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Local Risk-Based Disaster Education: An Analysis of Knowledge, Emergency Actions, and Preparedness of Elementary School Students in a Volcanic Region

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ABSTRACT

Disaster education grounded in local risk constitutes a crucial approach to enhancing students' capacity to confront disaster threats aligned with regional characteristics. This study aims to assess the disaster knowledge, comprehension of emergency actions, and preparedness of elementary school students in the volcanic disaster-prone region of West Ternate. The research employs a quantitative descriptive approach, involving 77 fifth-grade students from six elementary schools (SD). Data were collected using a disaster education evaluation instrument encompassing three dimensions: disaster knowledge, comprehension of emergency actions, and student preparedness. The data were analyzed using descriptive statistics, specifically mean scores and achievement percentages. The findings indicate that the achievement scores for students' disaster knowledge, comprehension of emergency actions, and student preparedness were 79.08%, 73.65%, and 82.53%, respectively. Furthermore, inter-school variations in achievement were observed across all three measured dimensions. The research findings reveal that while students have developed a foundational understanding of disaster risks and self-protective readiness, the aspect of emergency actions particularly evacuation procedures requires further reinforcement through practice-based learning and continuous simulations. This study underscores the critical importance of locally grounded disaster education in enhancing the preparedness of elementary school students in volcanic regions.

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INTRODUCTION

Indonesia is one of the countries facing high levels of disaster risk due to its tectonic setting, volcanic activity, and exposure to various natural hazards. These geographical conditions expose communities to a range of threats, including volcanic eruptions, floods, tsunamis, and extreme weather events, which can disrupt social and economic activities as well as educational continuity. Disaster risk reduction therefore requires not only effective emergency response but also sustained efforts to strengthen community capacity through education and preparedness initiatives. Disaster risk reduction education is an important strategy for improving disaster knowledge, fostering preparedness attitudes, and encouraging appropriate responses to disaster threats (Wardhani et al., 2024; Widowati et al., 2021, 2023). In the context of school-aged children, disaster education plays a strategic role because students can act not only as learners but also as channels for disseminating accurate disaster-related information to their families and communities (Johnson et al., 2014).

Schools are one of the important environments in building a disaster preparedness culture because most children's activities take place in an educational environment. Disaster education programs in schools not only aim to increase knowledge about the types of threats, but also build the ability to make decisions and take appropriate actions when emergencies occur. Research by Shah et al. (2020) shows that school preparedness is influenced by aspects of risk knowledge, emergency planning, and institutional capacity to manage disaster risks. In addition, disaster education that is carried out systematically can strengthen the relationship between students' preparedness knowledge and behavior (Ayub et al., 2022). However, the implementation of disaster education in schools still faces challenges, especially in the provision of evaluation instruments that are able to measure learning outcomes objectively and in accordance with local risk characteristics (Wijayanto et al., 2025).

Volcanic archipelagic regions exhibit distinct risk profiles compared to other areas, necessitating the development of disaster education tailored to the local context. Ternate Island is particularly vulnerable to volcanic threats due to the presence of Mount Gamalama, a volcano with a long history of eruptive activity (Ham, 2024). Consequently, it is imperative that the community, including elementary school students, develop a comprehensive understanding of volcanic hazard characteristics and appropriate safety protocols (Abdullah et al., 2024). Research on disaster mitigation education demonstrates that a contextually grounded approach is more effective in enhancing students' comprehension, as the instructional material directly correlates with their lived experiences and immediate environment (Rofiah et al., 2021). Moreover, the integration of disaster risk education with local socio-geographical conditions can bolster institutional capacity to foster long-term preparedness (Oktari et al., 2018).

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Despite the implementation of disaster education in schools, understanding students' knowledge, comprehension of emergency actions, and preparedness in specific hazard contexts remains important for identifying areas that require further improvement. In volcanic regions, such as West Ternate, students need to understand local disaster risks and appropriate safety measures. However, a descriptive assessment of these three dimensions can help identify differences between students' understanding of disaster risks and their reported readiness to respond to emergencies. Previous research has emphasized the importance of well-planned disaster education and continuous evaluation in strengthening children's preparedness (Yildiz et al., 2024). Program evaluation also provides empirical insights into students' existing competencies and the aspects of school-based disaster education that require further reinforcement. Therefore, this study provides a descriptive assessment of disaster knowledge, comprehension of emergency actions, and self-reported preparedness among fifth-grade students in six elementary schools in West Ternate, a volcanic-risk area. The findings are intended to identify educational aspects that may need further attention in locally grounded disaster education.

