

# ANALYSIS OF LANDSLIDE DISASTER MITIGATION UNDERSTANDING AMONG STUDENTS IN MIDDLE SCHOOLS IN BALIKPAPAN CITY DISTRICT

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## ABSTRACT

*This study aims to assess the level of understanding among middle school students in Balikpapan City about landslide disaster mitigation. Using a survey method with questionnaires, the research analyzes students' knowledge, attitudes, and actions regarding landslides. The results show that most students understand the basics of landslides but lack awareness of effective mitigation measures. Challenges include limited education on the topic and less interactive learning methods. This study recommends integrating disaster mitigation topics into school curricula and conducting simulation-based training to improve students' awareness and preparedness for landslide risks.*

*Keywords: Landslide Mitigation, Middle School Students, Balikpapan City*

## 1. INTRODUCTION

Disasters are events that cannot be predicted in terms of time and location (Yusdian, Fatwa Mauliza ; Hardiyansyah, 2019). Among the various types of disasters, landslides are one of the most frequent in Indonesia. Landslides are the movement of soil masses along with rock materials sliding towards lower areas (Saputra, Eka Gede Wayan I ; Ardhana, L.P.G ; Adnyana, 2016). Indonesia is a country with a high risk of natural disasters, including landslides. This disaster often occurs in various regions, including Balikpapan, which has geological conditions prone to soil movement. Landslides not only cause material losses but also result in casualties. Therefore, it is important to improve public understanding, particularly junior high school (SMP) students, regarding landslide disaster mitigation as an early preventive measure. Balikpapan City, as one of the areas prone to landslides, requires a strategic approach to educate the younger generation about the dangers and proper mitigation measures. This study aims to measure the level of students' understanding of landslide disaster mitigation and provide recommendations to raise awareness through the integration of the material into the school curriculum.

The research problem proposed in this study is as follows to what extent do the students of SMP Balikpapan City understand landslide disaster mitigation. What are the factors that influence the low understanding of students regarding mitigation measures. How can students' awareness of the risks of landslide disasters be increased.

This study is limited to the following aspects: the research respondents are students of SMP Balikpapan City, with the focus of the research being the level of understanding, attitudes, and actions of students related to landslide mitigation, and the analysis is based on data obtained through surveys and questionnaires. The

objectives of this research are to measure the level of understanding of SMP students in Balikpapan City regarding landslide disaster mitigation, identify the main obstacles in disaster mitigation education among students, and provide recommendations in the form of integrating mitigation material into the curriculum and simulation-based training.

## 2. LITERATURE REVIEW

Landslides are one of the natural disasters that frequently occur in Indonesia, particularly in mountainous areas and during the rainy season. Vulnerability to disasters can be defined as the condition or characteristics of geology, biology, hydrology, climatology, geography, social, cultural, political, economic, and technological aspects in a region during a specific period, which affect the ability to prevent, reduce, prepare for, and respond to the negative impacts of certain threats. (Alam, Sri Rahmadhani Nur ; Syarif, 2020). This occurs due to external disturbances that reduce the shear strength of the soil while increasing its shear stress. Landslides are caused by two main factors: controlling factors and triggering factors. Controlling factors are related to material conditions, such as geological characteristics, slope steepness, lithology types, and the presence of faults and fractures in the rock. Landslides have the potential to cause significant damage. However, the impact and risk of this disaster can be minimized through the implementation of effective and sustainable risk management, supported by accurate information regarding landslide events. One key step in reducing the risk is the use of landslide susceptibility mapping, which is beneficial for individuals, communities, governments, and researchers (Shahabi & Hashim, 2015).

Landslides or land movements have become increasingly frequent in Indonesia year by year, especially during the rainy season. Factors such as the tectonic conditions that shape the morphology of mountains, faults, easily brittle volcanic rocks, and the tropical wet climate in Indonesia, increase the risk of landslides. In addition, the worsening land-use changes in recent times have further exacerbated landslide events. The combination of natural factors and human activities is often the primary cause of landslides, resulting in loss of life and material damage. Therefore, mitigation measures are needed to reduce the impact of landslide disasters. (Naryanto, 2017). It is stated that steep slopes, high rainfall, and unstable soil conditions are the main factors triggering landslides in Southeast Asia, particularly in mountainous areas and valleys with a tropical climate. Excess water in the soil is the primary cause of slope instability, while water-saturated soil and extreme slope angles further increase the risk of landslides.

