

EFFECT OF COMMUNITY-BASED EARTHQUAKE EMERGENCY RESPONSE SIMULATION ON DISASTER PREPAREDNESS KNOWLEDGE AND SKILLS: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Earthquake disasters have the potential to cause casualties and material losses if not supported by adequate disaster preparedness. Disaster preparedness among students and communities is important to improve emergency response capacity in disaster-prone environments. This study aimed to determine the effect of earthquake emergency response simulation on disaster preparedness knowledge and skills among students and community participants. This study used a quasi-experimental design with a one group pre-test post-test approach. The study was conducted at STIKES Utama Abdi Husada Tulungagung on November 13, 2025, involving 87 respondents consisting of fifth-semester nursing students, members of the Student Executive Board (BEM), and community members. Data were collected using a disaster preparedness knowledge questionnaire and an observational checklist of disaster preparedness skills. Data analysis used descriptive statistics, Shapiro-Wilk normality test, and paired sample t-test with a significance level of $p < 0.05$. The results showed that the mean score of disaster preparedness knowledge increased from 64.83 ± 8.72 before intervention to 83.24 ± 6.95 after intervention with $p\text{-value} = <0.001$. The mean score of disaster preparedness skills also increased from 58.67 ± 9.14 to 84.85 ± 7.21 with $p\text{-value} = <0.001$. The findings indicate that earthquake emergency response simulation significantly improved disaster preparedness knowledge and skills among students and community participants. Earthquake emergency response simulation can be used as an effective disaster education method to improve disaster preparedness in higher education institutions and communities.

Keywords: disaster preparedness; earthquake simulation; emergency response; students; community.

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INTRODUCTION

Earthquakes are among the most destructive natural disasters in Indonesia, causing substantial loss of life, infrastructure damage, economic disruption, and adverse impacts on community well-being. Indonesia is situated within the Pacific Ring of Fire at the convergence of the Eurasian, Indo-Australian, and Pacific tectonic plates, making the country highly susceptible to frequent seismic activity (Alfayedh, 2021). According to the Indonesian National Disaster Management Agency (BNPB), disaster events occurring in Indonesia

during 2024 resulted in 540 deaths, 63 missing persons, 11,531 injuries, affected and displaced more than 8.1 million people, and caused damage to 80,304 houses, 612 educational facilities, 415 places of worship, 82 health facilities, 89 government offices, and 445 bridges. Furthermore, the Meteorology, Climatology, and Geophysics Agency (BMKG) continues to report high seismic activity across Indonesia due to its location within the Pacific Ring of Fire. These conditions underscore the urgent need to strengthen disaster preparedness through continuous education and simulation-based training to reduce casualties and minimize the impacts of future earthquake events (Badan Meteorologi, Klimatologi, 2024; Badan Nasional Penanggulangan Bencana, 2024).

Higher education institutions are among the environments with a high potential risk of disaster emergencies because they involve academic activities with large numbers of individuals within building areas. Students, as part of the campus community, need to possess adequate disaster preparedness knowledge and skills in order to perform appropriate self-rescue actions during emergency situations. In addition, communities living around the campus are also at risk of being affected when disasters occur within educational environments. Lack of understanding regarding evacuation procedures, evacuation routes, assembly points, and victim management may increase the risk of panic and injury during earthquakes (Madlazim et al., 2023). Therefore, strengthening disaster preparedness within higher education institutions and surrounding communities is essential for building disaster resilience. Higher education institutions can contribute to disaster risk reduction by strengthening awareness, preparedness, collaboration, and community engagement through systematic and structured disaster-related activities (Jumiyati, Omolu, Mappewali, & Akkas, 2024; Sulkowski, Towers, & Fuller, 2024)

One of the methods considered effective in improving disaster preparedness is disaster education and emergency response simulation through direct practice. The World Health Organization also emphasizes simulation-based preparedness training as an essential strategy to strengthen emergency response capacity in health settings (WHO, 2021). Simulation provides a more realistic learning experience, enabling participants not only to understand theoretical concepts but also to practice self-rescue actions, victim evacuation, and emergency response coordination directly. Lukman and Muhammad (2025) as well as Junianto and Hendriani (2023) explained that disaster preparedness education through simulation provides more realistic, interactive, and effective learning experiences, thereby improving students' knowledge, preparedness attitudes, and practical skills in responding to disaster situations. Buston et al. (2025) also reported that management education significantly improve participants' knowledge, attitudes, and preparedness skills compared with conventional learning methods (Buston, Efendi, Pardosi, Yusniarita, & Laasara, 2025). Furthermore, regular simulation exercises contribute to improving disaster preparedness and emergency response performance among participants

