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Pentahelix Collaboration in Achieving Disaster Preparedness through Resilient Villages: A Systematic Literature Review

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Abstract

Pentahelix is one of the disaster preparedness approaches. This study aimed to provide an overview of the roles of each component in pentahelix collaboration occurring in several countries, thereby enhancing the effectiveness of disaster preparedness. Indonesia is the country with the second-highest disaster risk in the world, with a total of 3,472 disasters occurring in 2024.. Pentahelix collaboration has not been optimal, and disaster preparedness has not been achieved. This systematic literature review was conducted in accordance with PRISMA guidelines, compiling relevant studies from databases including PubMed, ScienceDirect, and Scopus. The literature search was carried out between April and June 2024 using specific keywords. The search yielded a total of 3.848 articles across the selected databases. Of these, 2.384 articles were obtained from Scopus, 1.277 from Science Direct, and 187 from PubMed. After the screening process, 13 relevant articles were identified for further review. Conclusion: the Government, private sector, community, academics, and media play crucial roles in disaster preparedness effectiveness. Overall, the success of disaster preparedness depends on strong cooperation and coordination among all stakeholders. Strong coordination and close collaboration among all stakeholders through Penthahelix collaboration are crucial to minimize the impact of disasters and accelerate the recovery of critical infrastructure.

Introduction

The 2022 World Risk Report (WRR) indicated that the Philippines, India, and Indonesia ranked among the top three countries with the highest disaster risk index (IFHV, 2022). As entities responsible for public safety, governments have undertaken disaster mitigation efforts (Huang *et al*., 2021; Yulianto *et al*., 2021). However, these efforts have not established a resilient preparedness system (Mas'Ula *et al*., 2019). In some regions of Indonesia, local governments and their apparatus lack preparedness when disasters strike (Andreastuti *et al*., 2019).

Aligned with the formula where hazard equals risk divided by capacity, reducing hazard necessitates increasing the capacity of actors or regions (Gerges *et al*., 2023). In other words, if more actors possess the capacity for disaster preparedness and response in an area, the region's hazard will be more negligible, or its disaster risk index will be lower (Hardy *et al*., 2020). Pentahelix is a development model of the Quadruple Helix. The number of stakeholders involved increases, and multisectoral mechanisms become more comprehensive. Comprehensive actions and role allocation make disaster management efforts more effective (Haifani *et al*., 2022). The pentahelix collaboration, comprising government, private sector, community, academia, and media, has a distinct role based on its potential (Guzmán-

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Cortés *et al*., 2022; Haksama *et al*., 2022). Each component of the pentahelix plays a role in every phase of a disaster: pre-disaster, disaster response, and post-disaster recovery. Within the disaster phase, preparedness focuses on the first quadrant, pre-disaster (Haifani & Paripurno, 2022). Disaster-aware components can increase the willingness and awareness to collaborate with various parties to anticipate potential regional disasters (Westcott *et al*., 2020; Yuningsih *et al*., 2017). Prior research has yet to comprehensively discuss all components of the pentahelix collaboration in disaster preparedness. Therefore, this systematic literature review aims to describe the roles of each element in the pentahelix collaboration occurring in several countries, thereby enhancing the effectiveness of disaster preparedness.

Methods

The systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, as described in the Cochrane Collaboration Handbook. Relevant studies were sourced from databases including PubMed, ScienceDirect, and Scopus through advanced search techniques by using Boolean operators (AND/OR). The keywords employed were refined using Medical Subject Headings (MeSH) to ensure comprehensive coverage of relevant literature (Figure 1). The literature search was carried out between April and June 2024.

The inclusion criteria for this study were: (1) the study population was disaster-resilient villages or areas with disaster preparedness schemes; (2) articles published within the past five years (2019–2024); (3) articles in English and full-text; (4) qualitative or mixed-methods studies; (5) original research publications. The exclusion criteria in this study were: (1) studies in areas without disaster preparedness; (2) articles published before 2019 were excluded from the review; (3) articles that were not in English, not open access, and only provided abstracts; (4) publications in the form of review articles, book chapters, or encyclopedia entries. The selection and screening of studies were carried out using Mendeley Desktop. Studies deemed irrelevant and duplicate records were excluded. The remaining articles were then evaluated according to predefined inclusion and exclusion criteria. Data extraction was conducted systematically, ideally involving more than one researcher to reduce potential bias. The extracted data included author names, study location, study objective, research design, pentahelix components, and key findings. Article quality was appraised using ten criteria derived from the Joanna Briggs Institute (JBI) and the Mixed Methods Appraisal Tool (MMAT). Based on the proportion of positive responses, the risk of bias was categorized as high (<30%), moderate (31%–70%), or low (>70%).

