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Effect of Peer Video Disaster Management on Knowledge, Attitude, and Skill Among Primary School Children in Bengkulu City

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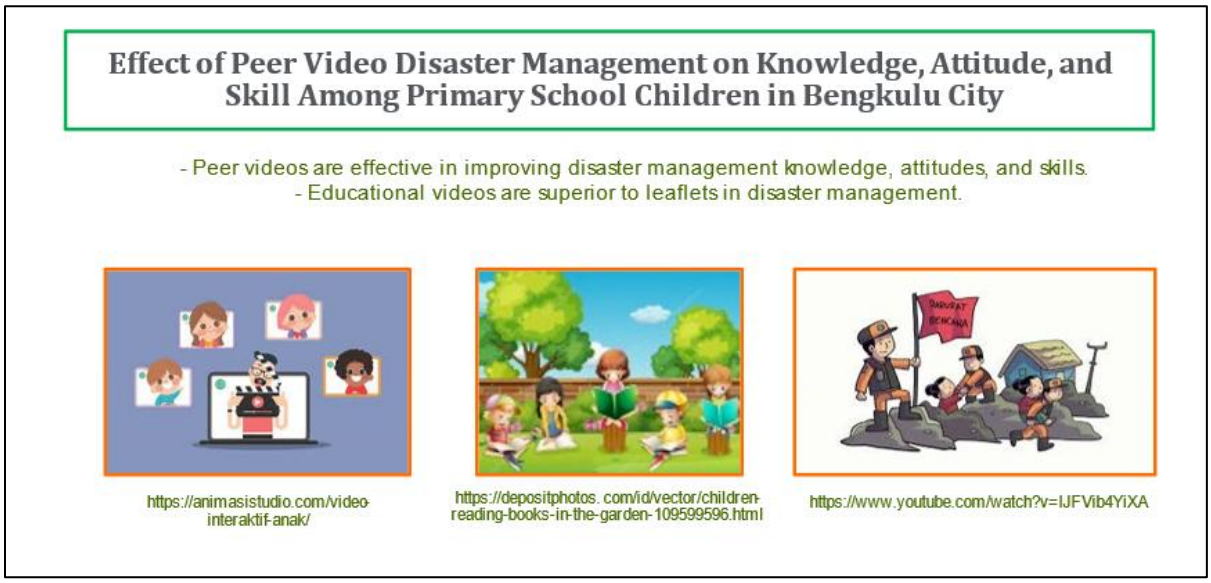
ABSTRACT

Natural disasters are unpredictable events, and preparedness is crucial to mitigate associated risks. One high-risk population for natural disasters is children. Disaster management programs for primary students is important to reduce the risk and prevent the worst impact. This study aims to examine the effectiveness of the peer video on disaster management knowledge, attitude, and skill among primary students. The sample size of this study was 60 students, with 30 students in the intervention and 30 in the control. The intervention group was given the video of disaster management, and the control group was given the leaflet. There is a pretest and a posttest, and in between, there are four times interventions given. The results revealed the effectiveness of disaster management education with peer video to improve the knowledge, attitude, and skill among primary students in Bengkulu City. Earthquake disaster management education in Bengkulu City among primary students is effective to reduce the risk. Future studies can include more predictors of risk management.

Key Messages:

- Peer videos effectively improve disaster management knowledge, attitudes, and skills.
- Educational videos are superior to leaflets in disaster management.

GRAPHICAL ABSTRACT



INTRODUCTION

Natural disasters pose significant threats to communities worldwide, with children being among the most vulnerable populations due to their physical, cognitive, and emotional development stages (1). Earthquakes, in particular, represent one of the most devastating forms of natural disasters, often resulting in widespread destruction, loss of life, and long-term psychological impacts (2). Children, when unprepared, face compounded risks, including injury, displacement, and disruption to their education and social support systems (3,4).