Previous research has examined disaster preparedness and disaster education in school settings, including studies focusing on students in volcanic-risk areas. However, further context-specific evidence is needed to understand disaster knowledge, comprehension of emergency actions, and self-reported preparedness among elementary school students living in the vicinity of Mount Gamalama. Building on previous research on disaster-related education in North Maluku, this study focuses specifically on fifth-grade students from six elementary schools in West Ternate. It examines three dimensions of disaster education: knowledge of disaster risks, comprehension of appropriate emergency actions, and self-reported preparedness. Unlike studies that evaluate the implementation of the Satuan Pendidikan Aman Bencana (SPAB) program at the school level, this study provides a descriptive assessment of students' responses across these three dimensions. By documenting students' achievement patterns in a volcanic-risk context, the study seeks to identify aspects of disaster education that may require further reinforcement, particularly in translating knowledge of disaster risks into an understanding of appropriate emergency actions.

Literature Review

Disaster Risk Reduction Education in Elementary Schools

Disaster Risk Reduction Education (DRRE) is an educational approach designed to cultivate the knowledge, skills, and attitudes necessary for communities to comprehend risks and execute appropriate actions in the face of disasters. Within the school environment, DRRE plays a pivotal role, as schools serve as strategic spaces for fostering a culture of safety from an early age. Research by Harada et al. (2023) elucidates that disaster education not only enhances knowledge regarding hazards but also contributes to the formation of proactive attitudes toward disaster risks. Disaster education at the elementary level also yields broader

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Index by:

impacts, as students can act as conduits for disaster-related information between schools and their families (Sakurai et al., 2018). Furthermore, the systematic implementation of disaster education can bolster school capacity in building more disaster-resilient schools (Amriet al., 2022).

The implementation of disaster education in schools necessitates an approach aligned with regional risk characteristics. Generic disaster education materials are often insufficient to address the needs of communities residing in areas with specific threats, such as active volcanic regions. Research by Seddighi et al. (2022) indicates that disaster risk reduction curricula must be developed contextually so that students can grasp the relationship between instructional materials and the environmental conditions of their residential areas. A locally based approach enables students to comprehend hazard characteristics, warning signs, evacuation procedures, and self-protective actions grounded in their immediate environmental experiences. Studies on the integration of disaster risk education in Indonesia also demonstrate that the success of disaster-prepared school programs is heavily influenced by the schools' ability to connect learning materials with local socio-geographical conditions (Amri et al., 2022).

Student Preparedness for Disasters

Student disaster preparedness encompasses the ability to recognize risks, understand safety procedures, and execute appropriate actions during emergency situations. Knowledge constitutes a primary component, as an understanding of disaster threats can significantly influence individual decision-making in risk situations. Research by Shah et al. (2020) demonstrates that school preparedness is influenced by multiple factors, including risk knowledge, emergency planning, and institutional capacity. However, knowledge alone is insufficient unless accompanied by the ability to apply safety measures through repeated drills and simulations. School-based disaster education programs in Indonesia indicate that student engagement in the learning process can enhance comprehension and facilitate the dissemination of disaster knowledge to their families (Lassa et al., 2023).

In the context of volcanic regions, student preparedness possesses distinct characteristics because eruption threats exhibit hazard patterns that differ from other types of disasters. Students need to understand the hazards of volcanic ash, evacuation procedures, the use of personal protective equipment, and safety protocols during rescue operations. Therefore, measuring preparedness should not be limited to the knowledge aspect; it must also encompass the comprehension of emergency actions and individual readiness attitudes.

Evaluation of Disaster Education and Instrument Development

The evaluation of disaster education is essential to determine the extent to which implemented programs can enhance student capacity. Without appropriate evaluation instruments, schools will face difficulties in identifying both the developed competencies and

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Index by:

the areas requiring further reinforcement. Rahma et al. (2024) note that while numerous school-based disaster preparedness learning resources are available, there remains a limitation in the formal evaluation of the effectiveness of student preparedness enhancement. This condition underscores that the development of measurement instruments is a crucial component in ensuring the sustainability of disaster education.

Effective evaluation of disaster education should consider the local hazard context, students' characteristics, and the intended learning outcomes. In elementary schools, assessing disaster knowledge, understanding of appropriate emergency actions, and preparedness-related attitudes can help identify students' strengths and areas requiring further learning. Previous research on school-based disaster preparedness in Indonesia has examined the relationship between students' disaster knowledge, attitudes, and preparedness, highlighting the importance of these dimensions in disaster risk reduction education (Sujarwo et al., 2018). In the context of West Ternate, where communities face volcanic hazards associated with Mount Gamalama, a descriptive assessment of these dimensions can provide context-specific evidence to inform improvements in disaster education. Accordingly, the present study examines disaster knowledge, comprehension of emergency actions, and self-reported preparedness among fifth-grade students in six elementary schools in West Ternate.