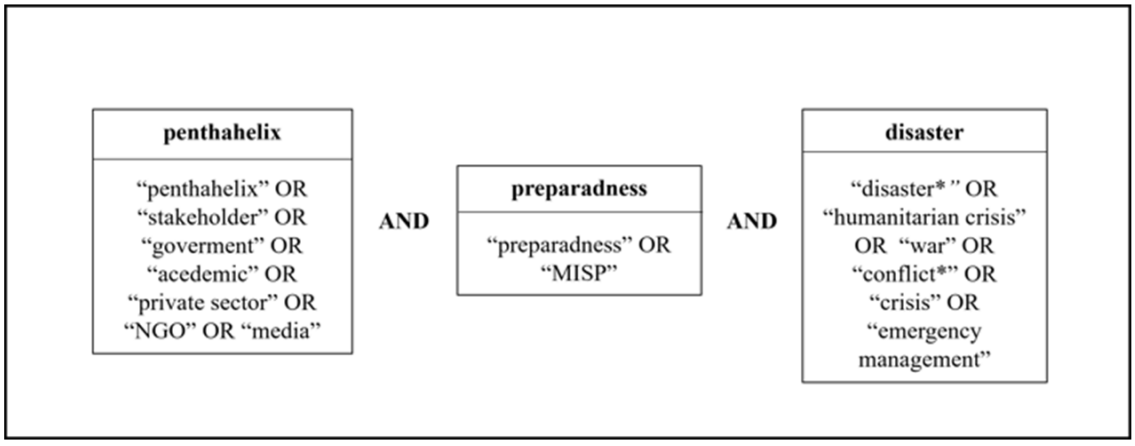

Figure 1. Keywords

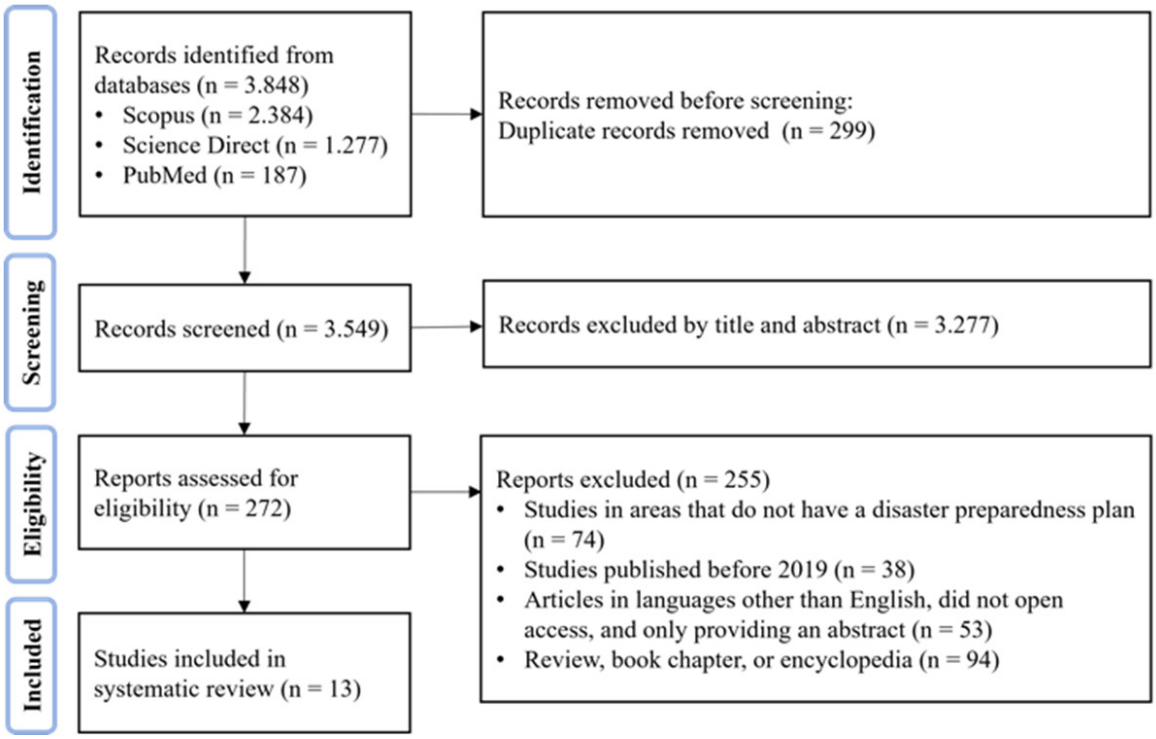

Figure 2. PRISMA Flow

Result and Discussion

The selection of studies adhered to the PRISMA guidelines, as depicted in Figure 2. From the results of the article search through databases using relevant keywords and considering the year of publication, 3,848 articles were found. In the final stage, 13 articles were selected for further analysis.

Of the 13 studies obtained, 2 were mixed-methods, while the remaining 11 were qualitative. The characteristics of the studies are classified in Table 1. Based on the assessment of article quality using the JBI Critical Appraisal Tools for qualitative studies and MMAT for mixed-methods studies, all 13 articles had a low bias, with "yes" answer obtained above 70% for all articles.

The pentahelix approach, as a collaborative or multi-stakeholder strategy, integrates various elements such as government, corporations, educational institutions, communities, and media to solve problems and develop programs by involving different sectors in role-sharing (Pasaribu *et al.*, 2023).

Table 1. Characteristics of the Studies

Author, year	Countries	Objectives	Methods, Design	Pentahelix Components	Findings
(Krongthaeo *et al.*, 2021)	Thailand	This study aimed to describe flood experiences, flood preparedness, and collaboration of care for dependent older adults and their family caregivers in Thai communities.	Qualitative study	Non-governmental Organizations (NGO)	This study emphasizes the importance of an inclusive community-based approach that considers the specific needs of dependent elderly individuals in flood preparedness planning and implementation.

Author, year	Countries	Objectives	Methods, Design	Pentahelix Components	Findings
(Vij *et al*., 2020)	Nepal	This article explains various disaster governance paradigms that have emerged and currently exist in Nepal.	Qualitative case study	Government, stakeholders, media	This study explains that the evolution of disaster governance in Nepal towards a more inclusive, decentralized, and technology-based approach has enhanced the country's capacity to respond to disasters more effectively and sustainably.
