

Megathrust Earthquake Preparedness in Aceh: Lessons from Literature and Disaster Management Implications

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Abstract. *Community preparedness for disasters, especially megathrust earthquakes, is a crucial issue, especially in Aceh which is highly prone to this type of large earthquake. This literature review examines various aspects of community preparedness in the face of disasters in five related articles. Each article analyzed provides important information on the role of communities, mitigation strategies, and disaster risk reduction efforts in communities. The review results show that improving community preparedness requires synergy between the government, related institutions, and local communities. Disaster mitigation education, simulation exercises, and the development of disaster-resistant infrastructure are instrumental in building community resilience to megathrust earthquakes. In addition to physical preparedness, psychological preparedness, and social support are also important aspects of the recovery process. This study offers guidelines that can help governments and relevant organizations design better effective mitigation policies and programs to enable communities to respond to the threat of megathrust earthquakes, minimize losses, and accelerate post-disaster recovery quickly and effectively.*

Keywords: *community preparedness, megathrust earthquake, disaster mitigation, mitigation education, disaster-resistant infrastructure*

1. Introduction

Community preparedness in the face of disasters, especially megathrust earthquakes, is a crucial and urgent topic in Indonesia, specifically in Aceh Province. Aceh is one of the areas vulnerable to megathrust earthquakes due to its geographical factors. A megathrust earthquake is a powerful type of earthquake that can cause major damage to infrastructure and people's lives (Jones, 2020). Therefore, the preparedness of Aceh people in the face of megathrust is key to increasing safety and reducing losses that may occur. In the face of a potentially destructive and devastating megathrust earthquake, the active participation and full involvement of the community is essential. Communities need to be actively and directly involved in all stages of the planning process, risk understanding, and emergency response training. In addition, public education and awareness raising on risk reduction measures and post-disaster recovery efforts are also crucial and vital in building better and more resilient preparedness (BNPB, 2020).

From the literature review, some of the articles reviewed provide important insights and information related to community preparedness in the face of disasters. When it comes to community preparedness, it is important to pay attention to and understand the challenges faced and the efforts to be made. In this review, we analyze five relevant articles to provide a deeper understanding of Acehnese community preparedness in the face of megathrust earthquake threats. The articles also provide detailed information on training programs, evacuation simulations, and infrastructure development that have been conducted to improve community preparedness. Furthermore, the results of this analysis can also serve as a reference for the government, related institutions, and local communities in designing more effective policies and programs for dealing with disasters

in this area.

The purpose of the analysis of the articles conducted by the author is to serve as a basis for developing concrete steps that the government and related institutions can take to prepare the people of Aceh for a megathrust earthquake. To ensure that communities are equipped with the necessary knowledge, skills, and adequate infrastructure to effectively respond to future disasters.

2. Method

The author's literature review method begins with determining the objectives, selecting several articles to be reviewed according to the criteria related to disaster preparedness, especially in the context of earthquakes and tsunamis, focusing on disaster-prone communities or areas and published in the last five years to maintain the currency of information. The articles referred to are:

- a. "Study on Community Resiliency Dealing with Natural Disaster Preparedness in Pandansari Krajan Village, Poncokusumo Sub-District, Malang Regency" by Debora & Syukkur, 2018.
- b. "One Community at A Time: Promoting Community Resilience in The Face of Natural Hazards and Public Health Challenges" by Chenwei Ma, et al, 2023.
- c. "School Community Preparedness in Reducing the Risk of Earthquake and Tsunami Disasters in Pesisir Selatan Regency" by Afrida & Manawanui, 2018.
- d. "Disaster Preparedness and Mitigation in Indonesia: A Narrative Review" by Ayuningtyas, et al, 2021.
- e. "Disaster Mitigation in Indonesia" by Maulana & Andriansyah, 2024.

3. Results and Discussions

The first reviewed article, "Study on Community Resiliency Dealing with Natural Disaster Preparedness in Pandansari Krajan Village, Poncokusumo Sub-District, Malang Regency" by Debora & Syukkur (2018) highlighted the importance of surveying vulnerable groups in the community. The research showed that community preparedness in the face of disasters should be based on a deep understanding of which communities need the most attention and strengthening. Therefore, a focused approach can be taken to ensure that all elements of society, especially the vulnerable, have adequate capacity to deal with emergencies (Syukkur, 2018).