Indonesia is among the most seismically active countries globally, situated along the Pacific Ring of Fire, where tectonic plate movements frequently result in earthquakes and volcanic eruptions. The western coastline of Sumatra, including Bengkulu City, is particularly vulnerable due to its proximity to the Sunda megathrust, a tectonic boundary capable of generating large earthquakes and tsunamis (5,6). Bengkulu has experienced several devastating earthquakes, including the 7.6-magnitude earthquake in 2007, which caused significant casualties and damage to infrastructure (6). Such recurrent seismic activity underscores the urgency of equipping local populations, especially children, with the knowledge and skills to mitigate risks.

Health education is a critical intervention in mitigating the risks associated with disasters, particularly among children. Education equips children with the knowledge, skills, and confidence necessary to respond effectively during emergencies (7). Studies have demonstrated that disaster education programs can significantly improve children's awareness, preparedness, and ability to act safely in the event of an earthquake (8). Moreover, health education fosters resilience, empowering children to adapt and recover from traumatic events (9).

In Indonesia, disaster education has been integrated into school curricula through initiatives such as the "Safe Schools Program" by the National Agency for Disaster Management (BNPB) and international organizations like UNICEF (10). These programs emphasize participatory learning methods, including evacuation drills and hazard mapping, to enhance children's understanding of disaster risks and responses (11). However, despite these efforts, there remains a gap in assessing the effectiveness of such education programs, particularly in high-risk areas like Bengkulu.

Bengkulu Province is one province in Indonesia with the highest potential for natural disaster due to its geographic location close to the beach line. According to Statistic Indonesia 2018, there were 737 natural disasters, such as flooding 231 times and earthquake 212 times. The disadvantage of natural disasters is not only to human beings but also materials and infrastructures. Populations needs to be

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extensively promoted. The data showed that early mitigation education can prevent and reduce the risk post-disaster.

Previous study informs that 87.0% of primary students are not ready for natural disasters such as earthquakes and tsunamis.(12) This is also in line with previous research which states that 50% of primary students are not ready to face natural disasters such as earthquakes.(13) There are various methods that can be used to provide education about disaster mitigation for school children, one of which is education about saving from earthquakes. Another research informs that the factors that cause many disaster victims and cause great losses is a lack of knowledge about the characteristics of hazards, attitudes or behaviors that result in a decrease in natural resources.(14) This is in accordance with the parameters set by UNESCO in 2006, namely regarding attitudes, emergency planning, early warning systems and disaster mobilization.(15) For this reason, it is necessary to implement preparedness programs at the primary school level in providing information about disaster preparedness through learning methods so that students are able to understand the knowledge conveyed. There are several learning methods that can be used to provide knowledge to primary school children, namely by providing education with peers. Even though there is existing disaster education efforts in Indonesia (e.g., "Safe Schools Program") but there is a gap in assessing the effectiveness of such programs, particularly in high-risk areas like Bengkulu.

This study aims to address this gap by evaluating the effects of a tailored health education intervention on children's disaster management knowledge and practices in Bengkulu City. By focusing on earthquake preparedness, this research seeks to contribute to the growing body of evidence supporting disaster education as a vital tool for risk reduction and child protection, particularly in regions prone to seismic activity.

METHODS

This study is quantitative research with quasi experimental with pre and posttest with control group. The study population in this study were primary students grade four from primary school numbers 32 and 38 in Bengkulu City. The data collection was done from 17 to 28 June 2024. The frequency was six times, with first and last meeting was the pre and posttest. The study sample size participated in this study were 60 students who selected by purposive sampling. They were divided into intervention and control groups with each 30 students. The intervention group was given the education video related to natural disaster management, specifically earthquake. The students were given the video which was explained the disaster management by the peer. The duration of the video is 15 minutes. After given the intervention, the students will ask some questions about the information's and those who can answer will give the gifts. There was also song related to disaster that the students sang together. The control group was given the leaflet containing the information of disaster management. The instrument used in this study are laptop, in focus, speaker, and leaflet.

