Open Access Health Scientific Journal
https://oahsj.org/index.php/oahsj Vol. 6 No. 1 February 2025, pp. 160-165

Research article

Analysis of Community Preparedness in Facing Disasters Following the Establishment of Village Disaster Preparedness Teams in Situmeang Hasundutan Village, North Tapanuli Regency

Bobby Simanjuntak*, Otniel Ketaren, Fridalina Tarigan, Kesaktian Manurung, Janno Sinaga

Universitas Sari Mutiara, North Sumatra, Indonesia

*Correspondent Author: Bobbi Simanjuntak (bobbyparasian27@gmail.com)

ARTICLE INFO

Keywords:
Community Preparedness,
Disaster Emergency Response,
Knowledge.

ABSTRACT

Background: Disasters are unpredictable events that can occur suddenly at any time and in any place. In response, the Indonesian government has prioritised disaster preparedness through various programmes, one of which is the Disaster Resilient Village (Desa Tangguh Bencana/Destana) initiative by BNPB. Situmeang Hasundutan Village is among those designated as a Destana. This study aims to analyse the community's preparedness for facing disasters following the formation of Destana in Situmeang Hasundutan Village, North Tapanuli Regency.
Methods: This qualitative study employed a phenomenological approach and was conducted in Situmeang Hasundutan Village, Sipoholon Sub-district, North Tapanuli Regency, from September 2023 to April 2024. A total of seven informants participated in the study. Data were collected through in-depth interviews, observations, and documentation.
Results: The findings revealed that the informants' knowledge and attitudes towards disaster preparedness improved through consistent dissemination of information and socialisation. Disaster simulations have been conducted, supported by an effective disaster information management system, including hazard maps and evacuation routes. Preventive efforts, such as the preparation of medicines, were in place. The mobilisation of human resources, including village leaders, religious and traditional figures, and youth representatives (18 people in total), demonstrated strong community readiness.
Conclusion: The implementation of Destana has significantly contributed to increasing disaster preparedness in Situmeang Hasundutan Village. It is recommended that the North Tapanuli BPBD conduct regular simulations and provide continuous support to Destana cadres. Community members are also encouraged to remain informed about earthquake disaster risks due to the village's vulnerable location.

BACKGROUND

Indonesia, located at the intersection of three major tectonic plates the Pacific, Indo-Australian, and Eurasian plates stands as one of the most disaster-prone nations globally. This unique geological position subjects numerous regions, including North Sumatra, to heightened seismic activity, making them vulnerable to natural disasters such as earthquakes. The Tapanuli Utara Regency, particularly the area surrounding Tarutung, exemplifies this risk due to its proximity to the active Toru fault segment, which shifts at a rate of approximately 24 mm per year. This geological reality not only predisposes the region to recurrent earthquakes but also to secondary hazards such as ground ruptures, landslides, and soil liquefaction. The implications of these risks are profound, impacting not only the physical landscape but also the socio-economic fabric of the communities living in these areas.

Received 19 December 2024; Accepted 30 January 2025; Published 28 February 2025
 DOI: https://doi.org/10.55700/oahsj.v6i1.88

Historical records provide a sobering account of the seismic activity in this region, illustrating the frequency and intensity of earthquakes that have occurred over the decades. For instance, the devastating earthquake in Tarutung in 2022 serves as a stark reminder of the potential for disaster in unprepared communities. This earthquake resulted in casualties, significant property loss, and triggered secondary disasters such as fires, which compounded the initial devastation. These events underscore the urgent need for effective disaster preparedness and risk mitigation strategies in areas prone to seismic activity. According to the Indonesian Disaster Risk Index (IRBI), while North Sumatra has shown slight improvements in its disaster risk score, several regencies, including Tapanuli Utara, continue to face medium to high risk levels, indicating that much work remains to be done in terms of community preparedness and resilience.