RESEARCH METHODOLOGY

Research Design

This study employs a quantitative descriptive approach to assess elementary school students' disaster knowledge, comprehension of emergency actions, and self-reported preparedness in the context of volcanic disaster risks. The study forms part of a broader investigation of disaster education in elementary schools located in the active volcanic region of Mount Gamalama, North Maluku, Indonesia. A quantitative approach was adopted because the data consist of numerical scores obtained from students' responses to the research instruments, which were analyzed statistically to describe their conditions across the three dimensions (Lim, 2025). These dimensions were selected to examine students' understanding of disaster risks, their comprehension of appropriate emergency responses, and their perceived readiness to face potential volcanic hazards. Together, they provide a descriptive overview of students' disaster-related knowledge and preparedness, while distinguishing cognitive understanding from self-reported readiness.

Research Location and Subjects

Data collection was conducted in six elementary schools in West Ternate, Ternate City, North Maluku, an area exposed to volcanic hazards associated with Mount Gamalama. According to the school directory, there are seven elementary schools (SD) in the area, or eight primary-level educational institutions when one Islamic elementary school (Madrasah Ibtidaiyah, MI) is included. The six participating schools were selected based on their relevance to the local volcanic-risk context and the focus of the study on disaster education.

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Index by:

The study involved 77 fifth-grade students, with 7–18 respondents per school. Student participation was recorded based on attendance lists on the data collection day. School identities were anonymized using numerical codes and initials. Following data screening, valid responses were available from 76 students for disaster knowledge, 74 for comprehension of emergency actions, and 77 for self-reported preparedness.

Research permission was obtained from the Faculty of Teacher Training and Education, Universitas Khairun (3316/UN44.C3/PP.03/2026). Permission to conduct the study was obtained verbally from the participating schools. This study used questionnaires and did not involve an intervention. No separate formal ethical approval was obtained, and no parental or guardian consent procedure was conducted. Students were given an explanation of the study and agreed to participate voluntarily. School identities were anonymized in the manuscript.

Table 1. Distribution of Respondents by School

No.	School	Number of Respondents	Percentage
1	SD 62 Tk	18	23.38%
2	SD 68 B	7	9.09%
3	SD 69 K	16	20.78%
4	SD 64 L	9	11.69%
5	SD 70 Tg	15	19.48%
6	SD 63 Tb	12	15.58%
Total		77	100.00%

Source: Researcher's processed data, 2026

The number of respondents per school ranges from 7 to 18 students. These variations in sample size are taken into consideration during the interpretation of the results, particularly when data are disaggregated by school.

Research Instruments

The study used a 30-item disaster education evaluation instrument covering three dimensions. Disaster knowledge (Items 1–10) and comprehension of emergency actions (Items 11–20) were assessed using multiple-choice questions scored dichotomously (1 for a correct answer and 0 for an incorrect answer). Self-reported preparedness (Items 21–30) was assessed using a four-point Likert scale. Internal consistency was examined using the Kuder–Richardson Formula 20 (KR-20) for the two multiple-choice sections and Cronbach's alpha for the preparedness scale. The coefficients were 0.709 for disaster knowledge, 0.786 for comprehension of emergency actions, and 0.669 for self-reported preparedness. Item-level analyses were conducted to examine item difficulty and corrected item–total correlations. These analyses provide preliminary information about item performance and internal consistency in the present sample; they do not, by themselves, establish instrument validity.

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Index by:

Data Collection Procedures

Data were collected at the participating schools using structured questionnaires administered under the supervision of teachers or designated personnel. Before completing the questionnaire, students received instructions on how to answer each section. The disaster knowledge and emergency-action dimensions consisted of multiple-choice questions, while the preparedness dimension comprised 10 statements rated on a four-point Likert scale: Strongly Agree, Agree, Disagree, and Strongly Disagree. Preparedness was treated as students' self-reported readiness, attitudes, and intentions concerning disaster response rather than as demonstrated ability to perform emergency procedures. After questionnaire administration, responses were checked for completeness. Incomplete responses were excluded from the relevant calculations, resulting in 76 valid responses for disaster knowledge, 74 for comprehension of emergency actions, and 77 for self-reported preparedness.