The outcomes of this study are knowledge, attitude, and skills. The student's knowledge was measured by instrument of multiple choice that has been tested for validity and reliability. The attitude was measured by favorable and unfavorable questions. The skills were measured following the Standard Operational Procedure (SOP) of evacuation and cervical trauma management. The dependent variables of this study are knowledge, attitude, and skills. The data was tested by SPSS statistical software with confidence interval of 0.05. The data was examined for univariate and bivariate. The univariate analysis was presented by frequency and percentage. The bivariate analysis (using the Wilcoxon signed rank test and the Mann-Whitney test) was used to describe the correlation between intervention and three outcomes, including knowledge, attitude, and skills.

CODE OF HEALTH ETHICS

This study was approved for ethical exemption by number KEPK.BKL/625/07/2024 from the health research ethics committee, Bengkulu Health Polytechnic.

RESULTS

Table 1 describes the general characteristics of the respondents. The general characteristics of the

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respondents in this study include age, sex, and whether they have been given the information of disaster management. It was described that the mean age of the intervention and control group were 9 years old. The minimum and maximum age for both intervention and control group were 9 and 11 years, respectively. The proportion of male students was higher than that of female, which is 60% for male and 40% for female for both intervention and control groups. The data on previous exposure to disaster management information revealed that all of the students in both intervention and control groups reported never getting any information on disaster management.

Table 1. General characteristics of the study sample

Characteristics	Group	
	Intervention	Control
Age (years old)		
Mean	9.63	9.63
Median	10.00	10.00
Min	9.00	9.00
Max	11.00	11.00
SD	0.61	0.61
CI 95%	9.40-9.86	9.40-9.86
Sex		
Female	12 (40%)	12 (40%)
Male	18 (60%)	18(60%)
Ever get the information		
Never	30 (100%)	30(100%)
Ever	0 (0%)	0 (0%)

Table 2 below describes the study comparison between pre and posttest among intervention and control groups. According to three outcomes of this study, the knowledge was increasing significantly for intervention groups compared to control groups. Similar to the knowledge, the attitude and skills score for intervention and control groups was also increasing significantly. However, it was found insignificant difference between intervention and control groups for each pre-test and post-test.

Table 2. The pre and posttest comparison between intervention and control groups

Variable	Pre-test		Post-test		*p-value*
	Intervention	Control	Intervention	Control	
Knowledge					0.667
Mean	42.67	43.67	95.33	83.00	
Median	40.00	45.00	100	80.00	
Min	30	30	90	70	
Max	60	60	100	90	
SD	8.277	9.643	5.074	7.022	
CI 95%	39.58-45.76	40.07-47.27	93.44-97.23	80.38-85.62	
Attitude					0.321
Mean	45.00	43.97	96.67	92.33	
Median	45.00	42.72	95.77	90.00	
Min	40	40	95	85	
Max	50	50	100	100	
SD	3.322	3.327	2.397	4.866	
CI 95%	43.76-46.24	42.72-45.21	95.77-97.56	90.52-94.15	
Skills					0.733
Mean	40.33	41.00	95.33	85.67	
Median	40.00	40.00	93.44	83.78	
Min	30	30	90	80	
Max	50	50	100	90	
SD	7.649	7.589	5.074	5.040	
CI 95%	37.48-43.19	38.17-43.83	93.44-97.23	83.78-87.55	

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Table 3 shows the median differences of scores of each outcome (before and after) by the Wilcoxon Signed Rank Test. In terms of the knowledge, it revealed a significant difference of median score of knowledge, attitude, and skills for intervention and control groups.