Furthermore, the article "One Community at A Time: Promoting Community Resilience in The Face of Natural Hazards and Public Health Challenges" by Chenwei Ma, et al 2023, developed the idea of a multi-scale approach to enhancing community resilience. The article emphasized how to deal with gradual threats, an integrated strategy between climate change adaptation and disaster risk reduction is needed. It also highlighted the importance of social capital in building community collaboration for long-term resource management. In addition, the article provided insights into community reactions to natural hazards and emphasized the need for effective information and local knowledge application. While Community-Based Disaster Preparedness (CBDP) can empower local communities, the authors also noted that this approach should not be considered a single solution to disaster management problems (Chenwei Ma, 2023).

The third article "School Community Preparedness in Reducing the Risk of Earthquake and Tsunami Disasters in Pesisir Selatan Regency" by Afrida & Manawanui 2018, emphasized the important role of the school community in improving community disaster preparedness. This research showed that school involvement in disaster

preparedness programs can reduce the risks faced by communities, particularly in coastal areas vulnerable to earthquakes and tsunamis. The findings provided a strong basis for the development of more integrated education and training strategies in the context of disaster preparedness (Manawanui, 2018).

The fourth article "Disaster Preparedness and Mitigation in Indonesia: A Narrative Review" by Ayuningtyas, D et al, 2021, presented a narrative review of disaster preparedness and mitigation in Indonesia. The research collected data from various sources to explore thematic phenomena related to disaster preparedness. With a comprehensive approach, this research showed that disaster preparedness must involve various elements of society and utilize publicly available information to develop effective strategies (Ayuningtyas, 2021).

The final article "Disaster Mitigation in Indonesia" by Maulana, AT & Andriansyah in 2024, provided an in-depth look at Indonesia's potential and vulnerability to natural disasters, especially earthquakes, tsunamis, volcanic eruptions, and land movements. The study presented a qualitative analysis of disaster mitigation developments and identified key factors that influence the effectiveness of mitigation policy implementation in Indonesia. It was relevant to highlight the preparedness of Acehese communities, given that Aceh is an area with a significant history of earthquake and tsunami disasters. It also provided important insights into how strengthening community preparedness can be done through community-based mitigation (Andriansyah, 2024).

From all the articles reviewed by the author, it can be explained that good coordination and cooperation between the government, related institutions, the community, and the private sector are crucial to strengthening overall community preparedness. Strong synergies in implementing preparedness programs can increase effectiveness and efficiency in dealing with disasters and reduce risks and losses. In this context, the role of the government and related institutions is also very important and needs to be clarified.

Indonesia's geographical position in a seismically prone region and its location on the Equator increases the risk of various geological and hydrometeorological disasters, including floods, flash floods, droughts, and forest fires. Disaster mitigation efforts in Indonesia must be supported by high public awareness of disaster risks. This awareness needs to be supported by disaster mitigation education and public policies that ensure better preparedness at all levels of society. The contribution of this study is to build the preparedness of the Acehese community in facing the threat of a megathrust earthquake a structured disaster mitigation strategy is needed at both the community and institutional levels. In this context, the effective implementation of mitigation policies plays an important role in reducing disaster impacts. Mitigation efforts in Aceh can include periodic earthquake simulations, the development of disaster-resistant infrastructure, and increasing public knowledge through socialization and mitigation training (Darmawan, 2019).

Education on disaster hazards and risks should be incorporated into public policies and encouraged through community-based approaches. Cultivating this awareness must be done early to foster a strong culture of preparedness. Cross-sector collaboration between the government, academia, community organizations, and the private sector is needed to build resilience to disasters throughout Indonesia. Community participation in mitigation and adaptation activities is an important step to improving national preparedness. Community-based mitigation programs that involve local communities in preparedness exercises can significantly reduce vulnerability and disaster impact risks

(Nugroho, 2022).

