

ORIGINAL RESEARCH ARTICLE

Effects of peer education–based student empowerment on flood disaster preparedness among junior high school students

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Abstract

Flood disasters frequently affect the Jember region, placing school-age children among vulnerable populations due to limited disaster preparedness. This study examined the effect of peer education–based student empowerment on flood disaster preparedness among students at MTsN 2 Jember. This study used a quasi-experimental design with a one-group pretest–posttest approach. The study population was 320 students, with a sample of 180 students selected through a multistage random sampling technique. Data were collected using structured questionnaires assessing knowledge and attitudes toward flood disaster preparedness. Data were analyzed using the Wilcoxon Signed Rank Test. The results showed a significant increase in students' knowledge and attitudes after receiving empowerment through the peer education method, with a p-value of 0.000. The simulation-based educational approach provided an active, contextual, and enjoyable learning experience, thereby enhancing students' preparedness in facing flood disasters. These findings suggest that peer education–based empowerment may be an effective strategy to enhance disaster preparedness among students. Implementation of this approach is recommended, particularly in schools located in disaster-prone areas, as part of disaster risk reduction and health promotion efforts. (*Afr J Reprod Health* 2026; 30 [9]: 106-112).

Keywords: Empowerment, students, peer education, behavior, preparedness

Résumé

Les catastrophes liées aux inondations touchent fréquemment la région de Jember, plaçant les enfants d'âge scolaire parmi les populations vulnérables en raison d'une préparation limitée aux catastrophes. Cette étude a examiné l'effet de l'autonomisation des élèves fondée sur l'éducation par les pairs sur la préparation aux catastrophes liées aux inondations chez les élèves de la MTsN 2 Jember. Cette étude a utilisé un devis quasi expérimental avec une approche à groupe unique prétest–posttest. La population de l'étude était composée de 320 élèves, avec un échantillon de 180 élèves sélectionnés au moyen d'une technique d'échantillonnage aléatoire à plusieurs degrés. Les données ont été recueillies à l'aide de questionnaires structurés évaluant les connaissances et les attitudes à l'égard de la préparation aux catastrophes liées aux inondations. Les données ont été analysées à l'aide du test des rangs signés de Wilcoxon. Les résultats ont montré une augmentation significative des connaissances et des attitudes des élèves après avoir bénéficié de l'autonomisation par la méthode d'éducation par les pairs, avec une valeur de p de 0,000. L'approche éducative fondée sur la simulation a offert une expérience d'apprentissage active, contextualisée et agréable, améliorant ainsi la préparation des élèves face aux catastrophes liées aux inondations. Ces résultats suggèrent que l'autonomisation fondée sur l'éducation par les pairs peut constituer une stratégie efficace pour renforcer la préparation aux catastrophes chez les élèves. La mise en œuvre de cette approche est recommandée, en particulier dans les écoles situées dans des zones exposées aux catastrophes, dans le cadre des efforts de réduction des risques de catastrophe et de promotion de la santé. (*Afr J Reprod Health* 2026; 30 [9]: 106-112).

Mots-clés: Autonomisation, élèves, éducation par les pairs, comportement, préparation

Introduction

Indonesia is one of the countries located within the Pacific Ring of Fire, which makes it highly

vulnerable to various types of natural disasters, including floods.¹ Students often lack knowledge about the appropriate actions to take during disasters and tend to exhibit attitudes that do not yet reflect

alertness and readiness to face emergency situations.² This lack of preparedness increases the risk of worsening the impact experienced by students during disasters, both in terms of physical safety and psychological well-being.³

A national survey on disaster literacy among students revealed that more than 60% of students do not know the correct evacuation steps during disasters, and only a small portion demonstrate responsive and cautious attitudes toward potential dangers in their surroundings. Floods are among the most frequent natural disasters in Indonesia, including in Jember Regency, which has geographical characteristics prone to flooding due to river flow conditions and high rainfall.⁴ The impact of flooding not only threatens infrastructure but also poses risks to public health and safety, especially for school-age students. Therefore, instilling preparedness from an early age is an important step to minimize disaster risks.

Schools, as educational institutions, play a strategic role in fostering students' knowledge, attitudes, and behaviors toward disaster preparedness. One effective method is peer education, an approach in which students share information, experiences, and skills with their peers. This approach is considered more acceptable to students because of emotional closeness and similarity in communication style.