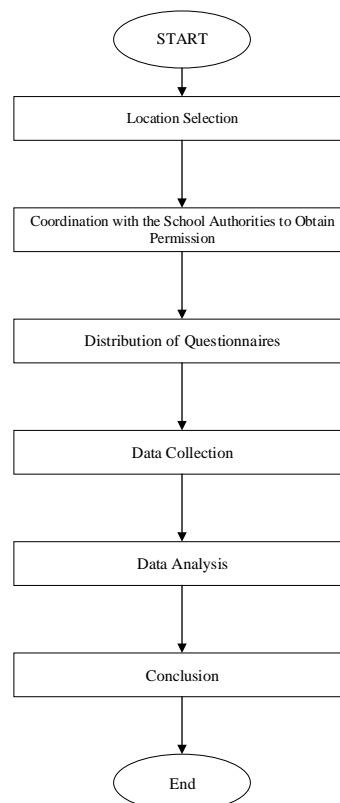
Handling landslide disasters requires active community involvement, as those directly affected have a deep understanding of local conditions and the solutions needed. Without community involvement, they are likely to be less prepared to face the dangers of a disaster. For areas with landslide potential and vulnerability, a risk assessment should be conducted to place the community according to the risk level in that region. Landslides are a type of disaster that can cause significant losses and threaten human life. Therefore, risk reduction and its impact must be a priority in disaster management. This requires an in-depth study of areas vulnerable to disaster threats.

### 3. RESEARCH METHODOLOGY

This study uses a quantitative approach with a descriptive design. The aim is to measure the students' understanding of landslide disaster mitigation through a questionnaire. The research was conducted at SMP Balikpapan City in December 2024. The instrument used in this study is a questionnaire consisting of three sections, namely:

1. Respondent identity this includes personal data such as name, gender, age, and school origin.
2. General knowledge to assess how well the students of SMP Balikpapan City understand landslide disasters
3. Disaster mitigation to assess how prepared the students of SMP Balikpapan City are in facing landslide disasters.

Data were collected through the direct completion of questionnaires under the supervision of the researcher. Data analysis was performed using descriptive statistics to describe the frequency distribution and percentages. A flowchart of the research procedure is presented to provide a systematic overview from planning to data analysis. With this methodology, the research can provide a comprehensive picture of the level of understanding of SMP students in Balikpapan City regarding landslide disaster mitigation. **Figure 3.1** illustrates the research steps from planning to data analysis.



**Figure 3.1** Flowchart prosedur penelitian

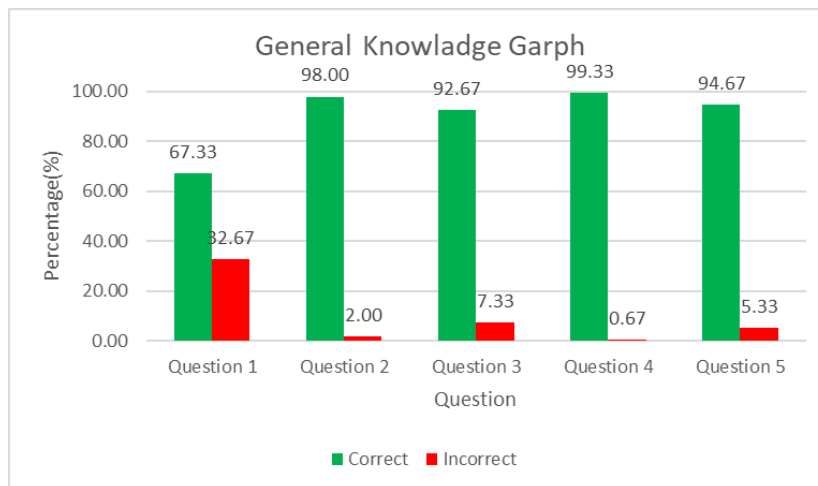
#### 4. ANALYSIS AND DISCUSSION

Data analysis was conducted based on the results of the questionnaires collected from 300 respondents. The data were processed using descriptive statistics to describe the level of understanding and preparedness for landslide disaster mitigation.

