

Analyzing the Influence of Perception on Disaster Risk Reduction Strategies and Students' Awareness of Disaster

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Abstract

Purpose: This study aims to assess the effectiveness of disaster risk reduction strategies implemented in schools and the level of disaster awareness among students living in areas with a high potential for eruption.

Methodology: The research method used a quantitative approach with descriptive and correlational analysis. The population in this study was all 837 students of SMA N 1 Dukun. The sample in this study comprised 271 students, selected via simple random sampling. Data collection techniques in this study used questionnaires, observations, and interviews. Data analysis in this study used descriptive and inferential statistical techniques.

Results: Students' perceptions of the school-established disaster risk reduction strategies were moderate. Meanwhile, students' level of disaster awareness in facing the eruption of Mount Merapi was high. Correlation analysis showed a relatively positive relationship between students' perceptions of disaster risk reduction strategies and students' disaster awareness.

Application/Originality/Value: This study revealed that students' perceptions of school strategies remained moderate, with high levels of disaster awareness, likely influenced by direct experience with prior eruptions.

Keywords: Disaster Risk Reduction, disaster awareness, student perception, SMA N 1 Dukun

Introduction Section

Disaster risk reduction (DRR) is a set of concepts and practices implemented to reduce disaster risk through systematic efforts to analyze and manage the factors that cause disasters. It includes reducing exposure to hazards, reducing the vulnerability of people and property, wisely managing land and the environment, and increasing preparedness for adverse events (Kaltmeier et al., 2020). Currently, Indonesia's disaster management efforts are regulated by the Disaster Management Law (Law Number 24 of 2007) and the Government Regulation Number 21 of 2008 concerning the Implementation of Disaster Management.

Disaster risk reduction (DRR) efforts require awareness from all parties and comprehensive action to minimize losses caused by disasters, especially in school environments, where schoolchildren are a vulnerable group. Disaster risk reduction education (DRR) is a DRR approach that uses various educational materials to raise public awareness of disaster risk reduction (Tuswadi & Hayashi, 2014). Standardizing disaster education and implementing it will not only raise awareness about disasters but also help students develop practical disaster management skills (Septikasari & Ayriza, 2018). Disaster education can also increase disaster awareness and reduce vulnerability to disasters (Septikasari et al., 2022). School students are still in the concrete operational stage, ensuring that the understanding gained in disaster education is applied in adulthood. Furthermore, students can play a role in disseminating disaster knowledge, at least within their own families.

The current implementation of disaster education in schools remains theoretical and lacks student participation. In addition to the lack of student active participation, this also results in limited knowledge of disasters in schools (DeSa et al., 2022). Students are unable to apply what actions to take in the event of a disaster. Therefore, disaster education must employ a variety of methods that actively involve students in their learning. Disaster awareness is a crucial aspect of implementing disaster risk reduction education. It is because students who lack adequate disaster awareness are likely to be unprepared and at high risk of the impacts of a disaster. Awareness of the dangers and risks of disasters stimulates curiosity about hazards and disaster preparedness, enabling students to actively participate in disaster preparedness and take appropriate steps to address them (Herdiansyah et al., 2020).

Understanding disasters is crucial for students because adequate knowledge will provide a sound basis for attitudes and actions. Adequate understanding will also help reduce disaster casualties, especially human loss (Sudrajat & Wibowo, 2016). In addition to disaster understanding, disaster awareness is also a crucial aspect that must be

emphasized in students. Through disaster awareness, students learn the actions to take in the pre-disaster phase. It can reduce the risk of disasters, especially at the educational level.

Student perceptions of the disaster risk reduction strategies established by schools help schools address any outstanding issues. For example, research conducted by Adiyoso in Aceh on the impact of various disaster education programs on tsunami preparedness among schoolchildren showed that implementing disaster education in schools effectively increased knowledge, risk perception, individual preparedness, and school preparedness, but did not improve critical awareness in early childhood. By increasing teachers' and students' knowledge, they can disseminate accurate information about disasters to the broader community beyond the school (Adiyoso & Kanegae, 2013).

SMA N 1 Dukun, Magelang Regency, is a secondary school located in Magelang Regency and falls within the Disaster Prone II area of Mount Merapi. Under these conditions, during an eruption, Disaster Prone II area of Mount Merapi has the potential to be hit by hot clouds, lava flows, volcanic bombs, toxic gases, rock falls (incandescent), and lahar flows. SMA N 1 Dukun, Magelang Regency, is located in Dukun Village, Dukun District, an area with high preparedness. The school's location in this zone requires it to be part of the Disaster Safe Education Unit (SPAB).

