

Community Empowerment in Recovering from the Impact of the Central Tapanuli Disaster in North Sumatra

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Abstract. *Disaster is a series of events that threaten and disrupt the lives and livelihoods of people caused by both natural and/or non-natural factors as well as human factors, resulting in human casualties, environmental damage, property losses and psychological impacts and beyond the capabilities of the community with all resources. The purpose of this Community Service is to help recover from the impact of floods and landslides both in terms of meeting needs during evacuation. The Implementation Method is carried out through FGDs and Counseling during the Evacuation as well as providing Flood Disaster Assistance, Floods and Landslides in addition to causing casualties, also cause damage to homes, public facilities, other important infrastructure and the emergence of post-flood and landslide diseases, especially infectious diseases and respiratory disorders as well as psychological impacts so that this slows down the recovery process. Currently, residents, especially in flood-prone areas, need health assistance, medicines, clean water and health education to prevent health crises both physically and psychologically. Considering the current situation and conditions, to support the accelerated recovery of disaster-affected communities, serious and integrated efforts are needed to target priority groups as the initial step towards successfully improving health in flood and landslide areas.*

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INTRODUCTION

North Sumatra Province is one of the regions in Indonesia with a high level of vulnerability to natural disasters, particularly floods and landslides. Its geographical location, dominated by mountains, river basins, and high rainfall, frequently causes various regions in North Sumatra to experience hydrometeorological disasters. In addition to natural factors, environmental damage due to land conversion, deforestation, and the lack of a proper drainage system also exacerbate the risk of flooding and landslides (Nasri et al., 2025; Yamamoto et al., 2021; Arrisaldi et al., 2021; Pacheco Quevedo et al., 2023; Umar & Triyatno, 2024). Furthermore, natural disasters also result in economic losses for the population. The current environmental conditions are very concerning.

The impact of flooding, with its devastated environment and impaired sanitation, increases the risk of disease, especially infectious diseases such as diarrhea, acute respiratory infections (ARI), skin diseases, leptospirosis, and the potential for dengue fever outbreaks (Gan et al., 2021; Syamsih et al., 2025; Junejo et al., 2023; Rupa & Hossian, 2024; Acosta-España et al., 2024; Yazdi et al., 2024; Luangnara et al., 2026). The dirty environment, stagnant water, and the concerning conditions will impact the health of affected residents. Based on collected data, an estimated 646

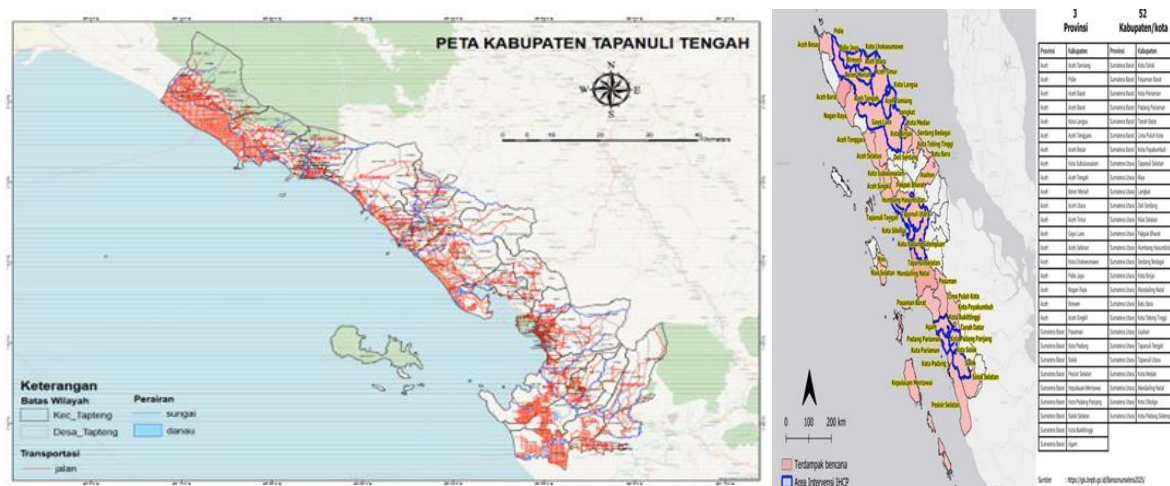
people suffered injuries, ranging from minor to serious. The number of displaced persons is currently estimated at 38,932 in the cities of Sibolga and Central Tapanuli. This requires serious attention in the handling and recovery of health for victims affected by floods and landslides. Health conditions worsen during evacuation, especially for vulnerable groups such as toddlers, pregnant women, and the elderly (Gan et al., 2021; Suhr & Steinert, 2022). Crowded and damp evacuation conditions increase the risk of disease spread. Poor sanitation, limited access to nutritious food, and handling of accidents or minor trauma can increase the risk of wound infection due to slow treatment (Willetts et al., 2022; Syamsih et al., 2025; Rupa & Hossian, 2024).