Student empowerment through peer education not only enhances understanding of risks and rescue measures during floods but also fosters a sense of collective responsibility, cooperation, and care among peers. This study was conducted to determine the effect of student empowerment through the peer education method on preparedness behavior in facing floods at MTsN 2 Jember. However, based on reports from the East Java Regional Disaster Management Agency (BPBD) and the Provincial Department of Education, the implementation of disaster education in schools remains uneven.⁵

Emergency situations often disrupt access to clean water, nutritious food, and health services, increasing the risk of infectious diseases and malnutrition. Students, as a vulnerable group, are particularly at risk of these impacts if they are not equipped with the necessary knowledge and preparedness to face disasters.⁶ With appropriate educational knowledge, students can better understand disaster threats, emergency responses,

self-protection measures, and proper evacuation steps.^{7,8}

The implementation of innovative disaster education through peer education at the junior high school level, particularly in disaster-prone areas such as Jember, is still limited.

The low application of this interactive educational approach highlights the need for effective solutions to shape a young generation that is alert and ready to face disasters. The results of this study are expected to serve as a foundation for developing more effective disaster education methods within educational settings, particularly for junior high school students living in disaster-prone areas.⁹ Therefore, the objective of this study is to analyze the effect of student empowerment through the peer education method on students' preparedness behavior in facing flood disasters at MTsN 2 Jember. The findings of this research are expected to provide scientific evidence supporting the use of peer education as an effective and sustainable model for disaster preparedness education in schools. Furthermore, this study is important for promoting disaster risk reduction initiatives and strengthening health promotion programs aimed at protecting vulnerable groups, especially school-aged children living in disaster-prone regions.

Methods

Study design

This quantitative research employed a quasi-experimental pretest–posttest design without a separate control group (single-group design) using a peer education intervention. All selected participants received the intervention and were assessed before and after the program. The study aimed to determine the effect of student empowerment through the peer education method on preparedness behavior in facing flood disasters at MTsN 2 Jember.

Population and sample

The population of this study consisted of all seventh- and eighth-grade students at MTsN 2 Jember, totaling 320 students. A sample of 180 students was selected using a multi-stage random sampling technique, in which classes were first randomly selected, then all students were assigned sequential numbers and chosen randomly using the Spinwheel

website. All selected students were included in the intervention and follow-up measurements.

Intervention procedures

The intervention was conducted over one month (August 2025) at MTsN 2 Jember. The activity began with a pretest, followed by the intervention using the Peer Education Method, and concluded with a posttest administered after completion of the intervention period. The intervention was carried out through small-group peer education sessions. Students participated in eight (8) peer-education meetings conducted across four weeks. During the sessions, each peer group received structured educational materials related to flood disaster preparedness. The educational content included: (1) recognition of flood risks and early warning signs, (2) evacuation routes and safety procedures, (3) preparation of emergency kits and family communication plans, and (4) appropriate actions before, during, and after a flood disaster. Different peer groups discussed these topics through rotating learning stations, simulations, group discussions, and problem-solving activities. Each session involved peer explanation, guided discussion, and evaluation activities such as games or group challenges designed to reinforce learning. Peer educators were trained students supervised by the research team and teachers to ensure consistency of message delivery. After the final session, researchers distributed posttest questionnaires to measure changes in students' knowledge and attitudes (preparedness behavior). The program ended with a question-and-answer segment and feedback to participants.

Research instruments

The research instruments consisted of two types of questionnaires. The first questionnaire was used to assess students' knowledge regarding flood disaster preparedness and contained 20 multiple-choice questions. Each correct answer was scored as 1, and each incorrect answer as 0. The total score was categorized as good, moderate, or poor. The second questionnaire measured students' attitudes toward preparedness for flood disasters and consisted of 20 statements using a Likert scale, covering attitudes before, during, and after the disaster. The final attitude score was categorized as positive or

negative. The same validated questionnaires were administered at both pretest and posttest to evaluate changes following the intervention.

Validity and reliability testing

Both instruments had undergone validity and reliability testing. The validity test using Pearson's correlation showed that all items were valid. The reliability test results showed Cronbach's Alpha values of 0.889 for the knowledge questionnaire and 0.892 for the attitude questionnaire, indicating a very high level of reliability.

Data analysis

Data were analyzed using the Wilcoxon Signed Rank Test, aimed at comparing pretest and posttest scores for the behavioral variables (knowledge and attitude) of students. Statistical significance was determined at $p < 0.05$.