Mount Merapi is classified as a dangerous volcano due to its relatively short-term eruptions (Habibi, 2013). As an active volcano, Mount Merapi poses a potential hazard to the safety of surrounding communities at any time. Furthermore, the slopes of Mount Merapi are densely populated. Besides threatening public safety, eruptions can also cause damage to surrounding areas. Disaster risk reduction measures are essential to minimize these impacts. Therefore, to improve the quality of school-based disaster risk reduction strategies, it is necessary to raise students' disaster awareness.

Disaster education in schools is beneficial for building students' knowledge and understanding of disasters and the actions they should take before a disaster occurs. Implementing disaster education is not simply about providing theoretical material; it requires active student involvement in the learning process. Therefore, student perceptions of the school's disaster education strategies are essential for future evaluation. Therefore, this study aims to analyze the relationship between student perceptions of disaster risk reduction strategies for Mount Merapi eruptions and student disaster awareness at SMA N 1 Dukun, Magelang Regency.

Research Method

This research is a quantitative study with a correlational research design. In this study, the relationship between student perceptions and disaster awareness was examined. This research was conducted at SMA N 1 Dukun, located on Jalan Musuk, Dukun, Dukun District, Magelang Regency, Central Java. The location was chosen because the school is located in the Disaster-Prone Area (KRB) III of Mount Merapi. The study population comprised 837 students in grades X, XI, and XII at SMA N 1 Dukun. Students were selected as samples for this study using the Random Sampling technique. The number of samples used in the study was determined using the Slovin formula. The sample for this study consisted of 271 students. The independent variable in this study was disaster awareness, while the dependent variable was student perception. In this study, to determine how students perceive disaster risk reduction strategies, students were asked to complete a 70-item questionnaire comprising 35 items on perception variables and 35 on disaster awareness variables. From the questionnaire containing this statement, if the student answers strongly agree, they will get 5 points, if the student answers agree, they will get 4 points, if the student answers they are unsure, they will get 3 points, if the student answers disagree, they will get 2 points, and if the student answers strongly disagree, they will get 1 point.

Table 1. Student Perception Indicators

Indicator	Description
Knowledge and Attitudes	Students will be able to identify and understand disaster risks and determine their attitudes toward disaster preparedness.
School Policies	Students will be aware of the school's disaster preparedness policies.
Preparedness Planning	Students will be aware of the school's disaster risk reduction plan.
Resource Mobilization	Students will be aware of the role and efforts involved in disaster risk reduction at school.

Source: (LIPI, 2006)

Table 2. Disaster Awareness Indicators

Indicator	Description
Disaster Education Awareness	Students will learn the importance of disaster education in dealing with disasters that can occur at any time.
Pre-Disaster Awareness	Students will be able to prepare a disaster rescue plan.
False-Disaster Awareness	Students will recognize that humans can minimize disaster risks.

Source: (Dikmenli et al., 2018)

Indicators for the disaster literacy variable include knowledge and attitudes, school policies, preparedness planning, and resource mobilization. Indicators for the disaster awareness variable include Disaster Education Awareness, Pre-Disaster Awareness, False Disaster Awareness, and Post-Disaster Awareness. The data collection techniques used by the researchers were questionnaires and interviews. The questionnaires were used to determine students' perceptions of disaster risk reduction strategies through disaster awareness. Prior to data collection, the researchers conducted validity and reliability tests on 36 students in grades X-7 at SMA N 1 Dukun. Validity and reliability tests were conducted on the perception variable, while the disaster awareness variable was not tested because the questionnaire was taken from an international journal (Dikmenli, Yakar, & Konca, "Development of disaster awareness scale: A validity and reliability study," 2018).

The data analysis techniques used in this study were descriptive statistics and inferential statistics. Descriptive statistical techniques in this study were used to analyze students' perceptions of disaster risk reduction strategies in the form of tables, diagrams, and dils. Inferential statistics in this study were used to determine the relationship between students' perceptions and disaster awareness. Inferential statistics consist of a normality test conducted as a prerequisite for data analysis. The data normality test is used to detect the distribution of data in one variable used in the study. Good and appropriate data to prove the research models is normally distributed data. Then there is a homogeneity test used to show that two or more groups of sample data come from populations that have the same variation. The homogeneity test formula according to (Sugiyono, 2013) is $F = (\text{largest variant}) / (\text{smallest variant})$. Finally, there is the Spearman rank correlation test used to measure the level of relationship between two variables where the correlated data does not need to follow a normal distribution. The Pearson correlation test or product moment is a test that aims to test whether two variables have a strong relationship or not.