In recent years, floods and landslides in North Sumatra have had a significant impact on the community. Several areas such as Central Tapanuli, South Tapanuli, Sibolga City, Langkat, and Padangsidempuan are frequently affected. The National Disaster Management Agency (BNPB) noted that extreme rainfall is one of the main causes of flash floods and landslides in these areas. Floods and landslides not only cause environmental damage, but also cause loss of life, damage to homes, public facilities, and disruption to community economic activities. BNPB reported that thousands of residents in North Sumatra had to evacuate due to floods and landslides that occurred in several districts/cities. Furthermore, damage to infrastructure such as roads, bridges, and educational facilities hampers aid distribution and recovery in affected areas (Nasri et al., 2025; Yamamoto et al., 2021; Nugraheni et al., 2022; Mulia & Handayani, 2024). Given the magnitude of the impact, managing floods and landslides in North Sumatra requires collaboration between the government, communities, and various relevant parties (Soetanto et al., 2022; Selvia & Angela, 2024). Mitigation efforts such as reforestation, improving spatial planning, building drainage systems, disaster education, and enhancing early warning systems need to be implemented sustainably to reduce the risk of future disasters (Rahardjo & Sujono, 2023; Aprianti et al., 2025). With appropriate and planned management, it is hoped that the impact of floods and landslides can be minimized, thereby maintaining the safety and well-being of the community.

Partner Issues

The existing conditions of the affected partners and communities are extremely concerning due to poor environmental sanitation, which can potentially lead to the spread of infectious diseases and respiratory problems due to hardened landslides and dirty dust surrounding residential areas. Furthermore, nutritional food supplies are inadequate due to limited access to essential food supplies. Insufficient food supplies also initiate a decline in health, which in the long term directly impacts nutritional needs, leading to a weakened immune system, and if not addressed promptly, can have even more devastating consequences. Disasters pose various potential health problems for affected communities. These impacts are felt more severely by vulnerable population groups.

The primary problem is the lack of comprehensive coordination of mitigation efforts to effectively rehabilitate disaster-affected areas. This can result in higher costs, inefficient resource waste, and delayed rehabilitation processes, causing additional suffering for affected communities, who are hoping for the restoration of services for a better, more sustainable future. Global experience shows that implementing integrated interventions targeting priority groups, particularly vulnerable toddlers, pregnant women, and the elderly, is key to successfully accelerating and sustaining disaster recovery. Target partner profile: Central Tapanuli Regency is a flood and landslide disaster area.



Based on the alignment of the implementation team's focus areas, the technology and innovations to be implemented are closely related to public health science in providing health services by assisting affected target partners to ensure their needs are met, as well as eradicating infectious diseases according to minimum standards. Mental health is also important for recovering psychologically from the impacts of flooding. According to the World Health Organization (WHO), mental health is a person's ability to adapt to themselves and their surroundings in general, enabling them to experience joy, happiness, live with ease, behave socially normally, and be able to face and accept the various realities of life. The issues and data outlined above point to the fact that maintaining physical and mental health has become crucial during this critical period of disaster. Therefore, interventions are needed to educate the community about the importance of self-defense activities and balanced nutritional intake for mental health through outreach. Furthermore, this community service activity aligns with local government activities in supporting.

The target partner's issues related to the main focus areas are supplemented by two aspects (non-productive communities) or three aspects (productive communities). As a disaster-prone country, floods and landslides are a serious problem. In Hajoran Village, Pandan District, Central Tapanuli Regency, 4,759 residents were affected by floods and landslides, which resulted in environmental damage and loss of livelihood. The disaster was caused by the destructive power of water such as erosion and sedimentation, landslides due to the destructive power of water causing rice fields to be flooded, buried, destroying housing and community settlements, damaging social and economic service facilities and public infrastructure, even claiming many lives, and damaging the environment. Globally, it will affect economic productivity, income and the quality of the nation. The impact in the health sector also experienced obstacles in fulfilling access to basic health services. Post-disaster activities by carrying out recovery require a very comprehensive and multi-dimensional discussion, not only the responsibility of the government but also part of the responsibility of all parties. This Target Partner is a Productive group (members of the Merah Putih cooperative) affected by the flood currently requires assistance and support in providing ready-to-eat food stocks that are easily obtained so that they can be consumed by families every day to fulfill balanced nutrition and increase body immunity to avoid infectious diseases due to poor environmental sanitation. Body immunity will increase if nutritional food needs are met. Currently the Government has held a coordination and consolidation meeting by collaborating across sectors and one of them is the University to jointly realize the recovery program for communities affected by floods and landslides. The fulfillment of basic health services for affected residents is very much needed to prevent health problems such as the spread of diseases such as respiratory disorders, ARI, diarrhea, DHF, typhus and other skin diseases due to poor environmental sanitation.