Although previous studies have demonstrated that disaster education and simulation effectively improve disaster preparedness, several important research gaps remain. Most previous studies have focused on a single participant group, such as students or community members, and primarily assessed disaster preparedness knowledge, attitudes, or preparedness as separate outcomes (Buston et al., 2025; Junianto & Hendriani, 2023b; Lukman & Muhammad, 2025). Furthermore, integrated earthquake emergency response simulations involving nursing students, student organizations, community members, and disaster management stakeholders have been rarely implemented, particularly in higher education settings. Comprehensive evaluations that simultaneously assess disaster preparedness knowledge and practical response skills also remain limited in the existing literature. Therefore, this study implemented a community-based earthquake emergency response simulation involving nursing students and community members to evaluate its effect on disaster preparedness knowledge and practical response skills using a quasi-

experimental approach. This study is expected to provide more comprehensive evidence regarding disaster preparedness education in higher education and community settings.

To the best of our knowledge, this is one of the first studies in Indonesia to implement a community-based earthquake emergency response simulation integrating nursing students, student organization members, community representatives, healthcare personnel, and the Regional Disaster Management Agency within a single disaster preparedness intervention while simultaneously evaluating disaster preparedness knowledge and practical response skills. Accordingly, this study aimed to analyze the effect of a community-based earthquake emergency response simulation on disaster preparedness knowledge and practical response skills among nursing students and community members at STIKES Hutama Abdi Husada Tulungagung.

METHODS

Study Design

This study employed a quasi-experimental design using a one group pre-test post-test approach to determine the effect of earthquake emergency response simulation on disaster preparedness knowledge and skills among students and community participants. Measurements were conducted before and after the intervention in the form of disaster education and earthquake emergency response simulation.

Setting

The study was conducted at STIKES Hutama Abdi Husada Tulungagung, East Java, Indonesia, on November 13, 2025. The intervention was implemented as part of the Disaster-Safe Campus Program and was completed in a single day. The program consisted of participant registration, pre-test assessment, disaster preparedness education, earthquake emergency response simulation, post-test knowledge assessment, and practical skill evaluation. The intervention was conducted collaboratively with the Regional Disaster Management Agency (BPBD) within the campus environment.

Research Subject

The study involved 87 participants, consisting of 47 fifth-semester undergraduate nursing students, 20 members of the Student Executive Board (BEM), and 20 community members from Ringinpitu Village. The nursing students and Student Executive Board members were recruited using total population sampling, as all eligible individuals participating in the Disaster-Safe Campus Program during the study period were included. Community participants were recruited using purposive sampling based on recommendations from local neighborhood leaders (RT/RW) to ensure the inclusion of active community representatives who were willing to participate throughout the intervention.

The sample size was determined based on the total accessible population involved in the Disaster-Safe Campus Program rather than formal statistical sampling, as the intervention was designed to include all eligible nursing students, Student Executive Board members, and selected community representatives participating in the program. The inclusion criteria were participants who were willing to participate in the study, attended all educational and simulation activities, and completed both the pre-test and post-test assessments. Participants who were absent during the intervention or failed to complete all study procedures were excluded from the analysis.

The three participant groups were intentionally included because disaster preparedness requires collaboration among campus stakeholders and surrounding communities during emergency situations. Involving nursing students, student organization members, and community representatives enabled the earthquake emergency response simulation to better represent real-world disaster response conditions and facilitated intersectoral collaboration during disaster preparedness training.

Instruments

The study employed two research instruments: a disaster preparedness knowledge questionnaire and a disaster preparedness skills observation checklist. The knowledge questionnaire was developed based on disaster preparedness concepts, earthquake evacuation procedures, self-protection measures, and disaster preparedness guidelines adapted from disaster management literature and the Indonesian National Disaster Management Agency (BNPB) guidelines. The questionnaire consisted of multiple-choice questions, with total scores converted to a scale ranging from 0 to 100.