(A. Hermawan *et al*., 2024)	Indonesia	This study investigates community engagement in fostering disaster preparedness in the Kepuharjo and Umbulharjo, the most vulnerable villages of Merapi slopes in the Cangkringan District of Sleman Regency.	Qualitative field study	Non-governmental Organizations (NGO)	The finding implies the significance of encouraging structural and cognitive approaches in developing policies to strengthen community-based disaster resilience and, in the theoretical insights, broadening the social capital lens in social studies of disaster.
(Sandaran & Selvaraj, 2021)	Malaysia	This study aimed to understand how government communication shapes responses, actions, and community empowerment in flood preparedness.	Qualitative study	Government	Government agencies' communication style regarding flood preparedness can influence how they respond to floods and whether communities are empowered to take action themselves. The findings suggest a focus on traditional relief and rehabilitation, potentially neglecting the importance of community involvement.
(R. Jayasekara *et al*., 2022)	Sri Lanka	This study evaluated the network of stakeholders in the National Early Warning System of Sri Lanka during preparedness planning.	Qualitative study	Stakeholder, government, private sector	Risk governance, emergency response and preparedness measures, institutional collaboration, community engagement in disaster preparedness planning and response, and the well-being of vulnerable communities were significantly affected during the COVID-19 pandemic. To cope these challenges, improvements such as a sound legal basis, strong institutional coordination among stakeholders, emulation of a multi-sectoral approach including the health sector, empowering local authorities, and strengthening hazard forecasting and predictions are needed.