Scoring followed the instrument's scoring guidelines. For disaster knowledge and comprehension of emergency actions, each correct answer was assigned a score of 1 and each incorrect answer a score of 0, resulting in a maximum score of 10 for each dimension. The self-reported preparedness dimension comprised 10 statements rated on a four-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (4), with a maximum possible total score of 40.

RESULTS AND DISCUSSION

Results

The results are presented across three dimensions: disaster knowledge, comprehension of emergency actions, and self-reported preparedness. The following section summarizes students' achievement in each dimension and examines variations across the six participating schools. During the data screening process, several incomplete responses were identified, resulting in varying numbers of valid data points across each dimension. Consequently, a total of 76 respondents were analyzed for the disaster knowledge dimension, 74 for the comprehension of emergency actions, and 77 for student preparedness.

Table 2. General Overview of the Disaster Education Dimensions of Fifth-Grade Students

Dimension	N	Mean (SD)	Observed Score Range	Maximum Score	Achievement (%)
Disaster knowledge	76	7.91 (2.09)	2–10	10	79.08
Comprehension of emergency actions	74	7.36 (2.42)	1–10	10	73.65
Self-reported preparedness	77	33.01 (4.53)	20–40	40	82.53

Source: Researcher's processed data, 2026

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Table 2 presents the descriptive statistics of the three disaster education dimensions assessed among fifth-grade students. For disaster knowledge, 76 valid responses were analyzed, with a mean score of 7.91 (SD = 2.09) out of a maximum score of 10. The observed scores ranged from 2 to 10, equivalent to an achievement percentage of 79.08%. For comprehension of emergency actions, 74 valid responses were obtained, with a mean score of 7.36 (SD = 2.42) out of 10. The observed scores ranged from 1 to 10, corresponding to an achievement percentage of 73.65%. Meanwhile, self-reported preparedness included 77 responses, with a mean score of 33.01 (SD = 4.53) out of a maximum score of 40. The observed scores ranged from 20 to 40, representing an achievement percentage of 82.53%. Descriptively, self-reported preparedness had the highest achievement percentage, followed by disaster knowledge and comprehension of emergency actions. These findings suggest that students' understanding of appropriate emergency actions may warrant further educational attention. However, the three dimensions use different scoring scales and measurement approaches; therefore, their achievement percentages should be interpreted descriptively rather than as direct evidence that one dimension is inherently more important or more developed than another.

Table 3. Item-Level Analysis of Disaster Education Dimensions

Dimension	Item	Proportion Correct / Mean	Corrected Item–Total Correlation
Disaster knowledge	Q1	0.829	0.270
	Q2	0.868	0.065
	Q3	0.842	0.455
	Q4	0.776	0.390
	Q5	0.566	0.364
	Q6	0.882	0.407
	Q7	0.684	0.421
	Q8	0.763	0.389
	Q9	0.816	0.478
	Q10	0.882	0.475
Emergency actions	Q11	0.797	0.588
	Q12	0.743	0.422
	Q13	0.784	0.657
	Q14	0.730	0.197
	Q15	0.851	0.530
	Q16	0.797	0.554
	Q17	0.284	0.216
	Q18	0.730	0.475
	Q19	0.757	0.495
	Q20	0.892	0.545

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Index by:

Self-reported preparedness	Q21	2.922	0.176
	Q22	3.286	0.226
	Q23	3.649	0.401
	Q24	3.416	0.359
	Q25	3.065	0.137
	Q26	3.260	0.473
	Q27	3.403	0.149
	Q28	3.286	0.432
	Q29	3.325	0.599
	Q30	3.403	0.451

Table 3 presents the item-level results for the three dimensions assessed in this study. For disaster knowledge, the proportion of correct responses ranged from 0.566 to 0.882, with Q5 showing the lowest proportion of correct answers. In the emergency action comprehension dimension, the proportion ranged from 0.284 to 0.892, with Q17 recording the lowest result. These findings indicate that students' performance varied across individual items, particularly in their understanding of certain emergency actions.

For self-reported preparedness, the mean item scores ranged from 2.922 to 3.649 on a four-point Likert scale. Corrected item–total correlations were relatively low for Q21, Q22, Q25, and Q27 compared with the other preparedness items. In the multiple-choice sections, Q2 and Q14 also showed relatively low corrected item–total correlations. These items warrant further examination of their wording, scoring, and alignment with the intended indicators. However, the results do not by themselves establish that these items are invalid or should be removed. Overall, the item-level analysis identifies areas for further instrument review while providing a more detailed description of students' responses across the three dimensions.