Disaster preparedness skills were assessed using an observation checklist developed by the researchers based on the earthquake emergency response simulation scenario. The assessed competencies included performing drop, cover, and hold on, following evacuation routes, conducting simple victim evacuation, performing basic triage procedures, and moving victims safely to the designated assembly point according to disaster safety procedures.

Before implementation, both research instruments underwent content review through expert judgment involving three experts, following established procedures for content validity assessment (Roebianto, Savitri, Aulia, Suciyan, & Mubarakah, 2023), consisting of two emergency nursing lecturers with expertise in emergency and disaster nursing (M.Kep.) and one disaster management practitioner from the Regional Disaster Management Agency (BPBD). The experts evaluated the relevance, clarity, and appropriateness of each instrument item, and revisions were made based on their recommendations before implementation.

The revised instruments were subsequently tested on 30 respondents outside the study sample. Item validity was evaluated using the Pearson Product Moment correlation test, while internal consistency reliability was assessed using Cronbach's Alpha, with a minimum acceptable coefficient of $\alpha \geq 0.70$ (Polit & Beck, 2021).

Table 1. Validity and Reliability Test Results of the Disaster Preparedness Knowledge Instrument

Variable	Number of Items	Range of r Count	r Table	Cronbach's Alpha	Description
Disaster Preparedness Knowledge	15	0.421 – 0.782	0.361	0.842	Valid and Reliable
Disaster Preparedness Skills	15	0.559 – 0.909	0.361	0.960	Valid and Reliable

Based on Table 1, the validity test results showed that all items of both research instruments had r-count values higher than the r-table value (0.361), indicating that all items were valid. The disaster preparedness knowledge instrument had r-count values ranging from 0.421 to 0.782 and a Cronbach's Alpha coefficient of 0.842, while the disaster preparedness skills observation checklist had r-count values ranging from 0.559 to 0.909 and a Cronbach's Alpha coefficient of 0.960. These results indicate that both instruments demonstrated good internal consistency and were reliable for use in this study.

Intervention

The intervention consisted of disaster preparedness education followed by a community-based earthquake emergency response simulation using a role-play approach. The intervention was completed within a single day. The activity began with a pre-test to assess participants' baseline disaster preparedness knowledge, followed by a 60-minute educational session delivered by facilitators from the Regional Disaster Management Agency (BPBD) with assistance from two emergency nursing lecturers. The educational session covered earthquake disaster concepts, evacuation routes, assembly points, self-protection techniques (drop, cover, and hold on), and basic disaster response procedures.

Following the educational session, participants took part in a 120-minute earthquake emergency response simulation designed using a semi-realistic disaster scenario. The simulation involved role-play activities representing actual earthquake emergency conditions, with simulated victims wearing injury makeup and acting according to predetermined disaster scenarios. Participants performed various disaster response activities, including self-evacuation, victim evacuation, simple triage, vulnerable group management, emergency response coordination, establishment of a temporary health post, and trauma healing. The simulation was conducted collaboratively with the Regional Disaster Management Agency (BPBD) and involved nursing students, Student Executive Board members, community representatives, volunteers, and healthcare personnel to enhance the realism of disaster response training.

After completion of the simulation, a structured debriefing session was conducted to review participants' performance. Facilitators discussed appropriate and inappropriate disaster response actions, provided constructive feedback, and reinforced key disaster preparedness principles to improve participants' understanding and practical response skills.