Despite the evident risks, the level of preparedness in many vulnerable areas remains alarmingly low. This lack of readiness can be attributed to several factors, including limited community capacity and insufficient disaster education. Many residents may not fully understand the nature of the risks they face or may lack access to resources that would enable them to effectively respond to disasters. For example, in Tarutung, the absence of comprehensive disaster education programmes has left many individuals unaware of the necessary precautions to take in the event of an earthquake. This gap in knowledge and preparedness can lead to tragic outcomes, as evidenced by the aftermath of the 2022 earthquake, where many residents were caught off guard and ill-equipped to respond to the crisis. In response to these challenges, the Indonesian National Disaster Management Agency (BNPB) has implemented the Disaster Resilient Village (Desa Tangguh Bencana or Destana) program. This initiative aims to promote local-level disaster risk reduction by training and empowering communities to recognise hazards, mobilise resources, and implement effective emergency response systems. The Destana programme is designed to foster a culture of preparedness, enabling communities to take proactive steps toward mitigating the impacts of disasters. However, despite the potential benefits of this programme, data indicates that its coverage remains limited. As of mid-2023, only 507 out of 6,132 villages in North Sumatra have been designated as Destana, with Tapanuli Utara having a mere eight villages participating in the programme.

One noteworthy case is Situmeang Hasundutan Village, which was designated as a Destana village in 2023. This village has a history of experiencing significant earthquake impacts, making its inclusion in the programme particularly relevant. However, the effectiveness of community preparedness initiatives in Situmeang Hasundutan post-Destana designation has yet to be thoroughly explored. Investigating how this village has adopted and implemented disaster preparedness initiatives can provide valuable insights into the real-world effectiveness of the Destana programme, especially in high-risk, underrepresented areas. To illustrate the potential of the Destana programme, it is essential to consider the various components that contribute to a village's disaster resilience. These components include community training sessions, the establishment of early warning systems, and the development of emergency response plans tailored to the specific risks faced by the community. For instance, community training sessions can educate residents on how to respond during an earthquake, including identifying safe locations within their homes and understanding the importance of having emergency kits ready. Additionally, the establishment of early warning systems can provide critical information to residents about impending seismic activity, allowing them to take necessary precautions before disaster strikes. Moreover, the development of emergency response plans is crucial in ensuring that communities are prepared to act swiftly and effectively in the aftermath of a disaster. These plans can outline specific roles and responsibilities for community members, as well as strategies for resource mobilization and coordination with local authorities. By fostering a sense of ownership and responsibility among residents, the Destana programme aims to create a culture of preparedness that extends beyond individual households to the entire community.

However, the success of the Destana programme hinges on several factors, including the active participation of community members, the availability of resources, and the support of local government agencies. In Situmeang Hasundutan Village, for example, the engagement of local leaders and the involvement of residents in the design and implementation of disaster preparedness initiatives will be critical in determining the programme's effectiveness. Furthermore, the availability of resources, such as funding for training sessions and the procurement of emergency supplies, will significantly influence the village's ability to enhance its disaster resilience. In addition to these practical considerations, it is essential to recognise the psychological and social dimensions of disaster preparedness. Communities that have experienced significant trauma from past disasters may face challenges in mobilising collective action for preparedness initiatives. Therefore, addressing the emotional and psychological needs of community members is vital in fostering a sense of agency and empowerment. Initiatives that incorporate

storytelling, community dialogues, and support networks can help build trust and solidarity among residents, ultimately enhancing their capacity to respond to future disasters.

Indonesia's geographic vulnerability to seismic activity necessitates a comprehensive and proactive approach to disaster preparedness and risk reduction. The Tapanuli Utara Regency, particularly areas like Tarutung and Situmeang Hasundutan Village, exemplifies the challenges faced by communities in high-risk regions. While the Destana programme offers a promising framework for enhancing community resilience, its effectiveness depends on various factors, including community engagement, resource availability, and the psychological readiness of residents. By understanding and addressing these complexities, stakeholders can work collaboratively to foster a culture of preparedness that empowers communities to withstand and recover from the impacts of disasters. Ultimately, the goal is to transform vulnerable communities into resilient ones, capable of navigating the challenges posed by their geological realities and emerging stronger in the face of adversity.