Table 4. Achievement of Disaster Education Dimensions by School

School	N respondents	Disaster knowledge	Emergency action comprehension	Self-reported preparedness
SD 62 Tk	18	73.89%	67.22%	82.92%
SD 68 B	7	93.33%	95.00%	78.21%
SD 69 K	16	71.25%	66.88%	76.56%
SD 64 L	9	78.89%	71.11%	82.50%
SD 70 Tg	15	86.00%	80.00%	87.67%
SD 63 Tb	12	81.67%	79.17%	86.04%

Source: Researcher's processed data, 2026

Table 4 presents descriptive variations in achievement across the six participating elementary schools. SD 70 Tg showed relatively high achievement across the three

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Index by:

dimensions, while SD 69 K recorded comparatively lower percentages for disaster knowledge and emergency action comprehension. However, these patterns should be interpreted cautiously because the number of respondents varied across schools and some dimensions had fewer valid responses than the total number of participating students.

SD 68 B recorded high percentages for disaster knowledge and emergency action comprehension, but these figures were based on only six and four valid responses, respectively. They should not be considered representative estimates of all students in that school. The school-level results are therefore presented as exploratory descriptions of observed patterns rather than evidence of statistically significant differences. Because this study did not directly measure school-level instructional practices or disaster education program implementation, the observed variations cannot be attributed to specific educational approaches or program effectiveness.

Discussion

This study provides a descriptive assessment of disaster knowledge, comprehension of emergency actions, and self-reported preparedness among fifth-grade students in six elementary schools in West Ternate, an area exposed to volcanic hazards associated with Mount Gamalama. The achievement percentages were 79.08% for disaster knowledge, 73.65% for comprehension of emergency actions, and 82.53% for self-reported preparedness. These results describe students' responses across three distinct dimensions and should not be interpreted as evidence of the overall effectiveness of disaster education programs. The lowest achievement percentage was observed in comprehension of emergency actions, suggesting that students' understanding of appropriate responses during emergencies warrants particular attention (Marzban et al., 2025). This finding is consistent with the broader perspective that school-based disaster risk reduction education should connect knowledge of hazards with preparedness and appropriate responses (Amri et al., 2022; Chaudhary & Piracha, 2021; Widowati et al., 2023).

The disaster knowledge achievement percentage of 79.08% indicates that students answered a substantial proportion of the knowledge questions correctly. However, the overall percentage alone does not establish that all aspects of volcanic risk were well understood. Item-level results are needed to identify specific topics that may require additional learning support. In the present study, the knowledge scores varied across individual questions, indicating that students' responses were not uniform across the content assessed. This finding supports the value of evaluating disaster education at both the overall and item levels. Contextualized learning may help students relate disaster information to the hazards and conditions in their own surroundings, although the present study did not directly test the effectiveness of any particular teaching approach (Pant, 2024; Schwartz-Marin et al., 2022).

Comprehension of emergency actions recorded the lowest achievement percentage, at 73.65%. This result identifies emergency-action understanding as an area for further

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Index by:

educational attention, particularly where students need to recognize appropriate conduct during evacuation. The item-level findings can help educators identify which emergency-response concepts were answered correctly less frequently and may therefore need clarification or reinforcement. Previous research has emphasized the importance of combining disaster-related knowledge with educational activities that allow students to engage with emergency procedures (Khan et al., 2021; Tipler et al., 2016). Nevertheless, the present study assessed students' answers to questionnaire items; it did not directly observe their performance during an evacuation drill or an actual emergency. Therefore, the results indicate differences in students' comprehension of emergency actions rather than demonstrating their practical response capabilities. Regular, locally relevant practice and evacuation exercises may be considered as educational priorities, but their effects would need to be evaluated in a separate study (Kawasaki et al., 2023; Triastari et al., 2021).

Self-reported preparedness reached 82.53%, representing the highest percentage among the reported achievement values. This result reflects students' responses to the preparedness statements and should be interpreted as perceived readiness, attitudes, or intentions, depending on the content of each item. It does not demonstrate that students can independently carry out the reported actions during an emergency. The distinction is important because self-reported preparedness and demonstrated response skills are different forms of evidence. The preparedness findings can provide an initial indication of how students perceive their readiness, while practical assessments would be needed to examine their ability to follow safety procedures. School-based disaster education research similarly highlights the importance of examining preparedness through multiple dimensions rather than relying on knowledge scores alone, as preparedness also involves students' attitudes, perceptions of risk, and ability to respond appropriately to emergency situations (Sujarwo et al., 2018).