Figure 3. Conditions at the Disaster Location in the Refugee Camp

Conducting Focus Group Discussions (FGD) on campaign or socialization activities is an alternative way to solve problems by providing persuasive information to families and communities to help the community have an impact.



Figure 4. Distribution of Donations to The Community to Meet Their Needs During the Evacuation



Figure 5. Family empowerment: Providing counseling for families with toddlers to fulfill their nutritional needs during evacuation.



Community Participation in Post-Disaster Response

The focus group discussion and outreach provided a way for the implementing team to engage with residents during evacuation. This approach is relevant in disaster settings, where needs can differ across households and change as recovery progresses. Studies of post-disaster participation suggest that community involvement can help make responses more attentive to local priorities and strengthen collective capacity (Tuhkanen, 2023; Duque Monsalve et al., 2024; Zhao et al., 2025). In the present program, however, the manuscript does not report what participants said during the discussion or how their views changed subsequent activities. The focus group discussion should therefore be understood as a documented form of engagement, rather than evidence that community priorities were incorporated into specific decisions.

Flood and landslide recovery also depends on the conditions in which affected residents live. Research on disaster risk and community resilience highlights the importance of local context, resources, and sustained participation (Cruickshank et al., 2024; Güngör & Elburz, 2024). The photographs of the evacuation site establish the setting for this program, but they do not measure residents' needs or resilience. Reporting the concerns raised by participants in future activities would provide a stronger basis for explaining why particular forms of assistance were selected.

Immediate Assistance and Family Nutrition

Donation distribution addressed the immediate disruption of daily necessities faced by displaced residents. The nutrition counseling for families with toddlers added a more targeted activity for a group whose food needs may be difficult to meet during evacuation. Research on emergency food and nutrition education supports addressing both access to food and practical knowledge in disaster responses (Fleischhacker et al., 2024). The present article establishes that donations were distributed and counseling was provided, but it does not report the number of recipients, the supplies delivered, or changes in families' food practices. Its findings consequently concern service delivery, rather than measured improvements in nutritional status.

The broader health literature helps explain why immediate assistance matters in evacuation settings. Displacement and limitations in water, sanitation, and hygiene can increase health risks after disasters (Tokumaru et al., 2021; Alareqi et al., 2024; Yazdi et al., 2024; van der Heijden et al., 2022). These risks provide context for the program; the article does not report disease surveillance, clinical assessments, or a clean-water intervention. Claims that the activities prevented infection or improved health would require evidence beyond the reported photographs and narrative description.

Scope of the Program and Implications for Recovery

The original article identifies sanitation and psychosocial support as important elements of post-disaster recovery. That emphasis is consistent with literature on hygiene interventions and psychological support after emergencies (Alareqi et al., 2024; Yazdi et al., 2024; Hermosilla et al., 2023; Movahed et al., 2022). The Results, however, do not document environmental

cleanup, sanitation facilities, psychological counseling, or trauma support as completed activities. These remain relevant priorities for future work, but they cannot be presented as outcomes of the program described here.

The participation of students, volunteers, and partner institutions also offers a basis for organizing continued community service. Previous studies describe how service learning and volunteer preparation can support disaster-related work and student development (In et al., 2022; Kane et al., 2022; Gautam et al., 2022), while research on volunteering points to the need for appropriate preparation and support (Demirbilek & Öztürk, 2023). Because this article does not specify participants' individual roles or evaluate student learning, those benefits remain potential implications rather than findings. Future programs could document each partner's contribution, the number of residents reached, and follow-up information to assess whether initial assistance connects to sustained community recovery (Tuhkanen, 2023; Duque Monsalve et al., 2024; Zhao et al., 2025; Güngör & Elburz, 2024; Cruickshank et al., 2024).

CONCLUSION

The implementation of community service programs in flood- and landslide-affected areas in North Sumatra was carried out through several integrated stages, starting with preparation, outreach, health services, nutritional support, environmental sanitation rehabilitation, psychosocial support, and monitoring and evaluation of activities. All stages were carried out in a participatory manner, involving local governments, health workers, volunteers, students, and disaster-affected communities.

SUGGESTION

Regional governments are expected to improve disaster mitigation and preparedness systems by strengthening early warning systems, improving regional spatial planning, normalizing drainage, rehabilitating river basins, and implementing reforestation in areas prone to landslides and flooding. Communities are expected to be more active in maintaining environmental cleanliness, implementing Clean and Healthy Living Behaviors (PHBS), and increasing awareness of waste management and environmental sanitation to reduce the risk of post-disaster disease spread. Community service activities in disaster areas are expected to be implemented sustainably and integrated with regional development programs so that their benefits can be felt in the long term by affected communities.

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