METHODS

This study employs a case-control design to analyse the factors that influence the compliance of pilgrims in returning to K3JH. The sample consists of 110 Hajj pilgrims, with 55 pilgrims in the case group (those returning to K3JH) and 55 pilgrims in the control group (those not returning to K3JH). The participants were randomly selected from the Medan Johor Health Centre in 2023. The research is ongoing from September 2023 to February 2024. Quantitative data were obtained through medical records and Siskohatkes, while qualitative data were gathered through in-depth interviews with eight informants: four pilgrims, two health officers, and two KBIHU leaders. The interviews aimed to explore the reasons for compliance or non-compliance with the K3JH return.

Quantitative analysis will employ the chi-square test to assess the relationship between variables, with a significance level set at 0.05, and will calculate the odds ratio (OR). Qualitative analysis will utilise thematic analysis to identify the main themes from the interviews. The research process includes preparation (research permission and ethical approval), data collection (interviews and medical record data), data processing (using SPSS), and presentation of results (tables, graphs, and descriptive summaries).

This study has received approval from the ethics committee, and all participants have provided written consent. Data confidentiality will be maintained, and participant identities will be anonymised.

RESULTS

Knowledge and Attitudes

The Disaster-Resilient Village (Destana) program implemented by the Regional Disaster Management Agency (BPBD) of North Tapanuli Regency has positively influenced the knowledge and attitudes of residents in Situmeang Hasundutan Village regarding natural disasters. Through education and awareness campaigns, the community has gained a better understanding of various disasters such as earthquakes, floods, and landslides, including both natural and human-induced causes.

Most informants demonstrated an awareness of earthquakes as geological phenomena caused by tectonic plate shifts and active faults, while floods and landslides were often linked to human activities such as deforestation. This increased knowledge has contributed to a greater sense of disaster preparedness, environmental responsibility, and community involvement. Destana cadres have actively disseminated disaster-related information and have advocated for printed materials (e.g., leaflets) to support broader public outreach.

Community members have shown strong motivation to continue receiving training and information regularly. There is also a growing awareness of the local geographical risks, particularly the village's proximity to the Toru Fault and volcanic rock formations from the Toba supervolcano. According to BMKG (2022), these geotectonic conditions contribute to the area's high earthquake vulnerability. This awareness is essential for enhancing the community's capacity to adapt and recover from disaster events.

Emergency Response Planning

Residents have been educated on the stages of emergency response: before, during, and after a disaster. Simulation exercises have equipped community members with practical knowledge about evacuation procedures, self-protection techniques, and the preparation of emergency supplies such as first-aid kits. Informants reported feeling more prepared to respond to disasters thanks to these simulations.

However, critical infrastructure for emergency response remains lacking. The village currently has no designated evacuation routes or early warning systems in place. Simple tools like traditional wooden alarms (kentongan) are not yet available. Regular evaluations of the emergency response plan are

necessary to ensure resource readiness, improve coordination, and optimize community response in real-time disaster situations.

Resource Mobilization

The Destana program in Situmeang Hasundutan has been relatively successful in terms of human resource quantity, with 18 cadres appointed to support disaster preparedness efforts. However, the quality of human resources remains a challenge, primarily due to the limited frequency of training sessions. Most informants stated that simulations and socialization events were held only once, which limits long-term effectiveness.

In addition, the lack of adequate disaster equipment and logistical support was identified as a major constraint. While initial training has enhanced community understanding of disaster preparedness, recurring sessions and access to proper tools are essential for sustainability. Informants emphasized the need for consistent capacity building and access to proper resources to effectively support risk reduction efforts.