Result and Discussion

Result

The results of the perception analysis of students in grades X, XI, and XII at SMA N 1 Dukun can be seen in the 271 respondents who completed the questionnaire, indicating that students' perceptions of DRR strategies at SMA N 1 Dukun, Magelang Regency, are in the moderate category. For indicators of knowledge and attitudes, school policies, and preparedness planning, the analysis results are in the moderate category, with values above 50%. Meanwhile, the resource mobilization indicator is also in the moderate category, but the analysis results are only 40%. The analysis results based on each student perception indicator are presented in Table 1.

Table 1. Student Perception

Indicator	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Knowledge and Attitudes	4 (1%)	22 (8%)	152 (56%)	72 (27%)	21% (8%)
School Policies	10 (4%)	15 (6%)	139 (51%)	77 (28%)	30 (11%)
Preparedness Planning	8 (3%)	29 (11%)	154 (57%)	59 (22%)	21 (8%)
Resource Mobilization	12 (4%)	134 (49%)	108 (40%)	15 (6%)	2 (1%)

The results of the disaster awareness analysis for grades X, XI, and XII at SMA N 1 Dukun are based on 271 respondents who completed the questionnaire, indicating that the level of disaster awareness of SMA N 1 Dukun students in Magelang Regency is in the high category. In the disaster education and pre-disaster awareness indicators, the analysis results are in the high category, with values exceeding 50%. Meanwhile, for the indicators false disaster awareness and post-disaster awareness, the analysis results are in the medium category, with values above 50%. The following analysis results based on each student perception indicator are presented in Table 2.

Table 2. Disaster Awareness Indicators

Indicator	Very High	High	Moderate	Low	Very Low
Disaster Education Awareness	4 (1%)	183 (68%)	82 (30%)	1 (0%)	1 (0%)
Pre-Disaster Awareness	49 (18%)	198 (73%)	22 (8%)	1 (0%)	1 (0%)
False Disaster Awareness	9 (3%)	96 (35%)	101 (37%)	61 (23%)	4 (1%)
After Disaster Awareness	6 (2%)	122 (45%)	138 (51%)	4 (1%)	1 (0%)

Based on Table 3, the significance value for both variables is 0.000, indicating a relationship. Furthermore, the degree of correlation is 0.488, indicating a moderate correlation between perception and awareness. It is concluded that perception is positively related to awareness, with a moderate correlation.

Table 3. Relationship between Student Perception and Disaster Awareness			
Variable	Correlation	Sig.	Result
Student Perception	0,4888	0,000	There is a positive relationship with sufficient correlation between the variables
Disaster Awareness			

Discussion

Student Perceptions of Disaster Risk Reduction Strategies Established by SMA Negeri 1 Dukun

Based on the study's data processing results on students' perceptions of disaster risk reduction strategies at SMA Negeri 1 Dukun. This problem formulation was measured using four indicators: 1) knowledge and attitudes, 2) school policies, 3) preparedness planning, and 4) resource mobility. The data processing results indicate that students' perceptions of DRR strategies at SMAN 1 Dukun, Magelang Regency, are in the moderate category. The indicators for knowledge and attitudes, school policies, and preparedness planning are in the moderate category, with analysis results exceeding 50%. The resource mobilization indicator is also in the moderate category, but its analysis results are only 40%. It aligns with research conducted (Luh et al., 2017) that student perceptions encompass general views of the program, program implementation, and program effectiveness.

Efforts to reduce disaster risk require promoting vigilance and preparedness through appropriate disaster management principles. However, the success of disaster management implementation depends heavily on the institution's ability and strategy to formulate and implement policies effectively. Disaster risk reduction strategies are needed to mitigate disaster risk, reduce vulnerability, and increase students' capacity to face disasters at SMA N 1 Dukun (Haeril et al., 2022). Data analysis revealed that many students have not yet felt the impact of the established disaster risk reduction strategies at SMA N 1 Dukun. It aligns with research by Nadia & Satria, 2018, that found that disaster knowledge and experience significantly influence attitudes and awareness of disaster preparedness.

Strategy updates are necessary to align with Law Number 24 of 2007 concerning Disaster Management, which states that disaster management principles include coordination, integration, partnership, and empowerment. It aligns with research by Khairullah & Fatimah, 2016, on community participation in mangrove forest conservation activities to reduce disaster risk, underscoring the need for community empowerment. Collaborative strategies are the most important in risk reduction efforts. The involvement of schools, students, and authorities such as the Regional Disaster Management Agency (BPBD) in coordinating, planning, utilizing, supervising, and controlling resources related to disaster risk reduction strategies is necessary, considering that if schools become high-risk areas.

