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# Landslide Disaster Mitigation Education in Creating Disaster-Responsive Villages

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**Abstract**

**Background:** Indonesia is prone to natural disasters such as earthquakes, volcanic eruptions, tsunamis, floods, and landslides. Landslides are the movement of masses of soil or rock from slopes, usually caused by heavy rainfall, earthquakes, or human activity. Jenawi District has varied topography, ranging from hills to mountainous areas. This place has a variety of heights, ranging from slopes to very steep areas. This area also has slopes ranging from 15-30% and high annual rainfall.
**Aims:** To increase knowledge of landslide disaster mitigation. The population for this community service program is residents of Jenawi Village.
**Method:** Focus Group Discussion (FGD) was used. The population consisted of 55 men and women from Jenawi Village. Jenawi District has many steep slopes and receives significant rainfall. This situation results in widespread erosion, soil decomposition, and landslides. Based on this identification, Mitra Husada Karanganyar Health College aims to educate residents about landslides and disaster-responsive villages.
**Results:** The community service activities ran smoothly, and understanding of landslides and disaster response increased by 76,4%.
**Conclusion**: Community knowledge about landslide mitigation has increased, but true knowledge is inseparable from education.

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## INTRODUCTION

Indonesia is a country with a very high level of disaster vulnerability (Ayuningtyas et al., 2021). Based on its geographic, geological, hydrological, and climatological location, Indonesia is prone to natural disasters such as earthquakes, volcanic eruptions, tsunamis, floods, and landslides (Ganoe et al., 2023). The high rate of disasters in Indonesia ranks high in terms of the number of people affected and the number of casualties due to disasters (Alami et al., 2023). Indonesia is one of the countries with the highest disaster risk levels in the world. According to the 2023 World Risk Report, Indonesia ranks second out of 193 countries, with a high vulnerability index (Amimah et al., 2025).

In addition to natural factors, changes in land use and reduced vegetation in hilly areas increase the risk of disasters, particularly during the rainy season, which triggers potential landslides and flash floods (Junjuli et al., 2024). This situation is exacerbated by the low level of community preparedness for potential disaster threats in their environment (Pramono & Nugraheni, 2023).

Landslides are the movement of masses of soil or rock from slopes, typically triggered by heavy rainfall, earthquakes, or human activity (Matpady et al., 2023). These disasters can cause extensive damage and loss of life. This situation highlights the importance of serious attention to disaster risk reduction efforts to minimize impacts and increase community resilience (Badan Nasional Penanggulangan Bencana, 2018).

The global prevalence of landslides represents a serious threat, particularly in Asia and the Americas (Emberson et al., 2020; Sim et al., 2022). According to the Unified Global Landslide Database (UGLD),

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a combination of EM-DAT, DesInventar, the Global Landslide Catalog (GLC), and the Global Fatal Landslide Database (GFLD), 37,946 landslide events and 185,753 fatalities were recorded in 161 countries between 1903 and 2020, with Asia and the Americas being the regions with the highest number of events and fatalities, although with varying annual patterns (Gómez et al., 2023). Annually, approximately 56 billion cubic meters of soil material are mobilized by landslides worldwide, with Asia contributing 68% of this volume (Broeckx et al., 2019). In Indonesia, data from the National Disaster Management Agency (BNPB) shows that landslides are the most frequent natural disaster compared to other disasters (Zamroni et al., 2020). In the period 2015–2024, 7,024 landslide incidents were recorded, and up to April 2024 alone, 183 incidents had occurred. Meanwhile, in Karanganyar Regency, during 2024, 87 landslide incidents had occurred, indicating that this area is included in the high vulnerability area (Rahmayanti et al., 2025).

According to the 2020 Indonesian Disaster Risk Index, Karanganyar Regency is one of the areas prone to landslides. The landslide risk index in this area reached 24.00, which is in the high category. Landslides have been the most frequent natural disaster in Indonesia in recent years. These incidents are spread across various regions, with a trend that continues to increase annually. One of the areas significantly affected is Karanganyar Regency, indicating its high vulnerability to this disaster. The main factors causing landslides include high rainfall, mountainous terrain, and uncontrolled land conversion (Retongga, 2024).

Regional governments, through the Regional Disaster Management Agency (BPBD), play a key role in disaster management efforts. According to Ruchban et al. (2024), the effectiveness of disaster management in Indonesia relies heavily on collaboration between government and non-governmental actors, including local communities. Furthermore, Nurcahyo et al. (2022) explain that disaster mitigation and management require a multi-actor approach that positions communities as subjects, not merely objects of assistance.