**Table 4.1** General knowledge data results

Question	Correct Answer (%)	Incorrect Answer (%)
Does landslides only occur in mountainous areas?	67.33	32.67
Landslides occur due to the movement of soil or rocks influenced by gravitational forces.	98.00	2.00
Landslides can also occur in urban areas.	92.67	7.33
Earthquakes can be one of the causes of landslides.	99.33	0.67
Planting trees on hill slopes can help prevent landslides.	94.67	5.33

Source: Self-analysis (2024)



**Figure 4.1.** General knowledge results graph

From the table and graph above, it can be seen that the knowledge about landslides has a higher percentage (%) of correct answers than incorrect ones. The highest percentage (%) of correct answers is found in question number 4, which is 99.33%, while the lowest percentage (%) of correct answers is found in question number 1, which is 67.33%.

**Table 4.2.** Preparedness data how often do you pay attention to information about the potential risk of landslides in your area of residence?

No	Knowledge	Frequency (f)	Percentage (%)
1	Never	31	10.3
2	Rarely	65	21.7
3	Sometimes	160	53.3
4	Often	33	11.0
5	Always	11	3.7
Total		300	100

From **Table 4.2**, it can be seen that out of 300 respondents, the majority answered "sometimes," which is 53.3% or 160 respondents, while the minority answered "always," which is 3.7% or 11 respondents.

**Table 4.3.** Preparedness data have you ever participated in a landslide disaster evacuation training or simulation at your school

No	Knowledge	Frequency (f)	Percentage (%)
1	Never	123	41.0
2	Rarely	56	18.7
3	Sometimes	78	26.0
4	Often	35	11.7
5	Always	8	2.7
Total		300	100

From **Table 4.3**, it can be seen that out of 300 respondents, the majority answered "never," which is 41% or 123 respondents, while the minority answered "always," which is 2.7% or 8 respondents.

**Table 4.4.** Preparedness data do you feel that you have sufficient knowledge about the early signs of a landslide?

No	Knowledge	Frequency (f)	Percentage (%)
1	Do not have	22	7.3
2	Have little	92	30.7
3	Have sufficient	132	44.0
4	Have	44	14.7
5	Have a lot	10	3.3
Total		300	100

From **Table 4.4**, it can be seen that out of 300 respondents, the majority answered "Have sufficient," which is 44% or 132 respondents, while the minority answered "Have a lot," which is 3.3% or 10 respondents.

**Table 4.5.** Preparedness Data: How often do you remind others about the importance of protecting the environment to reduce the risk of landslides.

No	Knowledge	Frequency (f)	Percentage (%)
1	Never	17	5.7
2	Rarely	82	27.3
3	Sometimes	119	39.7
4	Often	56	18.7
5	Always	26	8.7
Total		300	100

From **Table 4.5**, it can be seen that out of 300 respondents, the majority answered "sometimes," which is 39.7% or 119 respondents, while the minority answered "never," which is 5.7% or 17 respondents.

**Table 4.6.** Preparedness Data: Have you ever participated in training or seminars on handling or mitigating landslide disasters

No	Knowledge	Frequency (f)	Percentage (%)
1	Never	130	43.3
2	Have, but rarely	54	18.0
3	Quite often	70	23.3
4	Often	34	11.3
5	Always	12	4.0
Total		300	100

From **Table 4.6**, it can be seen that out of 300 respondents, the majority answered "never," which is 43.3% or 130 respondents, while the minority answered "always," which is 4% or 12 respondents.

**Table 4.7.** Preparedness Data: How prepared are you to respond and take action in the event of a landslide disaster in your surrounding environment

No	Knowledge	Frequency (f)	Percentage (%)
1	Not prepared	17	5.7
2	Slightly prepared	62	20.7
3	Quite prepared	138	46.0
4	Prepared	56	18.7
5	Very prepared	27	9.0
Total		300	100

From **Table 4.7.** it can be seen that out of 300 respondents, the majority answered "quite prepared," which is 46% or 138 respondents, while the minority answered "not prepared," which is 5.7% or 17 respondents.

**Table 4.8.** Preparedness Data: How well do you understand the factors that can increase the risk of landslides in an area

No	Knowledge	Frequency (f)	Percentage (%)
1	Do not understand	6	2.0
2	Slightly understand	83	27.7
3	Quite understand	130	43.3
4	Undestand	58	19.3
5	Understand very well	23	7.7
Total		300	100

From **Table 4.8.** it can be seen that out of 300 respondents, the majority answered "quite understand," which is 43.3% or 130 respondents, while the minority answered "do not understand," which is 2% or 6 respondents.