The school-level results showed descriptive variation across the six participating schools. However, the number of respondents differed by school, and the valid sample sizes for some dimensions were smaller than the number of students initially recorded. In particular, the high percentages reported for SD 68 B were based on only six valid responses for disaster knowledge and four for comprehension of emergency actions. These values should therefore be interpreted cautiously and should not be taken as representative estimates for all students at that school. The observed variations are useful for describing patterns within the study sample, but they do not establish statistically significant differences between schools. Furthermore, the study did not directly measure teaching practices, students' prior participation in disaster drills, or the implementation of school disaster preparedness programs. Consequently, these factors cannot be identified as explanations for the observed school-level patterns. Further research incorporating school-level information and larger samples would be required to examine these possible relationships.

The contribution of this study lies in its descriptive examination of three distinct dimensions—disaster knowledge, comprehension of emergency actions, and self-reported

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Index by:

preparedness—amongfifth-grade students in a volcanic-risk setting in West Ternate. Rather than evaluating the implementation or effectiveness of the Satuan Pendidikan Aman Bencana (SPAB) program, the study documents students' responses and identifies dimensions and individual items that may warrant further attention (Irawaty et al., 2023; Koswara et al., 2019). This focus provides context-specific evidence that may inform subsequent assessment and improvement of disaster education in the study area. The findings should, however, be interpreted in light of the study's descriptive design, the sample drawn from six schools, and the measurement limitations discussed below.

Several limitations should be considered when interpreting these findings. First, although internal consistency was examined in the present sample, the reported reliability coefficients do not by themselves establish the validity of the instrument. The measurement properties of the instrument, including the relevance and clarity of individual items for fifth-grade students in this context, require further evaluation. Second, preparedness was measured using students' self-reports rather than direct observation of their emergency-response behavior. Third, the study involved 77 fifth-grade students from six schools, with unequal school-level sample sizes and varying numbers of valid responses across the three dimensions. These characteristics limit the generalizability of the findings and the interpretation of school-level percentages. Fourth, the cross-sectional descriptive design does not establish causal relationships between disaster education activities and student outcomes. Finally, incomplete responses reduced the number of valid observations for the knowledge and emergency-action dimensions. Future studies should evaluate the instrument's validity more comprehensively, recruit larger and more balanced samples, document relevant school-level educational activities, and combine questionnaire measures with practical assessments of emergency-response skills.

CONCLUSION

This study provides a descriptive assessment of disaster knowledge, comprehension of emergency actions, and self-reported preparedness among 77 fifth-grade students from six elementary schools in West Ternate, a volcanic hazard-prone area associated with Mount Gamalama. The achievement percentages were 79.08% for disaster knowledge, 73.65% for comprehension of emergency actions, and 82.53% for self-reported preparedness. Comprehension of emergency actions recorded the lowest achievement percentage, indicating an area that may warrant further attention in school-based disaster education, particularly in relation to evacuation procedures. The preparedness result reflects students' reported readiness rather than their demonstrated ability to respond during an actual emergency. Although descriptive variations were observed across schools, the study did not evaluate school-level disaster education programs and therefore cannot establish the causes of these variations or the effectiveness of particular educational approaches.

The findings suggest that disaster education in volcanic-risk areas should consider not

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Index by:

only students' knowledge of hazards but also their understanding of appropriate emergency responses. Schools may use item-level results to identify topics requiring clarification and consider incorporating locally relevant learning activities and evacuation exercises into their educational practices. These recommendations should be regarded as potential areas for improvement rather than evidence of the effectiveness of specific interventions. Future research should assess students' practical response skills, examine the validity of the measurement instrument in the target population, and investigate how school-based educational activities relate to students' knowledge and preparedness using larger samples and appropriate research designs.

REFERENCES

Abdullah, I., Maryani, E., & Ningrum, E. (2024). Analysis of the level of knowledge of disaster preparedness attitudes in dealing with the Gamalama volcano disaster among students in senior high schools in the city of Ternate. *E3S Web of Conferences*, *600*. https://doi.org/10.1051/e3sconf/202460002016

Amri, A., Lassa, J. A., Tebe, Y., Hanifa, N. R., Kumar, J., & Sagala, S. (2022). Pathways to Disaster Risk Reduction Education integration in schools: Insights from SPAB evaluation in Indonesia. *International Journal of Disaster Risk Reduction*, *73*, *102860*. https://doi.org/10.1016/j.ijdrr.2022.102860

Ayub, S., Kosim, K., Gunada, I. W., & Syahidi, K. (2022). Effectiveness of Student Oriented Disaster Mitigation Learning Model on Students' Disaster Awareness in Primary School. *Kappa Journal*, *6*(1), 71–91. https://doi.org/10.29408/kpj.v6i1.5750