Landslide mitigation requires a holistic approach, encompassing not only technical aspects but also social ones (Acuña et al., 2021). Structurally, efforts such as embankment construction, adequate drainage systems, and the implementation of early warning systems are crucial to reducing immediate risks in vulnerable areas (Šakić Trogrlić et al., 2022). Environmental rehabilitation through reforestation and vulnerability-based spatial planning is also integral to long-term mitigation (Bakhtiar et al., 2026). However, the success of landslide mitigation relies heavily on the active participation of the community. Therefore, education and empowerment are key. Education helps communities understand risks, recognize danger signs, and learn appropriate evacuation steps. Empowerment, on the other hand, encourages community participation in preserving the environment and building an independent preparedness system. Based on the aforementioned issues, we, lecturers from Mitra Husada Karanganyar Health College, aim to provide education to residents to increase their understanding of landslide disaster mitigation in disaster response situations.

## METHOD

This community service activity was aimed at the community of Jenawi Village, Karanganyar, with 55 participants. The activity took place on Sunday, January 18, 2026, starting at 09.00, at the homes of local residents. This study used a pre-experimental design with a quantitative approach, employing a one-group pretest-posttest design. The method used was PBL (Problem-Based Learning), and the problems faced by partners were collected by the community service implementation team through FGD (Focus Group Discussion) activities. The results of interviews with residents found that some did not understand landslide disaster mitigation. This was done to facilitate the determination of priority problems that must be immediately addressed to address partner problems. Instruments or tools used to deliver material in the activity using PowerPoint leaflet media. After delivering the material, the team provided motivation and counseling about basic assistance during a disaster. The instrument in this study used a questionnaire on the level of knowledge of disaster mitigation consisting of 13 items. The validity test statement was r count 0.3550 > 0.30, and the reliability test result was 0.752 > 0.60 (Dasanayaka & Matsuda, 2022).

## RESULTS AND DISCUSSION

### Results

The community service activity took place on January 18, 2026, in Jenawi Village, Karanganyar with 55 participants present, addressing a variety of complex issues. Researchers conducted surveys and interviews on December 23, 2025. Many residents still lacked understanding of landslides. The community service program demonstrated a willingness to participate in education.

The implementation of this community service program aims to provide education through four steps. First, gather information about social issues. Second, identify residents. Third, deliver material on landslide disaster management and village preparedness. Fourth, evaluate the educational outcomes to determine the achievement of objectives. A total of 55 Jenawi villagers participated in the outreach activities. The outreach process began with a pre-test, followed by a presentation by the facilitator, who discussed landslide disaster mitigation. At the end, there was a post-test to measure understanding of the material. The pre-test and post-test results can be seen in the table below.

**Table 1.** Measuring Knowledge of Landslide Disasters

| Landslide Disaster Knowledge | n | % |
|---|---|---|
| Pre test | 13 | 23,6 |
| Post test | 42 | 76,4 |
| Total | 55 | 100 |

The results of the community service implementation can be seen that there is an increase in knowledge about landslide disaster material from 23.6% pretest to 76.4% after the posttest. Residents actively participated, especially in discussion sessions with facilitators, which helped shape their attitudes and responsiveness toward landslide disaster mitigation that may occur in their environment. It was seen that residents were able to explain what the researcher explained at the beginning. It can be said that educational activities in the community using leaflet media greatly influenced community attitudes towards disasters, including the community in Jenawi. This activity was very useful and increased residents' insights that had not been obtained so far. This finding aligns with Alam & Syarif (2020) who stated that knowledge is influenced by information, data obtained from events that is converted into a meaningful form for the recipient, where the main function of the information itself is to increase knowledge. Experience, whether positive or negative, can broaden and deepen one's knowledge.

**Figure 1.** Presentation of Material

**Figure 2.** Discussion

**Figure 3.** Discussion with Cadres

**Figure 4.** Data Entry

## Discussion

The increased knowledge gained during the training demonstrated that the material presented to participants was effective and useful in supporting volunteers in disaster response situations. Qualitative evaluation results from interviews also supported this, with several participants expressing increased confidence in providing answers. Increased community knowledge reduced the risk of landslides. Furthermore, residents were able to anticipate and build an emergency fund, rather than simply waiting for assistance.

Prior to conducting the community service activity on landslide mitigation education in Jenawi Village, the community service team conducted thorough preparation. One step was preparing materials on landslide-resistant mitigation to increase community knowledge and awareness of disaster preparedness.

This one-day activity focused on providing information and training on landslide mitigation for disaster-prepared villages. Before the training began, participants underwent a pre-test to assess their knowledge. After the training session, participants were able to ask questions, and a post-test was administered to assess changes in their understanding. Evaluation included participant attendance and participation, as well as planning for next steps through discussions between residents and the village head to determine appropriate activities to improve knowledge about landslide mitigation.

In carrying out community service through educational activities in Jenawi Village, Karanganyar, the community service team made various preparations. These preparations aimed to ensure the educational activities ran smoothly and according to plan and included all stages of the educational activities. The community service team employed several methods. The first step before going into the field is to discuss the material they want to teach the community. Our community service team discussed landslide mitigation and disaster-prepared villages, so they first sought out relevant literature and information sources.