Data Analysis

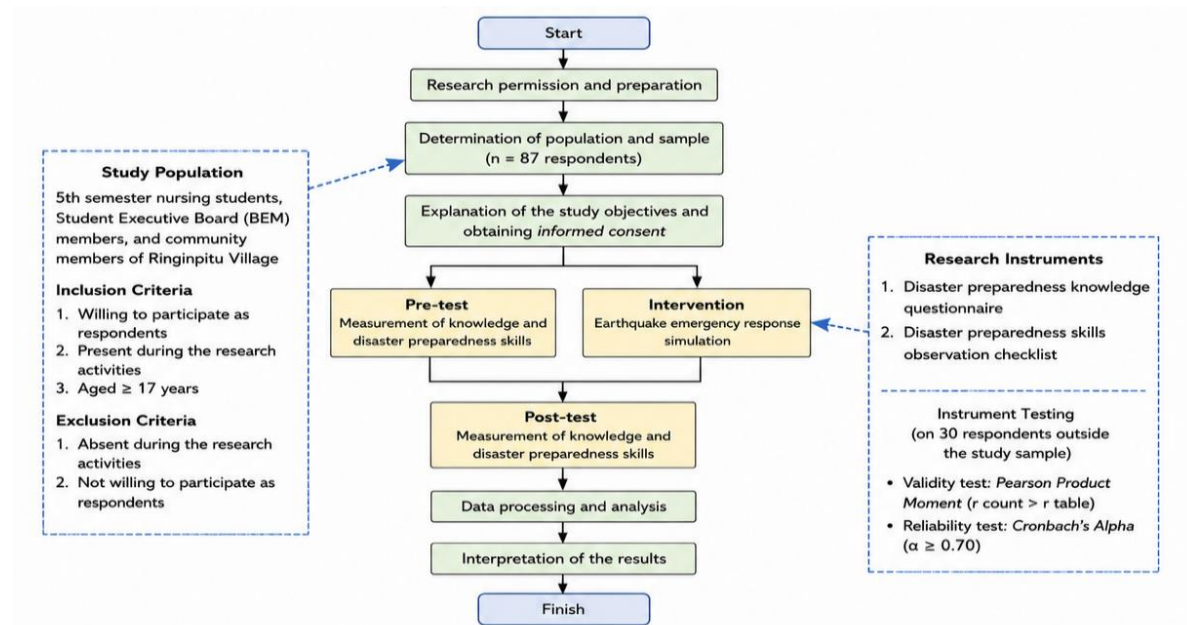
Data were analyzed using descriptive and inferential statistical analyses. Descriptive statistics were used to summarize respondents' demographic characteristics using frequencies and percentages. Item validity was assessed using the Pearson Product Moment correlation test, while internal consistency reliability was evaluated using Cronbach's Alpha, with $\alpha \geq 0.70$ considered acceptable.

The normality of the pre-test and post-test knowledge and skills scores was assessed using the Shapiro-Wilk test. Inferential analysis was performed using the paired t-test to compare participants' disaster preparedness knowledge and practical response skills before and after the intervention. Continuous variables were summarized using the mean and standard deviation (SD), while the intervention effect was presented as the mean difference and p-value. A p-value < 0.05 was considered statistically significant.

Table 2. Normality Test Results of Disaster Preparedness Knowledge and Skills Data

Variables	Shapiro-Wilk Statistic	p-value	Description
Knowledge Pre-test	0.972	0.118	Normal
Knowledge Post-test	0.981	0.247	Normal
Skills Pre-test	0.976	0.156	Normal
Skills Post-test	0.984	0.312	Normal

Based on Table 2, the Shapiro-Wilk normality test showed that all variables had p-values > 0.05 , indicating that the data were normally distributed. Therefore, differences in knowledge and skills scores before and after the intervention were analyzed using paired t-test.

Figure 1. Flowchart of the Study

Ethical Consideration

This study received ethical approval from the Ethics Committee of LPPM STIKES Hutama Abdi Husada Tulungagung with ethical clearance number 107/K-STIKESHAH/EC/XI/2025. Before the study was conducted, all respondents were informed about the study objectives and procedures and were asked to sign informed consent forms as agreement to participate in the study.

RESULTS

This study involved 87 respondents consisting of fifth-semester undergraduate nursing students, members of the Student Executive Board (BEM), and community members from Ringinpitu Village. All respondents participated in the research process, including pre-test, intervention in the form of disaster education and earthquake emergency response simulation, and post-test. Respondents' characteristics are presented in Table 3.

Table 3. Characteristics of Respondents (n = 87)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	32	36.8
Female	55	63.2
Respondent Groups		
Fifth-semester students	47	54.0
BEM members	20	23.0
Community members	20	23.0
Age		
17–25 years	67	77.0
26–35 years	12	13.8
36–45 years	8	9.2
Total	87	100

Based on Table 3, most respondents were female, accounting for 55 respondents (63.2%), while male respondents accounted for 32 respondents (36.8%). Based on respondent groups, the majority of participants were fifth-semester students with 47 respondents (54.0%), followed by BEM members and community members, each consisting of 20 respondents (23.0%). Based on age, most respondents were aged 17–25 years, accounting for 67 respondents (77.0%).