Chaudhary, M. T., & Piracha, A. (2021). Natural Disasters—Origins, Impacts, Management. *Encyclopedia*, *1*(4), 1101–1131. https://doi.org/10.3390/encyclopedia1040084

Ham, C. M. (2024). Reflecting on the 1775 Mount Gamalama Eruption: Lessons from Indigenous Knowledge for Sustainable Development in Ternate Island, North Maluku Province, Indonesia. *Journal of Human Ecology and Sustainability*, *2*(3), 2. https://doi.org/10.56237/jhes24ichspd01

Harada, T., Shoji, M., & Takafuji, Y. (2023). Intergenerational spillover effects of school-based disaster education: Evidence from Indonesia. *International Journal of Disaster Risk Reduction*, *85*, 103505. https://doi.org/10.1016/j.ijdrr.2022.103505

Irawaty, I., Suran Ningsih, A., Prabowo, M. S., Setyasto, N., Wardani, N. W., Munawaroha, E., Hanuma, H. L., Farlina, I., Indriyani, W., & Lestari, E. (2023). Program Sekolah Penggerak dan Peran Guru Penggerak Berdasarkan Kurikulum Merdeka Bagi Guru Yayasan Asshodiqiyah Kota Semarang. *LOSARI: Jurnal Pengabdian Kepada Masyarakat*, *5*(1). https://doi.org/10.53860/losari.v5i1.123

Johnson, V. A., Ronan, K. R., Johnston, D. M., & Peace, R. (2014). Evaluations of disaster education programs for children: A methodological review. *International Journal of Disaster Risk Reduction*, *9*, 107–123. https://doi.org/10.1016/j.ijdrr.2014.04.001

e-ISSN 2715-8551
DOI: http://dx.doi.org/10.33387/j.edu.v24i2.12858
https://ejournal.unkhair.ac.id/index.php/edu
(Accredited Sinta Rank 3)
Index by:

Kawasaki, H., Cui, Z., Kurokawa, M., & Sonai, K. (2023). Current Situation of Disaster Preparedness for Effective Response in Japanese Special Needs Schools. *Disaster Medicine and Public Health Preparedness*, *17*(2). https://doi.org/10.1017/dmp.2023.98

Khan, A. A., Rana, I. A., Nawaz, A., & Waheed, A. (2021). Gender-based emergency preparedness and awareness: empirical evidences from high-school students of Gilgit, Pakistan. *Environmental Hazards*, *20*(4), 416–431. https://doi.org/10.1080/17477891.2020.1839375

Koswara, A., Amri, A., Zainuddin, F. K., Ngurah, I., Muzaki, J., Muttmainnah, L., Utaminingsih, M., Saleky, S. R., Widowati, & Tebe, Y. (2019). *Satuan Pendidikan Aman Bencana*. Sekretariat Nasional Satuan Pendidikan Aman Bencana (Seknas Spab). http://spab.kemdikbud.go.id

Lassa, J. A., Petal, M., & Surjan, A. (2023). Intergenerational spillover effects of school-based disaster education: Evidence from Indonesia. *International Journal of Disaster Risk Reduction*, *85*, 103505. https://doi.org/10.1016/j.ijdrr.2022.103505

Lim, W. M. (2025). What Is Quantitative Research? An Overview and Guidelines. *Australasian Marketing Journal*, *33*(3), 325–348. https://doi.org/10.1177/14413582241264622

Marzban, A., Dowlati, M., Moslehi, S., & Marzaleh, M. A. (2025). Role of schools in disaster risk management: a systematic review. *BMC Emergency Medicine*, *26*(1), 23. https://doi.org/10.1186/s12873-025-01453-z

Oktari, R. S., Shiwaku, K., Munadi, K., Syamsidik, & Shaw, R. (2018). Enhancing community resilience towards disaster: The contributing factors of school-community collaborative network in the tsunami affected area in Aceh. *International Journal of Disaster Risk Reduction*, *29*, 3–12. https://doi.org/10.1016/j.ijdrr.2017.07.009

Pant, Y. R. (2024). Preparing Youth for Disasters: The Need for a Contextualised Disaster Risk Reduction Curriculum in Schools. *Open Journal of Earthquake Research*, *13*(04), 183–217. https://doi.org/10.4236/ojer.2024.134009

Rahma, A., Rizkiyani, F., Sari, D. Y., & Palupi, I. R. (2024). School Community Disaster Resilience: Promoting Geological Disaster Preparedness among Early Childhood Education Teachers. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah*, *9*(1), 165–180. https://doi.org/10.24042/tadris.v9i1.18733