The government is responsible for providing policies that support the improvement of community preparedness. In addition, relevant institutions, such as the National Disaster Management Agency (NDMA) and the Regional Disaster Management Agency (RDMA), should play a significant role in providing technical support and adequate resource allocation for running preparedness programs (BNPB, 2021). Technology is also a significant element in strengthening community preparedness. The development of an effective and accurate early warning system and the dissemination of timely and reliable information will go a long way in reducing the impact of such disasters (Wulandari, 2022). Furthermore, the utilization of social media and other technology-based applications and online communication can make it easier for people to get the latest information and share their experiences and knowledge about disasters (Mulyadi, 2023).

By increasing public awareness, knowledge, and preparedness, it is hoped that our communities can become more resilient, adaptive, and better able to deal with disasters (Yusuf, 2021). In addition to physical preparedness, psychological preparedness must also be taken seriously. Social support and psychological recovery after a disaster are crucial in ensuring that the community can go through the recovery process well and return to normal life quickly. Therefore, sufficient attention and effort are needed to address these aspects.

Training programs provide the people of Aceh with the necessary knowledge and skills to act effectively in emergencies. Regular evacuation simulations help people recognize safe evacuation routes and minimize risks during disasters. Infrastructure development that includes earthquake-resistant buildings, evacuation roads, and reliable communication facilities are also important factors in strengthening community preparedness (Zulkarnain, 2022). Furthermore, the role of local communities should not be overlooked. Collaboration between local communities, the government, and related agencies makes for a more comprehensive and effective emergency response plan in the face of disasters (Shaw, 2020).

Through an improved understanding of disaster risks, local communities can actively build public awareness and enhance preparedness. Effective communication networks between local communities, the government, and relevant agencies are also important tools for coordination in emergencies (Rizky, 2020). The analysis of this article not only provides a more comprehensive understanding but also aims to provide guidance for the government, relevant agencies, and local communities in designing and implementing effective programs in the face of a megathrust earthquake disaster in Aceh.

By developing community preparedness, it is expected that the level of public safety can be well maintained and losses minimized when facing a megathrust earthquake disaster in Aceh. Moreover, this increased preparedness will enable communities to respond quickly and effectively to disaster threats, minimize losses, and recover better after a disaster occurs (Halim, 2021). Therefore, concrete steps taken by the government and relevant agencies, as well as the role of local communities, are crucial to achieving this goal. Thus, improving community preparedness for a megathrust earthquake in Aceh should be a top priority for all parties involved. Community safety and the sustainability of the region depend on collective efforts to improve disaster preparedness and response (Ismail, 2018)

The literature review explores how local communities work together with the government and relevant agencies to develop emergency response plans, improve understanding of disaster risks, and build effective communication networks for disaster

management. Local communities have valuable local knowledge and wisdom in dealing with disasters, and collaboration with the government and relevant agencies will ensure that these preparedness efforts are more effective. By analyzing these articles, we hope to gain a more comprehensive understanding of the preparedness of Acehese communities in the face of a megathrust earthquake. This will provide an important basis for improving the safety and sustainability of Acehese communities in the future.

4. Conclusions

Community preparedness in the face of a megathrust earthquake is crucial and increasingly relevant given the growing complexity of disaster threats in Indonesia. Building community preparedness requires active participation from the community at all stages, the role of the government and related institutions, and the utilization of existing technology and resources. Through synergistic efforts, it is hoped that our communities can become more resilient, adaptive, and able to reduce the risks and impacts of these disasters.

To achieve this goal, capacity building and more intensive training for the community are needed. Additionally, adequate financial support from the government and international institutions is essential for the effective and optimal implementation of preparedness programs. All parties, including the government, the community, and related institutions, must continue to work together to address this disaster.

In this way, we can ensure that the preparedness of our communities is strengthened and can better cope with disasters in the future. It is important to remember that strengthening community preparedness does not only depend on stakeholders and the government itself but also requires active participation and awareness from every individual in the community. With a unified vision and common goal, we can build resilient and sustainable preparedness.

The five articles reviewed provide a valuable perspective on community preparedness in facing disasters, emphasizing the importance of understanding the social context and special needs of vulnerable groups, as well as building community awareness and strong collaboration in disaster mitigation. This is in line with efforts to improve preparedness in Aceh by involving all elements of society according to their capacity and capability. Hence, this study will contribute to a better understanding of how Acehese communities can be prepared for future megathrust earthquake disasters.

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