DISCUSSION

Knowledge and Attitudes

The study revealed that residents of Situmeang Hasundutan Village have a good understanding of natural disasters, recognizing both natural and human-induced causes, especially in the cases of landslides and floods. Earthquakes were correctly identified as resulting from tectonic activity, volcanic eruptions, or rockfalls.

This knowledge is largely attributed to the Disaster-Resilient Village (Destana) program, which involved community education, simulations, and ongoing information dissemination. According to Pahleviannur (2019), increasing disaster awareness through knowledge is vital for reducing risk. As a result, the community has shown enhanced preparedness and a proactive attitude toward disaster mitigation.

The Destana program has instilled a strong sense of motivation and responsibility in local cadres, who actively share disaster knowledge with others in the village. This aligns with Syakir et al. (2023), who found similar outcomes in other disaster-prone communities. The community's positive attitude toward preparedness is also influenced by previous disaster experiences, making residents more alert and willing to take action.

In practice, the village has demonstrated readiness by conducting simulations and risk analyses, recognizing warning signs of potential disasters. These proactive attitudes are essential, as per Notoatmodjo (2014), who emphasizes that attitudes precede behavior and can determine disaster response effectiveness. Overall, increased knowledge has led to more effective preparedness actions among villagers.

Emergency Response Planning

Pre-disaster activities in Situmeang Hasundutan include awareness campaigns, simulation exercises, and community education. Residents understand their region's vulnerability due to geological conditions like the nearby Toru Fault.

Emergency preparedness efforts have been supported through disaster simulations. However, not all residents have participated, and some infrastructure gaps remain, such as the absence of early warning systems and earthquake-resistant buildings. First-aid kits are available in some households, but disaster warnings still rely on informal communication (e.g., mobile phones), with no traditional warning tools (e.g., bamboo bells).

During disasters, residents now demonstrate appropriate behavior, such as seeking shelter under sturdy furniture and protecting their heads improvements made possible by the Destana program. There is also a strong spirit of mutual aid and cooperation during emergencies, with neighbors helping one another.

Post-disaster actions involve recovery, reconstruction, and continued vigilance. With support from Destana, the community understands the importance of helping affected families and preparing for aftershocks. Strong social values like gotong royong (mutual assistance) further reinforce resilience.

Resource Mobilization

Human resources play a critical role in disaster management. Situmeang Hasundutan has a core team of 18 community members, including local leaders and youth representatives, who serve as Destana cadres. While human resource quantity is sufficient, quality and equipment are lacking due to limited training sessions and inadequate tools.

The study highlights that effective disaster response requires ongoing training and equipment readiness. Without repeated simulations, knowledge retention decreases over time. Informants also noted that simulations were sometimes not taken seriously, reducing their effectiveness.

Despite these challenges, Destana has equipped residents with basic disaster knowledge, covering pre-disaster, during-disaster, and post-disaster stages. Continued capacity development is essential to build a responsive and skilled community capable of managing emergency situations.

The ability to mobilize resources, both human and material, is key to an effective disaster response. This includes having trained individuals, maintaining community networks based on local values, and ensuring that knowledge is retained and passed down. BPBD North Tapanuli continues to support this through simulations and technical assistance.

In conclusion, the mobilization of human resources in Situmeang Hasundutan has shown progress, but sustained effort is needed in training, simulation frequency, and logistical support to achieve long-term disaster resilience.