Rofiah, N. H., Kawai, N., & Hayati, E. N. (2021). Key elements of disaster mitigation education in inclusive school setting in the Indonesian context. *Jàmbá: Journal of Disaster Risk Studies, 13(1), a1159. https://doi.org/10.4102/jamba.v13i1.1159*

Sakurai, A., Bisri, M. B. F., Oda, T., Oktari, R. S., Murayama, Y., Nizammudin, & Affan, M. (2018). Exploring minimum essentials for sustainable school disaster preparedness: A case of elementary schools in Banda Aceh City, Indonesia. *International Journal of Disaster Risk Reduction*, *29*, 73–83. https://doi.org/10.1016/j.ijdrr.2017.08.005

Schwartz-Marin, E., Merli, C., Rachmawati, L., Horwell, C. J., & Nugroho, F. (2022). Merapi multiple: Protection around Yogyakarta's celebrity volcano through masks, dreams, and seismographs. *History and Anthropology*, *33*(5), 588–610.

e-ISSN 2715-8551
DOI: http://dx.doi.org/10.33387/j.edu.v24i2.12858
https://ejournal.unkhair.ac.id/index.php/edu
(Accredited Sinta Rank 3)
Index by:

https://doi.org/10.1080/02757206.2020.1799788

Seddighi, H., Sajjadi, H., Yousefzadeh, S., López López, M., Vameghi, M., Rafiey, H., & Khankeh, H. (2022). School-based education programs for preparing children for natural hazards: A systematic review. *Disaster Medicine and Public Health Preparedness*, *16*(3), 1229–1241. https://doi.org/10.1017/dmp.2020.479

Shah, A. A., Gong, Z., Pal, I., Sun, R., Ullah, W., & Wani, G. F. (2020). Disaster risk management insight on school emergency preparedness: A case study of Khyber Pakhtunkhwa, Pakistan. *International Journal of Disaster Risk Reduction*, *51*, 101805. https://doi.org/10.1016/j.ijdrr.2020.101805

Sujarwo, Noorhamdani, & Fathoni, M. (2018). Disaster Risk Reduction in Schools: The Relationship of Knowledge and Attitudes Towards Preparedness from Elementary School Students in School-Based Disaster Preparedness in the Mentawai Islands, Indonesia. *Prehospital and Disaster Medicine*, *33*(6), 581–586. https://doi.org/10.1017/S1049023X18000778

Tipler, K. S., Tarrant, R. A., Johnston, D. M., & Tuffin, K. F. (2016). New Zealand ShakeOut exercise: lessons learned by schools. *Disaster Prevention and Management*, *25*(4), 550–563. https://doi.org/10.1108/DPM-01-2016-0018

Triastari, I., Dwiningrum, S. I. A., & Rahmia, S. H. (2021). Developing Disaster Mitigation Education with Local Wisdom: Exemplified in Indonesia Schools. *IOP Conference Series: Earth and Environmental Science*, *884*(1), 012004. https://doi.org/10.1088/1755-1315/884/1/012004

Wardhani, P. I., Musiyam, M., Wibowo, Y. A., Rahmadana, A. D. W., Utami, S., & Maulana, E. (2024). Evaluation of disaster safe education unit programme implementation in Mt. Merapi using the pressure state response approach. *Jàmbá: Journal of Disaster Risk Studies, 16(1), a1769.*https://doi.org/10.4102/JAMBA.V16I1.1769

Widowati, E., Koesyanto, H., Istiono, W., Sutomo, A. H., & Sugiharto. (2023). Disaster Preparedness and Safety School as a Conceptual Framework of Comprehensive School Safety. *SAGE Open, 13(4).*https://doi.org/10.1177/21582440231211209

Widowati, E., Sutomo, A. H., & Istiono, W. (2021). Are Elementary Schools Ready for Disaster Preparedness and Safety? *E3S Web of Conferences*, *317*. https://doi.org/10.1051/e3sconf/202131701087

Wijayanto, D., Sjamsuddin, S., & Suryadi, S. (2025). Implementation of the Collaborative Governance Model in Disaster Mitigation: A Process Analysis of the Regional Disaster Management Agency (BPBD) of Batu City. *Pena Justisia: Media Komunikasi Dan Kajian Hukum*, *24*(1), 7013–7023. https://doi.org/10.31941/pj.v24i1.6591

Yildiz, A., Dickinson, J., Priego-Hernández, J., Teeuw, R., & Shaw, R. (2024). Effects of disaster education on children's risk perception and preparedness: A quasi-experimental longitudinal study. *The Geographical Journal*, *190*(2). https://doi.org/10.1111/geoj.12556