The analysis results regarding the effect of earthquake emergency response simulation on disaster preparedness knowledge and skills are presented in Table 4.

Table 4. Effect of Earthquake Emergency Response Simulation on Disaster Preparedness Knowledge and Skills (n = 87)

Variables	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	95% CI	p- value	Effect Size
Disaster preparedness knowledge	64.83 ± 8.72	83.24 ± 6.95	18.41	16.41–20.41	<0.001	1.963
Disaster preparedness skills	58.67 ± 9.14	84.85 ± 7.21	26.18	24.09–28.27	<0.001	2.672

Based on Table 4, the mean disaster preparedness knowledge score increased from 64.83 ± 8.72 before the intervention to 83.24 ± 6.95 after the earthquake emergency response simulation, with a mean difference of 18.41 (95% CI: 16.41–20.41). The paired t-test showed a statistically significant difference ($p < 0.001$), with a large effect size (Cohen's $d_z = 1.963$). Similarly, the mean disaster preparedness skills score increased from 58.67 ± 9.14 before the intervention to 84.85 ± 7.21 after the simulation, with a mean difference of 26.18 (95% CI: 24.09–28.27). The paired t-test also showed a statistically significant difference ($p < 0.001$), with a large effect size (Cohen's $d_z = 2.672$). These findings indicate that the earthquake emergency response simulation significantly improved both disaster preparedness knowledge and skills among the participants.

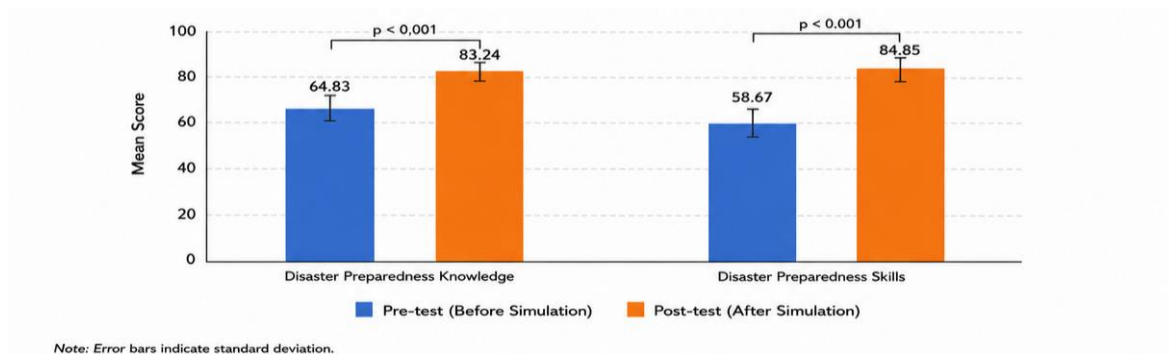


Figure 2. Mean Scores of Disaster Preparedness Knowledge and Skills Before and After Earthquake Emergency Response Simulation

Based on Figure 2, there was an increase in the mean scores of disaster preparedness knowledge and skills after the implementation of the earthquake emergency response simulation. Post-test scores for both variables were higher than pre-test scores with $p < 0.001$, indicating that earthquake emergency response simulation significantly improved participants' knowledge and skills.

DISCUSSION

The results of this study showed that earthquake emergency response simulation significantly improved disaster preparedness knowledge among students and community participants. The improvement in disaster preparedness knowledge can be explained by the experiential nature of simulation-based learning, in which participants engage in concrete experiences, reflect on their performance, and integrate their experiences with appropriate knowledge and actions during debriefing (Bresolin et al., 2022). In this study, participants not only received theoretical information but also experienced realistic earthquake emergency scenarios through role-play activities. The structured debriefing session conducted after the simulation further reinforced learning by allowing participants to reflect on their performance, discuss appropriate and inappropriate actions, and receive immediate feedback from facilitators. This experiential learning approach encourages active participation and reflection, enabling participants to integrate theoretical knowledge with practical disaster response skills more effectively. This mechanism may explain the significant improvement in participants' disaster preparedness knowledge observed in the present study. These findings are consistent with Putri et al. (2024), who reported that earthquake disaster simulation significantly improved disaster preparedness knowledge and attitudes among students (Putri, Suryarinilsih, Rachmadanur, & Metti, 2024). In addition, Madlazim et al. (2023) stated that disaster education based on direct practice can improve individuals' understanding and awareness regarding disaster risks and self-rescue actions during emergency situations (Mادلazim et al., 2023). This finding is also consistent with simulation-based learning theory proposed by Jeffries (2021), which emphasizes that realistic simulation and structured debriefing improve learning outcomes and clinical competence.