Author, year	Countries	Objectives	Methods, Design	Pentahelix Components	Findings
(Nick *et al*., 2023)	Western Germany	This study explored collaborative processes in the disaster response of critical water and health sectors following the 2021 floods in Western Germany.	Qualitative study	Stakeholder, Non-governmental Organization (NGO)	Organizational factors, including collaboration, coordination, communication, information management, and time management, were vital and interacted with physical, human, and social aspects and the overarching legal frameworks and policies within the disaster context. Lacking many enabling factors, the German flood response was insufficient, showing that critical infrastructures, interdependencies, and collaborative processes need a more substantial consideration in preparedness planning.
(Seddighi *et al*., 2023)	Iran	This study identified challenges of the existing disaster preparedness education programs for children in Iran.	Qualitative study	Academic, stakeholder, Non-governmental Organization (NGO)	The main challenges of disaster education programs in Iran are Communication (stakeholder communication, stakeholders' recognition, informing of stakeholders, and reliability), planning (sustainable planning, timetable, inclusivity, educational resources), coordination (inter-organizations, intra-organizations), and logistics (staff, trainers, equipment, budget).
(Graham *et al*., 2022)	Eastern Caribbean countries	This study aimed to identify and evaluate effective stakeholder relationship management strategies for improving situation awareness during volcanic emergencies in the Eastern Caribbean region.	Qualitative case study	Stakeholder	Strong relationships between volcano scientists and authorities, coupled with purpose-driven communication methods, can improve decision-making capacity among public officials, reducing public vulnerability.

Author, year	Countries	Objectives	Methods, Design	Pentahelix Components	Findings
(Beek *et al*., 2021)	Fiji and Tonga	This study aimed to identify the capacity development activities undertaken in the SPRINT program in Fiji and Tonga and how these enabled the sexual and reproductive health (SRH) response to Tropical Cyclones Winston and Gita.	Qualitative study	Non-governmental Organizations (NGO), stakeholder	This research has outlined the need for comprehensive activities at multiple levels within a country and across the Pacific region to build capacity for an SRH response in crises. The study highlights the importance of formal partnerships, regular communication, institutionalizing, accountability mechanisms, and training to ensure up-to-date coordination efforts in disaster readiness.
(Booth *et al*., 2020)	European countries	This study aimed to identify and evaluate solutions involving stakeholders in building interdisciplinary and international synergies between Climate Change Adaptation and Disaster Risk Reduction.	Quantitative and qualitative study (mixed-methods)	Stakeholder, private sector	The research results emphasize the importance of clear communication, maintaining political support, and involving the currently under-utilized private sector in positively establishing closer cooperation between Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR).
(Hasbi *et al*., 2023)	Indonesia	This study optimizes the implementation of the School Development Plan in flood disaster mitigation policies on a tropical rain forest at State Junior High School 5 Samarinda.	Qualitative study	Academic, stakeholder	The conceptualization of the School Development Plan in the flood disaster mitigation policy in a tropical rain forest at the State Junior High School 5 Samarinda, through environmental data analysis, stakeholder participation, and accommodating the concept of tropical schools, has been fully optimized. Implementing the School Development Plan in flood disaster mitigation policies in a tropical rain forest at State Junior High School 5 Samarinda through three basic mitigation programs and periodic evaluations has not been optimal.
(Khaledi *et al*., 2023)	Iran	This study aimed to investigate factors affecting the participation of NGOs in disaster management in Iran.	Qualitative study	Non-governmental Organization	Factors affecting the participation of NGOs in disaster management were classified into four main categories and 14 subcategories, including organizational and managerial, field and operational, social and cultural, and policymaking factors.

Author, year	Countries	Objectives	Methods, Design	Pentahelix Components	Findings
(Jardine *et al*., 2023)	United Kingdom	This study examines the extent to which meteorological variability, short-term response, and long-term policies contributed to the catastrophe of Storm Dennis and Ciara.	Quantitative and qualitative study (mixed-methods)	Media, government	The study underlines the importance of multidisciplinary research in understanding extreme weather events and exhibits the diverse factors that cause catastrophes.