Table 3. The median differences of outcomes before and after among intervention and control

Outcomes	n	Median (Min-Max)	z	*p-value*
Intervention				
Knowledge (before)	30	40.00 (30-60)	-4.480	<0.001
Knowledge (after)	30	95.33 (90-100)		
Control				
Knowledge (before)	30	45 (30-60)	-4.816	<0.001
Knowledge (after)	30	83(70-90)		
Intervention				
Attitude (before)	30	45.00 (40-50)	-4.821	<0.001
Attitude (after)	30	95.77 (95-100)		
Control				
Attitude (before)	30	42.72 (40-50)	-4.808	<0.001
Attitude (after)	30	90.00 (85-100)		
Intervention				
Skills (before)	30	40.00 (30-50)	-4.896	<0.001
Skills (after)	30	93.44 (90-100)		
Control				
Skills (before)	30	40.00 (30-50)	-4.818	<0.001
Skills (after)	30	83.78 (80-90)		

Table 4 below describes the result from the Mann-Whitney test of association between intervention and the knowledge, attitude, and skill for both intervention and control groups. It was found that there was a significant association between the video-based disaster management education and the improvement of knowledge, attitude, and skill.

Table 4. The effect of intervention on knowledge, attitude, and skill score

Outcomes	n	Median (Min-Max)	U	*p-value*
Knowledge score				
Intervention	30	60.00 (40-70)	159.500	<0.001
Control	30	40.00 (20-60)		
Attitude score				
Intervention	30	50.00 (45-60	292.000	0.017
Control	30	50.00 (38-60)		
Skill score				
Intervention	30	50.00 (40-70	241.500	0.001
Control	30	45.00 (30-60)		

DISCUSSION

This study highlights the significant impact of health education on improving children's knowledge and preparedness for earthquake disaster management in Bengkulu City, a region highly vulnerable to seismic activity.(5,6) The findings underscore the critical role of targeted educational interventions in equipping children with the necessary skills to respond effectively during emergencies, thereby reducing their vulnerability. Consistent with previous studies, the results confirm that disaster education significantly enhances children's disaster management capabilities.(16) By incorporating age-appropriate content and interactive teaching methods, the intervention successfully increased students' understanding of earthquake hazards, emergency responses, and evacuation procedures.(17,18) This aligns with evidence suggesting that participatory and experiential learning approaches, such as simulations and drills, are particularly effective in fostering disaster preparedness among young learners.(7,15)

In the context of Bengkulu, where seismic risks are frequent and severe, these findings hold critical implications for disaster risk reduction (DRR) strategies. Bengkulu's proximity to the Sunda megathrust

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necessitates proactive measures to mitigate risks, especially among vulnerable groups like children. While national programs such as BNPB's "Safe Schools" initiative aim to integrate DRR education into school curricula, this study reveals a need for more localized and context-specific interventions that address unique regional risks and resources.(11) The gender-disaggregated analysis further highlights nuanced differences in how boys and girls respond to disaster education. Boys demonstrated a slightly higher improvement in evacuation planning, while girls excelled in hazard identification and safety measures. This finding suggests that disaster education programs should consider gender-specific learning needs to maximize their effectiveness.(2)

Moreover, the study provides insights into the role of community involvement in enhancing the sustainability of educational interventions. The active participation of teachers, parents, and local disaster management authorities was instrumental in reinforcing the program's impact. This supports previous research emphasizing the importance of community-based approaches in fostering a culture of preparedness and resilience.(3,4,19–21).

However, the study also identifies challenges, including limited resources for disaster education in schools and varying levels of teacher preparedness. Addressing these gaps requires greater investment in teacher training, the provision of DRR materials, and the integration of technology to facilitate innovative learning methods.(7) Finally, this research highlights the broader implications of health education in achieving the Sustainable Development Goals (SDGs), particularly Goal 4 (quality education) and Goal 13 (climate action). By enhancing children's disaster preparedness, the study contributes to building safer, more resilient communities in Indonesia, in line with the national agenda for disaster risk reduction.(17)

This study highlights the significant impact of health education on improving children's knowledge and preparedness for earthquake disaster management in Bengkulu City, a region highly vulnerable to seismic activity. The findings underscore the critical role of targeted educational interventions in equipping children with the necessary skills to respond effectively during emergencies, thereby reducing their vulnerability.