Students' Disaster Awareness in Facing the Eruption of Mount Merapi at SMA N 1 Dukun

Based on the data analysis results obtained in the study on students' disaster awareness in the face of the Mount Merapi eruption at SMA N 1 Dukun, the results of the first research problem formulation, namely, students' disaster awareness in the face of the Mount Merapi eruption at SMA N 1 Dukun, were measured using four indicators: 1) disaster education awareness, 2) pre-disaster awareness, 3) false disaster awareness, and 4) post-disaster awareness. The data analysis results indicate that the level of disaster awareness of students at SMA N 1 Dukun, Magelang Regency, is in the high category.

The disaster education awareness and pre-disaster awareness indicators are in the high category, with analysis results exceeding 50%. Meanwhile, the false disaster awareness and post-disaster awareness indicators are in the moderate category, with analysis results exceeding 50%. All indicators of student disaster awareness are in the good category. This contrasts with research conducted by Prihatin, 2018, which found that no more than 10% of respondents were aware that disaster risks can be avoided or minimized if they have extensive knowledge and thorough preparation.

The high level of disaster awareness among students at SMAN 1 Dukun is influenced by several factors, including their prior disaster experience. This research was also conducted by Trimunandar & Wahab Abdi, 2024, with similar results: most students already understood the level of disaster awareness. Research by Syaifulloh et al., 2023, also found that disaster knowledge is closely linked to awareness and preparedness.

Disaster awareness is not limited to taking action during or after a disaster but also encompasses preventative measures and pre-disaster preparation (Dikmenli et al., 2018). If disaster awareness can be cultivated in everyone, protective and preventative behaviors will develop, which will minimize damage and loss of life and property resulting from potential disaster threats. Students who have disaster awareness will have sufficient information about disasters and may be aware of the potential, threats and risks so they can make action plans for disasters and act appropriately when a disaster occurs.

Based on the analysis, this study demonstrates a positive relationship between students' perceptions of disaster risk reduction strategies and their disaster awareness established at SMA Negeri 1 Dukun. This analysis used a nonparametric correlation test, with a significance value of $0.000 < 0.005$. The correlation coefficient was 0.488, indicating a moderate correlation between perception and awareness.

The analysis revealed that students' perceptions of the disaster risk reduction strategies implemented at SMA Negeri 1 Dukun were moderately correlated with their disaster awareness. Students' perceptions of the disaster risk reduction strategies were categorized as moderate, with high levels of student disaster awareness. Students assessed the school's disaster risk reduction strategies as inadequate due to insufficient practice. This finding is supported by research by Fung, Loke, and Lai (2008), which was later re-explained by Susila et al., 2020, that disaster emergency training is necessary to address disaster situations. Training is crucial for improving disaster preparedness and emergency management. Research found that disaster management training significantly increased respondents' confidence in their ability to manage disasters effectively. Furthermore, Susila et al., 2020 research found that one-third of respondents considered frequent disaster drills the best learning method for achieving effective disaster preparedness.

Students' disaster awareness levels were high. Students tend to have a high level of disaster awareness because they experienced the Mount Merapi eruption. Past disaster experiences, whether direct or indirect, can influence individual disaster awareness and preparedness. Disaster experiences can be valuable lessons for the future (Havwina et al., 2017). SMA Negeri 1 Dukun is a public school with a school zoning system, meaning most students have experienced eruptions because they live in areas near Mount Merapi.

The school's established disaster risk reduction strategies can enhance students' knowledge about disasters. Analyzing students' perceptions of disaster risk reduction strategies can increase disaster awareness. Students' prior disaster experiences support it. A similar topic was discussed by Haeril et al., 2022, who stated that schools play a crucial role in reducing disaster risk and increasing students' disaster awareness. Through structured education and training programs, schools can equip students with the knowledge and skills needed to respond to emergencies.

Conclusion

Based on the results and discussion presented, the conclusion of this study is as follows: student perceptions of disaster risk reduction strategies at SMA Negeri 1 Dukun fall into the moderate category. Indicators used include knowledge and attitudes, school policies, preparedness planning, and resource mobility. While the knowledge, policy, and planning indicators scored above 50%, resource mobilization only reached 40%. The success of disaster risk reduction strategies depends heavily on school policies and their implementation. The level of disaster awareness of students at SMA Negeri 1 Dukun facing the eruption of Mount Merapi is in the high category. The first and second indicators scored high, while the last two indicators are in the moderate category. There is a positive relationship between student perceptions of disaster risk reduction strategies and disaster awareness at SMA Negeri 1 Dukun. With non-parametric analysis, a significance value of 0.000 and a degree of relationship of 0.488 were obtained, indicating a sufficient correlation. Although students' disaster awareness is high, their perception of existing strategies falls in the moderate range due to limited practice. This research was conducted at only one school, so further research can be conducted with a wider, more comprehensive sample.

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