Source: Primary Data, 2025

Roles of Stakeholders and Government in Disaster Preparedness

Each stakeholder has a unique and complementary role in detecting, disseminating information, and responding to multi-hazard threats amidst biological outbreaks (Graham *et al*., 2022; R. U. Jayasekara *et al*., 2023). Strong coordination and close cooperation among all stakeholders are vital to minimizing the impacts of disasters and accelerating the recovery of critical infrastructure (Ashraf *et al*., 2023; Nick *et al*., 2023). Research in the Philippines highlights the role of national institutions in providing technical support, funding, and resources to local governments. They also offer guidelines and frameworks for disaster preparedness and response (Dariagan *et al*., 2021; Kanteler & Bakouros, 2024). Local governments play a vital role in coordination; provincial disaster agencies (BPBD) can unite various sectors (Handayani *et al*., 2024). From the perspective of reproductive health during disasters, strengthening reproductive health communication in early marriage is a critical component of disaster preparedness, where the role of stakeholders—such as health educators, community leaders, and policy makers—is essential in ensuring that young couples are equipped with the knowledge and resources needed to manage reproductive health risks in emergency contexts (Najib *et al*., 2020; Nisa *et al*., 2025).

The government is crucial in driving coordination to strengthen connections among the pentahelix components. The government has supporting resources to accommodate meetings involving the other four elements of the pentahelix. The established coordination serves as a medium to map the potential of each component within the pentahelix as well as the roles that can be played to build preparedness in the region. Research in Nepal underscores the role of the government in strengthening policies, decentralizing authority, adopting technology, building capacity, and cooperation and coordination with various stakeholders as the key to enhancing the country's capacity to deal with disasters more effectively and sustainably (Márquez-Lameda, 2022; Vij *et al*., 2020). Government efforts not only improve the efficiency of disaster response but also strengthen the capacity of communities to withstand and recover from the impacts of disasters (Bera, 2023; Lalancette & Charles, 2022). The government's active role in all aspects of flood disaster preparedness demonstrates the importance of government leadership and support in reducing disaster risk and improving public safety and well-being (Sandaran & Selvaraj, 2021).

Role of the Private Sector in Disaster Preparedness

The private sector is often overlooked in efforts to integrate Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR). The private sector can help provide the resources, innovation, and technology needed to improve disaster preparedness and mitigation (Booth *et al*., 2020). Contributions by the private sector in biological outbreak situations include technology infrastructure, financial support, innovation, and the provision of health services. Financial investments from private companies

can help maintain and improve the capabilities of early warning systems (Gozzoli *et al*., 2024). In preparing logistics preparedness, including food and health, private sector support is needed. Disaster-affected communities will need personal hygiene kits (dignity kits) during emergencies. Logistics preparedness, with the support of the private sector, will be able to reduce the time required for distribution and expand the distribution coverage area during emergencies.

In Sri Lanka, the private sector contributes to disaster preparedness by supplying technological infrastructure, including Multi-Hazard Early Warning Systems (MHEWS), through telecommunications, data processing, and information dissemination systems to ensure timely alerts reach the public. Public–private collaboration plays a vital role in enabling the exchange of resources, expertise, and knowledge to strengthen disaster risk reduction efforts (R. U. Jayasekara *et al*., 2023).

Role of Academia in Disaster Preparedness

Research institutions and academics, working with the government, play a role in providing the necessary scientific data and analysis (Graham *et al*., 2022). Academics play a role in designing, developing, and evaluating disaster mitigation policies and plans. Academics also contribute to creating disaster mitigation components by integrating mitigation principles into these plans, so that policies are not only reactive but also preventive. In the monitoring and evaluation process, academics assess the extent to which disaster mitigation plans are implemented, identify the strengths and weaknesses of these policies, and provide recommendations for more effective and efficient improvements (Hasbi *et al*., 2023).