Ethical considerations

This study received ethical approval from the Health Research Ethics Committee, Faculty of Health Sciences, Universitas Muhammadiyah Jember, with approval number 0189/KEPK/FKES/VII/2025. Prior to participation, written permission was obtained from the school administration. Students and their parents/guardians received information about the study objectives, procedures, voluntary participation, and confidentiality of data. Informed consent from parents/guardians and student assent were obtained before data collection. Participants were assured that their responses would remain anonymous and would be used solely for research purposes.

Results

The data collected in this study included general and specific data. The general data consisted of the respondents' age and gender, while the specific data included the dependent and independent variables.

Based on Table 1, the majority of students were 15 years old (85 students or 47.2%), while in terms of gender, most of the students were female (94 students or 52.2%).

Based on Table 2, it shows that there was an increase in student knowledge about flood disaster

Table 1: Characteristics of students at MTsN 2 Jember, August 2025 (n = 180)

No	Description	Criteria	Frequency (f)	Percentage (%)
1	Age	13 years	50	27.8
		14 years	45	25.0
		15 years	85	47.2
		Total	180	100.0
2	Gender	Male	86	47.8
		Female	94	52.2
		Total	180	100.0

Table 2: Students' knowledge before and after peer education-based student empowerment intervention at MTsN 2 Jember in August 2025 (n=180)

Variable		Frequency (%)	Percentage (%)	p-value
Before Intervention	Good	12	6.67	0.000
	Fair	70	38.89	
	Poor	98	54.44	
After Intervention	Good	138	76.67	0.000
	Fair	32	17.78	
	Poor	10	5.56	

Table 3: Students' attitudes before and after peer education-based student empowerment intervention at MTsN 2 Jember in August 2025 (n=180)

Variable		Frequency (%)	Percentage (%)	p-value
Before Intervention	Good	28	15.56	0.000
	Fair	60	33.33	
	Poor	92	51.11	
After Intervention	Good	112	62.22	0.000
	Fair	56	31.11	
	Poor	12	6.67	

preparedness after being given peer education-based student empowerment. Knowledge before the intervention was in the poor category of 98 students (54.44%), and after the intervention, most of the knowledge was in the good category of 138 students with a percentage of 76.67%. The results of the statistical test showed a p value = 0.000 ($p < 0.05$),

Table 4: Students' behavior before and after the intervention in the control and intervention groups at MTsN 2 Jember, August 2025 (n = 180)

Variable		Frequency (%)	Percentage (%)	p-value
Before Intervention	Good	17	9.44	0.000
	Fair	56	31.11	
	Poor	107	59.44	
After Intervention	Good	99	55.00	0.000
	Fair	70	38.89	
	Poor	11	6.11	

which means there was a significant difference between the level of student knowledge before and after the intervention. Based on Table 3, it shows that there was an increase in student knowledge about flood disaster preparedness after being given peer education-based student empowerment. The attitude before the intervention was in the poor category of 92 students (51.11%), and after the intervention, the majority of attitudes were good (112 students with a percentage of 62.22%). The results of the statistical test showed a p value = 0.000 ($p < 0.05$), which means there was a significant difference between student attitudes before and after the intervention.

Based on Table 4, it shows that there was an increase in skills in the form of student behavior regarding flood disaster preparedness after being given a peer education-based student empowerment intervention. Behavior before the intervention was categorized as less than 107 students (59.44%), and after the intervention, the majority of students behaved well (99 students with a percentage of 55.0%). The results of the statistical test showed a p value = 0.000 ($p < 0.05$), which means there was a significant difference between student behavior before and after the intervention.

Discussion

The results of this study indicate that before being given education through the Peer Education Method, most students at MTsN 2 Jember had low levels of knowledge and preparedness attitudes, with understanding still limited to basic information such as general warning signs. However, they had not yet mastered practical aspects such as recognizing evacuation signs, preparing emergency kits, and knowing what actions to take when the siren sounds.¹⁰ This finding suggests that students' prior exposure to disaster preparedness was largely

theoretical and lacked experiential and skills-based components. This condition aligns with Nola Pender's Health Promotion Model (HPM), which states that preparedness behavior is influenced by meaningful learning experiences and perceived benefits of action, and situational interpersonal influences such as peer communication; without interactive learning methods, knowledge and attitudes are difficult to develop optimally. Student empowerment therefore requires interactive communication processes, since barriers in knowledge and attitude development may depend on determinants affecting the implementation of peer-based empowerment strategies. These findings are supported by the study of Damayanti et al. (2023), which also reported that limited exposure to practical and interactive education contributes to weak preparedness among communities and students in disaster-prone areas.¹¹ Similar results have also been reported in more recent school-based disaster education studies showing that insufficient simulation-based learning is associated with poor evacuation readiness and low emergency response confidence among adolescents.¹²