This aligns with Bakhtiar et al. (2026) view that educational institutions need to provide activities that prepare students for disasters to improve their response to emergency situations such as landslides.

Facilitator skills are important to create a good atmosphere. This helps to realize the preparation for facing landslide disasters.

This community service activity has successfully increased the understanding and awareness of Jenawi Village residents regarding disaster preparedness. The main goal is to provide education to increase public knowledge and reduce the impact of disaster risks. With this initiative, it is hoped that Jenawi Village can become a Disaster-Responsive Village.

A disaster is an event or series of events that endangers and disrupts the lives and livelihoods of a community, caused by natural and/or non-natural factors and human influence, resulting in loss of life, environmental damage, financial loss, and psychological impacts (Utami et al., 2024). In addition, a disaster can be defined as a significant disruption that causes loss of life, damage to property, and environmental damage, which exceeds the community's ability to cope with it with available resources (Ismowati et al., 2023).

Law No. 24 of 2007 concerning disaster management explains that a disaster is an event or series of events that can endanger and disrupt the lives and livelihoods of the community, caused by natural, non-natural elements, or human actions, which result in loss of life, environmental damage, financial losses, and psychological effects.

Mitigation means efforts to reduce the impact of a hazard before it occurs. The concept of mitigation encompasses a wide range of activities and protective measures, from physical measures, such as building robust infrastructure, to procedural measures, such as standardized methods for incorporating risk assessments into spatial planning (Setyawati et al., 2020).

Natural disasters in the form of landslides are one type of disaster that can have a very large impact. Losses experienced by individuals affected by landslides are often caused by the community's lack of

knowledge regarding the possibility of disasters that could occur in their area and the low level of awareness of disaster preparation. This activity has the potential to improve people's standard of living to make them more independent. In addition, the technical knowledge provided can be applied by local communities when facing emergencies (Lutfiyah et al., 2024).

The community service activity was carried out on January 18, 2026, at a resident's house during the Jenawi Karanganyar Village event, which was attended by residents, community leaders, and the Karanganyar Regional Disaster Management Agency (BPBD). The material for this activity was delivered by the Community Service Team. The main objective of this activity was to broaden residents' understanding of landslide disaster prevention. The community service team assumed that after residents acquired knowledge and skills related to landslide disaster mitigation, they would have a more responsive attitude towards disasters. One of the goals of landslide disaster mitigation is to increase community understanding and create a village that is ready to face disasters. Therefore, the team from STIKes Mitra Husada Karanganyar needed to carry out this community service activity. The Community Service Team and Resource Persons, who are nursing lecturers from STIKes Mitra Husada Karanganyar, attempted to collect data through discussions with volunteers, the community, and relevant parties. For this reason, there are several aspects related to landslide disaster risk reduction and village readiness in facing disasters.

### Implications

The implications of this community service activity can impact the Jenawi village community by helping them understand landslides, enabling them to anticipate and respond to them. This can lead to the creation of a disaster-responsive village.

### Research Contribution

This service provides both direct and indirect contributions to the residents of Jenawi village by increasing residents' understanding of landslide disaster mitigation and making residents disaster-responsive.

### Limitations

The limitations of this service are that it has not been carried out for all ages; this activity has only been carried out for fathers and mothers from early adulthood to the elderly, it has not been carried out for children and teenagers.

### Suggestions

In the future, this service can be carried out for all ages and can be supplemented by providing simulations.

## CONCLUSION

This community service activity was aimed at residents of Jenawi Village, Karanganyar, with 55 participants. The activity took place in residents' homes and used the Problem-Based Learning (PBL) method. The implementation team collected partner issues through Focus Group Discussions (FGDs). Post-test results showed a 76.4% increase in residents' knowledge regarding landslide mitigation. Success was evident in the knowledge evaluation at the end of the activity. Residents actively participated, especially during discussions, which increased their understanding of landslide mitigation. Educational efforts significantly contributed to this increase in knowledge

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## AUTHOR CONTRIBUTION STATEMENT

Yeni Nur Rahmayanti is in charge of preliminary surveys, providing education related to disaster mitigation, and compiling reports. Eka Novitayanti is in charge of preliminary surveys and creating

educational media, Fadma Aji Pramudita is in charge of preliminary surveys and reference searches, Pipi Anonyma is in charge of preliminary surveys and delivering disaster response materials.

## AI DISCLOSURE STATEMENT

The author declares that this research was prepared, conducted, written, and edited without the use of artificial intelligence (AI) tools or services. All stages of the study, including data collection, analysis, interpretation, and manuscript preparation, were completed solely by the author, who takes full responsibility for the content of this publication.

## CONFLICTS OF INTEREST

No financial, institutional, or personal conflicts of interest are associated with this study or its publication.

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