An improvement was also observed in disaster preparedness skills after participants attended the earthquake emergency response simulation. The findings showed that participants' mean skill scores significantly increased following the intervention. Role-play-based simulation provided participants with opportunities to directly practice self-protection actions, drop, cover, and hold on techniques, evacuation procedures, simple triage, and coordination of victim management during emergency situations. Such direct practical activities helped participants understand disaster response procedures more applicatively, resulting in better skill development compared to theoretical learning alone. During the simulation, most participants were able to follow evacuation routes properly, assist in victim evacuation, and coordinate according to the instructions provided by facilitators and the Regional Disaster Management Agency team. These findings are consistent with Sova Evie et al. (2022), who demonstrated that earthquake disaster education and simulation can improve disaster preparedness knowledge, behavior, and self-rescue skills. They also recommended conducting disaster simulations regularly to strengthen disaster preparedness (Evie, Hasni, Azwar, & Saman, 2022). These findings are also supported by the studies of Mahdi et al. (2023) and Schumacher et al. (2022), which stated that regular disaster simulation exercises are an effective method to improve response skills, decision-making, practical skills, as well as individual and institutional preparedness in facing emergency situations (Mahdi et al., 2023; Schumacher et al., 2022).

Beyond the experiential learning process, the effectiveness of the earthquake emergency response simulation in this study was also influenced by the implementation of an integrated and collaborative disaster preparedness approach. The simulation focused not only on providing direct practical experience but also on strengthening collaboration among nursing students, student organization members, community representatives, healthcare personnel, volunteers, and the Regional Disaster Management Agency (BPBD). In addition, the simulation involved victim management scenarios, simple triage, emergency coordination, vulnerable group management, and trauma healing, allowing participants to gain a more comprehensive learning experience. The semi-realistic disaster scenario, involving simulated victims, interprofessional collaboration, and real-time decision-making, enabled participants to better understand their respective roles and responsibilities during disaster emergencies.

Furthermore, the involvement of students, BEM members, community members, volunteers, healthcare personnel, and the Regional Disaster Management Agency strengthened the learning process because participants were able to learn through direct coordination and teamwork. These findings are supported by Widjanarko and Minnafiah (2019), who stated that practice-based disaster simulations can increase participant engagement and strengthen emergency response capabilities more effectively than conventional lecture methods (Widjanarko & Minnafiah, 2019). Several studies have also stated that simulation methods in disaster preparedness education and training are effective in improving the preparedness of individuals and communities in facing and reducing the impacts of disaster situations (Evie et al., 2022; Virgiani, Aeni, & Safitri, 2022).

This study also demonstrated that community-based earthquake emergency response simulation can enhance collaboration and coordination among participants during disaster emergencies. The involvement of fifth-semester students, BEM members, and community members in a single simulation activity created a more interactive learning experience because each participant had specific roles and responsibilities during the emergency response process. Nursing students were involved in assisting victim evacuation and simple victim management, while community members and BEM participants contributed to evacuation, coordination, and vulnerable group rescue activities. These findings indicate that disaster preparedness depends not only on individual capabilities but also on collective participation, collaboration, and coordination within communities, which can strengthen community capacity and resilience in responding to disaster risks (Hermawan, Guntoro, & Sulhan, 2024; Johnston, Taylor, & Ryan, 2022). This finding is also in accordance with the International Federation of Red Cross and Red Crescent Societies (IFRC, 2020), which emphasizes community participation as a key component of disaster risk reduction. Integrated simulation activities such as these are important for developing a disaster awareness culture within higher education institutions and surrounding communities. These results are consistent with Madlazim et al. (2023), who stated that collaborative approaches in disaster education can improve community capacity in responding to disaster risks more effectively (Madlazim et al., 2023). In addition, Partini and Hidayat (2024) explained that involving various community elements in disaster simulations can strengthen community preparedness and improve emergency response effectiveness during disasters (Partini & Hidayat, 2024).