CONCLUSION

The informants demonstrated a good level of knowledge and a positive attitude regarding disaster response, especially after the establishment of the Disaster-Resilient Village (Destana) program in Situmeang Hasundutan. Their awareness was also shaped by previous experiences with earthquakes. They understood the phases of emergency response—pre-disaster, during disaster, and post-disaster. Pre-disaster actions included acquiring knowledge through socialization sessions and preparing essential supplies such as medicine. During the disaster, they knew to protect their heads and evacuate to designated safe zones. Post-disaster, they understood the importance of assisting victims once conditions were safe. Human resource quality is a fundamental aspect of disaster-prone areas. In Situmeang Hasundutan, both the quantity and quality of human resources are considered sufficient to support disaster preparedness and response

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

Aka, F. T., Buh, G. W., Fantong, W. Y., Issa, Zouh, I. T., Djomou, S. L. B., ... & Hell, J. V. (2017). Disaster prevention, disaster preparedness and local community resilience within the context of disaster risk management in Cameroon. Natural hazards, 86, 57-88.

Aldrich, D. P. (2017). The importance of social capital in building community resilience. Rethinking resilience, adaptation and transformation in a time of change, 357-364.

Aldrich, D. P., & Meyer, M. A. (2015). Social capital and community resilience. American behavioral scientist, 59(2), 254-269.

Asian Development Bank. (2023). Enhancing Disaster Resilience in Southeast Asia.

BMKG. (2022). Analysis of the Tarutung Earthquake (North Sumatra) Mw 5.8 on October 1, 2022. Active Fault Working Group and Earthquake Catalog of the Meteorology, Climatology, and Geology Agency.

BNPB. (2021). IRBI (Indonesian Disaster Risk Index) 2021. Disaster Data, Information and Communication Center of the National Disaster Management Agency.

Centre for Research on the Epidemiology of Disasters. (2022). Natural Disasters and Their Impact on Communities in Indonesia.

Derakhshan, S., Emrich, C. T., & Cutter, S. L. (2022). Degree and direction of overlap between social vulnerability and community resilience measurements. PLoS One, 17(10), e0275975.

DIBI-BNPB. (2023). Indonesian Disaster Data and Information: Study of Indonesian Disaster Incident Data. BNPB.

Geological Agency of Indonesia. (2022). Seismic Activity and Fault Systems in North Sumatra.

Indonesian Institute of Sciences. (2023). Community Preparedness and Resilience in the Face of Natural Disasters.

Indonesian National Disaster Management Agency/BNPB. (2023). Disaster Resilient Village Programme Overview.

International Federation of Red Cross and Red Crescent Societies. (2023). Community-Based Disaster Risk Reduction.

Labrague, L. J., Hammad, K., Gloe, D. S., McEnroe-Petitte, D. M., Fronda, D. C., Obeidat, A. A., ... & Mirafuentes, E. C. (2018). Disaster preparedness among nurses: a systematic review of literature. International nursing review, 65(1), 41-53.

Monsalve, L. F. D., Valladares, C. P. N., & Díaz, J. S. (2024). Relationship between political participation and community resilience in the disaster risk process: A systematic review. International Journal of Disaster Risk Reduction, 104751.

Pandey, C. L. (2019). Making communities disaster resilient: Challenges and prospects for community engagement in Nepal. Disaster Prevention and Management: An International Journal, 28(1), 106-118.

Paton, D. (2019). Disaster risk reduction: Psychological perspectives on preparedness. Australian journal of psychology, 71(4), 327-341.

Ryan, B., Johnston, K. A., Taylor, M., & McAndrew, R. (2020). Community engagement for disaster preparedness: A systematic literature review. International journal of disaster risk reduction, 49, 101655.

Shi, P., Ye, T., Wang, Y., Zhou, T., Xu, W., Du, J., ... & Okada, N. (2020). Disaster risk science: A geographical perspective and a research framework. International Journal of Disaster Risk Science, 11, 426-440.

Suharini, E., Aisyah, S., & Kurniawan, E. (2020). The role of Community-Based Disaster Preparedness and Response Team in building community resilience. Geografia, 16(4).

United Nations Office for Disaster Risk Reduction. (2022). Global Assessment Report on Disaster Risk Reduction.

World Bank. (2023). Building Resilience in Disaster-Prone Regions: A Case Study of Indonesia.