.-Y. (2021). Medical Students as Disaster Volunteers: A Strategy for Improving Emergency Department Surge Response in Times of Crisis. In *World Journal of Critical Care Medicine*. <https://doi.org/10.5492/wjccm.v10.i5.163>
- 42) Raisa, S., Maryani, E., & Ningrum, E. (2022). Contribution of Critical Thinking in the Disaster Preparedness of Geographic Students. In *IOP Conference Series Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/1089/1/012066>
- 43) Rany, T. D., & Mundilarto, M. (2021). Development of Learning Media for Earthquake Disaster Through Physics Subjects to Improve Problem-Solving Ability and Disaster Preparedness. In *Jurnal Pendidikan Fisika Indonesia*. <https://doi.org/10.15294/jpfi.v17i2.27421>
- 44) Roberts, R., Wong, A., Jenkins, S., Neher, A., Sutton, C., O'Meara, P., Frost, M., Bamberry, L., & Dwivedi, A. (2021). Mental Health and Well-being Impacts of COVID-19 on Rural Paramedics, Police, Community Nurses and Child Protection Workers. In *Australian Journal of Rural Health*. <https://doi.org/10.1111/ajr.12804>
- 45) Rostami-Moez, M., Rabiee-Yeganeh, M., Shokouhi, M., Dosti-Irani, A., & Rezapur-Shahkolai, F. (2020). Earthquake Preparedness of Households and Its Predictors Based on Health Belief Model. In *BMC Public Health*. <https://doi.org/10.1186/s12889-020-08814-2>
- 46) Salsabila, R. A., Alfian, A. R., & Rahman, A. (2023). Junior High School Students Preparedness Toward Earthquake in Urban and Rural Areas in Pesisir Selatan. In *IOP Conference Series Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/1173/1/012074>
- 47) Sari, I. W., Bahri, A. S., & Rosiana, U. H. (2022). Effectiveness of Family-Based Education to Improve Disaster Preparedness Among Mount Merapi Residents. In *International Journal of Public Health Excellence (Ijphe)*. <https://doi.org/10.55299/ijphe.v1i2.162>
- 48) Shofa, M. I., Pujianto, P., & Elviana, R. (2021). *Natural Science Teacher Perception on Subject Specific Pedagogy Integrated Earthquake Disaster Mitigation*. <https://doi.org/10.2991/assehr.k.210326.087>
- 49) Sideng, U., Upu, H., Haris, N. A., & Rahmayana, D. (2023). 2d Simulation of Design Discharge in Flood Hazard Spatial Analysis Using Hec-Ras, (Case Study Mata Allo Sub-Watershed, Enrekang, Indonesia). In *Geographia Technica*. https://doi.org/10.21163/gt_2023.182.01
- 50) Sok, S. R., Gu, M., R, K., & H, L. (2019). *Factors Influencing the Disaster-Incident-Related Shock Experienced by Korean Nursing Students*. <https://doi.org/10.20944/preprints201911.0205.v1>
- 51) Subedi, S., & Hetényi, G. (2021). The Representation of Earthquakes in Hindu Religion: A Literature Review to Improve Educational Communications in Nepal. In *Frontiers in Communication*. <https://doi.org/10.3389/fcomm.2021.668086>
- 52) Sultan, M. A. S., Carlström, E., Sørensen, J. L., Alruwaili, A., & Khorram-Manesh, A. (2023). Incorporating Simulation Exercises Using Collaborative Tools Into Disaster and Emergency Medicine Curriculum—A Pilot Survey Among Saudi Arabian Professionals. In *Journal of Contingencies and Crisis Management*. <https://doi.org/10.1111/1468-5973.12491>
- 53) Sun, L., & Xue, L. (2020). Does Non-destructive Earthquake Experience Affect Risk Perception and Motivate Preparedness? In *Journal of Contingencies and Crisis Management*. <https://doi.org/10.1111/1468-5973.12286>
- 54) Syahputri, D. M., Aris, Y., Hafida, S. H. N., Widiyatmoko, W., Anwar, Y., & Dewi, R. P. (2022). Implementation of Comprehensive School Safety: The Risk Reduction and Resilience Education Pillar in State Senior High School 1 of Pacitan and Islamic State Senior High School 1 of Pacitan, Indonesia. In *IOP Conference Series Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/986/1/012016>
- 55) Tariq, N., Jaffry, T. N., & Khalid, S. (2019). Earthquake Preparedness in Schools of Islamabad. In *Journal of Islamabad Medical & Dental College*. <https://doi.org/10.35787/jimdc.v8i3.398>
- 56) Tercan, B., & Şahinöz, S. (2021). Nurses' Perceived and Actual Preparedness for Disasters. In *International Journal of Health Services Research and Policy*. <https://doi.org/10.33457/ijhsrp.764850>

- 57) Vrselja, I., Pandžić, M., & Glavaš, D. (2022). Predicting Earthquake Preparedness Intention Among Croatian Residents: Application of the Theory of Planned Behaviour. In *International Journal of Psychology*. <https://doi.org/10.1002/ijop.12882>
- 58) Wei, L., Hayashi, H., & Dun, W. (2019). Tourism Sector Preparedness in Zones With a High Seismic Risk: A Case Study of the Capital Region of Japan. In *International Journal of Safety and Security Engineering*. <https://doi.org/10.2495/safe-v9-n2-166-181>
- 59) Widdyusuf, L., Muktiarni, M., & Mupita, J. (2022). Earthquake Disaster Preparedness for Students of Junior High School. In *Asean Journal of Science and Engineering Education*. <https://doi.org/10.17509/ajsee.v2i2.38679>
- 60) Wiedyaningsih, C., Nugroho, A. K., Widyakusuma, N. N., & Prasetyo, S. D. (2023). How to Best Prepare Pharmacy Students for Disaster Management: A Qualitative Study. In *Disaster Medicine and Public Health Preparedness*. <https://doi.org/10.1017/dmp.2022.289>
- 61) Wulandari, F., Budijanto, B., Bachri, S., & Utomo, D. H. (2023). The Relationship Between Knowledge and Disaster Preparedness of Undergraduates Responding to Forest Fires. In *Jambá Journal of Disaster Risk Studies*. <https://doi.org/10.4102/jamba.v15i1.1408>
- 62) Yildiz, A., Teeuw, R., Dickinson, J. R., & Roberts, J. M. (2020). Children's Earthquake Preparedness and Risk Perception: A Comparative Study of Two Cities in Turkey, Using a Modified PRISM Approach. In *International Journal of Disaster Risk Reduction*. <https://doi.org/10.1016/j.ijdr.2020.101666>
- 63) Yong, Z., Zhuang, L., Liu, Y., Deng, X., & Xu, D. (2020). Differences in the Disaster-Preparedness Behaviors of the General Public and Professionals: Evidence From Sichuan Province, China. In *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph17145254>
- 64) Yusniawati, Y. N. P., & Suantika, P. I. R. (2020). Factors Related to School's Preparedness in Facing Earthquake Disasters in Denpasar City. In *Nurse and Health Jurnal Keperawatan*. <https://doi.org/10.36720/nhjk.v9i2.192>