**Table 4.9.** Preparedness Data: How necessary do you think the implementation of landslide disaster mitigation socialization is in schools

No	Knowledge	Frequency (f)	Percentage (%)
1	Not necessary	6	2.0
2	Not very necessary	34	11.3
3	Neutral	106	35.3
4	Necessary	76	25.3
5	Very necessary	78	26.0
Total		300	100



From **Table 4.9**, it can be seen that out of 300 respondents, the majority answered "neutral," which is 35.3% or 106 respondents, while the minority answered "not necessary," which is 2% or 6 respondents.

From the data in **Table 4.1** and **Figure 4.1**, which shows the general knowledge results graph, it can be seen that the majority of students have a good basic understanding of landslides. The highest percentage of correct answers is found in question number 4, which is 99.33%, indicating that students understand the main triggers of landslides. However, the lowest percentage of correct answers is found in question number 1, with 67.33%. This suggests that while students have knowledge about landslides, there are certain aspects that need reinforcement, particularly regarding the early signs of landslides.

The information on the potential disaster in **Table 4.2** shows that the majority of respondents (53.3%) claim to only occasionally pay attention to information about the potential risk of landslides. This indicates the need for improved access to more structured and engaging information for students. Training and simulations in **Table 4.3** reveal that 41% of respondents have never participated in landslide evacuation training or simulations. The low participation in this activity highlights the importance of organizing regular simulations in schools. Regarding knowledge of early signs in **Table 4.4**, the majority of respondents (44%) feel they have sufficient knowledge about the early signs of landslides. However, there is still room to improve this knowledge, especially through practical and visual approaches. In terms of environmental awareness in **Table 4.5**, only 39.7% of students actively remind others about the importance of environmental protection. This indicates that while there is theoretical understanding, the actual implementation in real actions is still lacking. For disaster handling simulations in **Table 4.6**, 43.3% of respondents have never participated in training or seminars about landslide disaster mitigation. This shows the need for collaboration between schools and the government to provide further education. Regarding response readiness in **Table 4.7**, 46% of respondents feel sufficiently prepared to face landslide disasters. However, this readiness needs to be tested and improved through regular simulation training. Concerning understanding of risk factors in **Table 4.8**, the majority of students (43.3%) feel they have a sufficient understanding of factors that can increase the risk of landslides. However, 2% of students do not understand this at all, which requires special attention. Finally, regarding the importance of socialization in **Table 4.9**, the majority of students (35.3%) feel neutral about the need for disaster mitigation socialization in schools. This suggests that more effective communication strategies should be applied to instill the urgency of mitigation.

These findings reveal a gap between theoretical knowledge and practical implementation concerning landslide disaster mitigation. While most students understand the basics of landslides, their participation in training and simulations remains low. Therefore, interactive approaches, such as organizing simulations and



integrating mitigation material into the school curriculum, could be an effective solution. Collaboration between local governments, schools, and communities is also crucial to enhance students' preparedness..

## 5. CONCLUSION AND SUGGESTIONS

This study reveals that junior high school students in Balikpapan City have a fairly good understanding of the basics of landslide disasters, such as the main causes. However, there is a significant gap in terms of awareness and practical preparedness for landslide disaster mitigation. Most students rarely receive information related to disasters, have never participated in evacuation training or simulations, and are not proactive in maintaining the environment to reduce risks. Students' preparedness to respond to disasters is still considered moderate, with the majority feeling somewhat prepared but lacking direct experience through simulations. Additionally, only a few students consistently understand the risk factors and the importance of mitigation socialization.

To improve students' understanding and preparedness in facing landslide disasters, it is recommended that schools integrate disaster mitigation material into the curriculum, organize regular simulations and training, and provide engaging educational materials such as videos and posters. Local governments can collaborate with schools and communities to hold seminars or mitigation campaigns. Interactive learning methods such as group discussions, educational games, and competitions can also be implemented to increase student interest. Additionally, it is important to conduct regular monitoring and evaluation of students' understanding to ensure the effectiveness of the implemented mitigation programs.

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