Consistent with previous studies, the results confirm that disaster education significantly enhances children's disaster management capabilities.(20,22) By incorporating age-appropriate content and interactive teaching methods, the intervention successfully increased students' understanding of earthquake hazards, emergency responses, and evacuation procedures. This aligns with evidence from Japan, where integrating disaster education into school curricula has significantly reduced casualties and improved disaster response during emergencies.(21) Japan's approach emphasizes experiential learning through drills, simulations, and community involvement, which are proven to foster a culture of preparedness among young learners.

In the context of Bengkulu, where seismic risks are frequent and severe, these findings hold critical implications for disaster risk reduction (DRR) strategies. Bengkulu's proximity to the Sunda megathrust necessitates proactive measures to mitigate risks, especially among vulnerable groups like children. While national programs such as BNPB's "Safe Schools" initiative aim to integrate DRR education into school curricula, this study reveals a need for more localized and context-specific interventions that address unique regional risks and resources.(11) Other regions in Indonesia also potentially of natural disaster.(23)

Drawing parallels to other countries, such as New Zealand and Turkey, further emphasizes the importance of tailored disaster education.(24,25) In New Zealand, the "ShakeOut" program has effectively raised earthquake awareness through national drills involving schools.(26) Similarly, in Turkey, earthquake education initiatives have improved children's hazard perception and evacuation behavior, demonstrating the global applicability of such interventions.(27)

The gender-disaggregated analysis in this study also highlights nuanced differences in how boys and girls respond to disaster education. Boys demonstrated a slightly higher improvement in evacuation planning, while girls excelled in hazard identification and safety measures. This finding is consistent with international evidence, suggesting that gender-specific approaches may enhance the effectiveness of disaster education programs.(15)

Moreover, the study provides insights into the role of community involvement in enhancing the

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sustainability of educational interventions. The active participation of teachers, parents, and local disaster management authorities was instrumental in reinforcing the program's impact.(28–31) This is consistent with Japanese models of disaster education, where strong community engagement and multi-stakeholder collaboration have been critical to the success of disaster preparedness initiatives.(19) However, challenges persist, including limited resources for disaster education in schools and varying levels of teacher preparedness.(32–39) Addressing these gaps requires greater investment in teacher training, the provision of DRR materials, and the integration of technology to facilitate innovative learning methods.(7) Finally, this research highlights the broader implications of health education in achieving the Sustainable Development Goals (SDGs), particularly Goal 4 (quality education) and Goal 13 (climate action). By enhancing children's disaster preparedness, the study contributes to building safer, more resilient communities in Indonesia, aligning with global frameworks like the Sendai Framework for Disaster Risk Reduction. There are some critical analyses from this study, including the gender differences and importance of community involvement. Additionally, the challenges are limited resources and teacher preparedness. Moreover, limitations of quasi-experimental design, purposive sampling, potential Hawthorne effect, reliance on self-report for attitude, specifics of skill assessment challenges.

CONCLUSION

This study found the peer video intervention to be more effective than the leaflet in improving disaster management knowledge. Improvements were observed in knowledge, attitude, and skill. This study's limitation was that most of the students were in an uncontrolled and unconducive environment during the data collection. However, the researchers managed these issues very well, even though it took more time. While this study demonstrates the effectiveness of health education in improving disaster preparedness, future research should explore its long-term impacts on behavioral change and resilience. Comparative studies across regions and countries with similar seismic risks, such as Japan and New Zealand, could provide further insights into best practices and scalable models for disaster education. While this study demonstrates the effectiveness of health education in improving disaster preparedness, future research should explore its long-term impacts on behavioral change and resilience. Additionally, expanding the study to other high-risk regions in Indonesia would provide comparative insights into the scalability and adaptability of educational interventions. The practical implications for policymakers and educators in Bengkulu Province include providing learning materials that contain audio and visual content to effectively improve the knowledge, attitude, and skills of disaster management.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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