After the peer education intervention, the majority of students showed substantial improvements in knowledge, attitude, and behavior related to disaster preparedness. This improvement highlights the effectiveness of integrating student empowerment with peer-led participatory learning approaches. This reflects the effectiveness of a fun, participatory, and simulation-based peer education approach in delivering disaster preparedness material.¹³ This improvement is consistent with the Health Promotion Model (HPM), which emphasizes the importance of peer situational factors and direct experience in shaping healthy behaviors.¹⁴ In this context, peer education serves as an educational medium that stimulates students' understanding and commitment toward preparedness. This finding is reinforced by Damayanti et al. (2023), who demonstrated that active learning methods can increase students' readiness to face disasters.¹¹ Similarly, Khairunnisa et al. (2022) stated that experiential learning helps shape disaster-responsive attitudes among adolescents.¹⁵ Recent educational intervention studies in disaster-prone regions have likewise demonstrated that peer-assisted simulations, collaborative drills, and student-led preparedness campaigns significantly improve not

only knowledge retention but also emergency decision-making skills and collective responsibility among students.^{16,17} Simulations involving challenges, puzzles, and problem-solving activities through the Peer Education Method create a deeper and more relevant learning experience.¹⁸ These preparedness skills—developed through repeated simulation, discussion, and peer interaction—strengthen the linkage between knowledge, attitude, and observable preparedness behavior.

The results of this study are consistent with the findings of Kurniawan and Nirmalasari (2023) and Purnama et al. (2022), which showed that the use of visual media, narratives, and hands-on practice can significantly improve knowledge scores and disaster preparedness.¹⁹⁻²¹ Similarly, the increase in students' positive attitudes aligns with the results of Putri et al. (2023), who confirmed that good knowledge and active involvement in disaster simulations directly influence readiness and awareness in facing disasters.⁷ Comparable findings from recent public-health-oriented disaster

education research also emphasize that multi-modal learning approaches combining visual instruction, peer discussion, and scenario rehearsal produce stronger behavioral preparedness outcomes than lecture-based education alone.²² Thus, disaster education using the Peer Education model has proven to be effective not only in improving cognitive aspects but also in shaping proactive, empathetic, and reflective attitudes, fostering student behavior that is more aware of natural warning signs such as flood disasters. This approach provides a contextual, challenging, and enjoyable learning experience, making it highly relevant for widespread implementation in disaster preparedness education—particularly in disaster-prone regions such as Jember. The findings therefore support the integration of peer-empowerment-based disaster education into routine school health promotion programs in high-risk areas.

Despite these important findings, this study has several limitations. First, the quasi-experimental single-group design without long-term follow-up limits the ability to determine whether the observed behavioral improvements are sustained over time. Second, the study was conducted in only one school, which may restrict the generalizability of the findings to other educational settings or regions with

different socio-environmental characteristics. Third, preparedness behavior was measured using self-reported questionnaires, which may be subject to response bias or social desirability effects. Fourth, external factors such as teacher involvement, prior disaster experience, or access to digital disaster information were not formally controlled and may have influenced students' preparedness levels. Future studies are therefore recommended to use multi-school randomized designs, include objective simulation-based performance assessments, and evaluate long-term retention of preparedness skills.

Conclusion

This study demonstrated a significant improvement in students' knowledge, attitudes, and behaviors after being provided with disaster education using the peer education approach. These findings can serve as input for schools to integrate interactive learning models as part of disaster education programs that are both enjoyable and effective. For health professionals, the results strengthen the importance of health promotion through experiential learning approaches that are aligned with students' characteristics. The success of this educational method is also consistent with the principles of the Health Promotion Model (HPM), which emphasize direct experience and environmental support as key factors in behavior change. Future researchers are encouraged to explore other factors that may influence the effectiveness of education, such as the role of teachers, social environment, or the use of digital media as learning support tools..

Conflict of interest

The authors declare there is no conflict of interest

Contribution of authors

Susi W. Asih: research methods and data analysis, drafted the manuscript

Ah Yusuf: scientific writing and research methods

Sriyono: research methods, revised and edited the manuscript

Supriyadi: data collection, revised and edited the manuscript

Luh T. Handayani: data collection, revised and edited the manuscript

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