IMPLICATION AND LIMITATIONS

The findings of this study have important implications for the development of disaster preparedness programs in higher education institutions, particularly in health education institutions. Earthquake emergency response simulation not only improved participants' knowledge and skills but also served as a practical learning medium for developing a disaster-aware culture within higher education institutions, which is consistent with the Comprehensive School Safety Framework promoted by UNESCO (2023). Nursing students, as future healthcare professionals, need to possess adequate preparedness in disaster emergency situations because they may become directly involved in disaster victim management. Therefore, integrating disaster education and simulation into academic activities and student development programs can become an effective strategy to improve sustainable disaster preparedness capacity. In addition, collaboration with the Regional Disaster Management Agency and surrounding communities is an important component in supporting community-based disaster preparedness systems within higher education institutions. This collaborative approach is consistent with the Health Emergency and Disaster Risk Management approach promoted by the World Health Organization, which emphasizes coordinated action, collaboration among relevant sectors and stakeholders, and community involvement in reducing health risks and strengthening preparedness for emergencies and disasters (WHO, 2022). These findings are supported by Budhiana et al. (2025), who stated that simulation-based disaster training can improve community capacity in responding to emergency situations more effectively (Budhiana, Dewi, Huda, & Hasibuan,

2025). Schumacher et al. (2022) also explained that repeated disaster simulations and practice-based training can strengthen individuals' practical response skills and preparedness for actual disaster risks.

This study has several limitations that should be considered when interpreting the findings. The study used a one group pre-test post-test design without a control group; therefore, external factors outside the intervention could not be optimally controlled. In addition, the study was conducted in only one educational institution with a limited number of respondents, which may limit the generalizability of the findings to broader populations. The simulation activities were also conducted within a relatively short period, meaning that the study could not evaluate the long-term sustainability of improvements in participants' knowledge and skills. Nevertheless, this study provides evidence that role-play-based earthquake emergency response simulation has the potential to become an effective disaster education method for improving disaster preparedness among students and communities. Future studies are recommended to involve control groups, larger sample sizes, multicenter research settings, and long-term evaluations to assess the effectiveness of disaster preparedness simulations more comprehensively.

CONCLUSION

Earthquake emergency response simulation significantly improved disaster preparedness knowledge and skills among students and community participants. The increase in the mean scores of knowledge and skills after the intervention indicated that education and role-play-based simulation were effective in improving participants' understanding of evacuation procedures, self-protection measures, emergency response coordination, and disaster victim management. The simulation activities, which involved students, BEM members, community members, volunteers, healthcare personnel, and the Regional Disaster Management Agency, provided a more realistic and practical learning experience in dealing with disaster emergency situations. Therefore, earthquake emergency response simulation can be considered an effective disaster education method to improve disaster preparedness in higher education institutions and communities.

SUGGESTIONS

Educational institutions are expected to conduct disaster education and emergency response simulations regularly as part of efforts to improve disaster preparedness within campus environments. This recommendation is also consistent with the Minimum Standards for Education in Emergencies developed by INEE (2021). The integration of disaster preparedness materials into academic activities, student organizations, and student development programs is also recommended to strengthen disaster awareness culture in higher education institutions. In addition, collaboration with the Regional Disaster Management Agency, healthcare personnel, and communities should be continuously enhanced to ensure that disaster simulations are conducted more realistically and in an integrated manner.

Future studies are recommended to use research designs involving control groups, larger sample sizes, and broader research settings to obtain more representative findings. Long-term evaluations of participants' preparedness levels after simulation activities are also necessary to assess the sustainability and effectiveness of disaster preparedness interventions over time.

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DECLARATION OF INTEREST

The authors declare that there is no conflict of interest related to this study.

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AUTHOR CONTRIBUTION

Author 1: Developed the research concept, designed the research methods, conducted data analysis, and prepared the research manuscript.

Author 2: Assisted in the development of research instruments, implementation of disaster education and earthquake emergency response simulation, and data collection.

Author 3: Assisted in coordinating the research activities, observing participants' skills, and documenting the simulation activities.

Author 4: Assisted in instrument validation, data processing, and interpretation of the research findings.

Author 5: Assisted in the implementation of field simulations, coordination of research participants, and documentation of research activities.

Author 6: Supervised the research process, revised the manuscript, and provided scientific input during the preparation of the research article.

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