Academics can develop holistic and integrated educational programs to ensure that disaster education programs receive the necessary support, good knowledge and can be implemented effectively in the field (Boland *et al*., 2024; Indarjo *et al*., 2022; Nugroho, Istiada, *et al*., 2025). Academics contribute not only through research and curriculum development, but also through teacher training, program evaluation, advocacy, and collaboration with various stakeholders (Seddighi *et al*., 2023). teacher training, program evaluation, advocacy, and collaboration with various stakeholders (Seddighi *et al*., 2023). In addition, the role of academics in disaster preparedness through research activities and community service activities, they are able to develop various programs to increase village resilience to multi-disaster threats, starting from the village or from elementary and secondary schools in the village. Resilience to multi-disaster threats is seen as a strategic approach, namely starting from building commitment, policies and regulations, planning, budgeting, risk assessment, teamwork, coordination, standard operating procedures, technical guidelines, monitoring and evaluation, resource mobilization, infrastructure, information systems, assembly points, safe zones, sister schools, curriculum integration, integration into learning activities, training program simulations, trained teachers, information dissemination, student cadres, and safety competitions (Widowati *et al*., 2021, 2023).

Role of Non-Governmental Organizations in Disaster Preparedness

A study conducted in Thailand highlights the crucial role of non-governmental organizations in enhancing community-based flood preparedness for the elderly. Through various initiatives and interventions, non-governmental organizations help ensure that vulnerable elderly populations have access to the education, resources, support, and networks needed to cope with and recover from disasters. The active role of non-governmental organizations in advocacy and policy change is also crucial to create a safer and more resilient environment for the elderly in Thailand (Krongthaeo *et al*., 2021). Initiatives undertaken by non-governmental organizations not only enhance the capacity of local communities to cope with disasters but also strengthen overall disaster management systems in the region. The formation of Disaster Preparedness Groups empowers community members to take an active role in disaster planning and emergency response efforts on Mount Merapi, Indonesia (D. Y. Hermawan *et al*., 2023; Nugroho, Nisa,

et al., 2025). Communities are encouraged to use locally available resources for disaster preparedness, including using local materials to build safer homes and create community-based emergency response kits (A. Hermawan *et al*., 2024).

The flexibility of non-governmental organizations in innovating together with communities is one of the advantages optimized in finding new approaches or methods in efforts to improve disaster preparedness. Collaboration involving communities and non-government organizations improves effective communication, leadership, transparency, and technology optimization (Nyadenga & Davis, 2023; Windraswara, 2009). The results of piloting that produce updates become models that can be further developed or adopted by the government, and applied to wider areas.

Role of Media in Disaster Preparedness

The Nepalese government has adopted modern technology to improve the effectiveness of disaster management, like the use of Geographic Information Systems (GIS), weather monitoring tools, and mobile applications to inform the public about potential threats and provide evacuation guidance (Vij *et al*., 2020). Overall, the role of the media in investigating storms Ciara and Dennis shows that effective communication and rapid dissemination of information can help reduce the impacts of disasters and improve public preparedness (Jardine *et al*., 2023). Through social media, people can report local situations, request assistance, and provide direct feedback to those responsible (Zander *et al*., 2022). Research on the use of technology in disaster preparedness found that Internet of Things (IoT) sensors can be applied to monitor environmental conditions, such as water levels during floods or ground vibrations before earthquakes. To identify disaster risk patterns and trends, big data analysis from various sources can be used to design more effective mitigation strategies. Virtual Reality (VR) and Augmented Reality (AR) based simulations can help people understand disaster situations and evacuation drills, as well as increase readiness to face real disasters. Collaboration between technology and media can produce more effective and inclusive disaster responses (Latvakoski *et al*., 2022).

Conclusion

Personal relationships, individual motivation, organizational response, and positive community relations are key to providing reproductive health services during emergencies. Governments play a central role in strengthening policies, decentralizing authority, adopting technology, building capacity, and collaborating with various stakeholders. The private sector also plays a vital role in providing the resources, innovation, and technology needed for disaster preparedness and mitigation. Academics contribute through research, policy development, and education, while non-governmental organizations strengthen community preparedness through advocacy, resource mobilization, and building local capacity. The collaboration between media and technology also plays a role in producing more effective and inclusive disaster responses. Overall, the success of disaster preparedness depends on strong cooperation and coordination among all stakeholders. Each stakeholder has a unique and complementary role in detecting, disseminating information, and responding to multi-hazard threats, including biological outbreaks. Strong pentahelix collaboration among all stakeholders contributes to minimizing the impacts of disasters and accelerating the recovery of critical infrastructure.

References

Andreastuti, S., Paripurno, E., Gunawan, H., Budianto, A., Syahbana, D., & Pallister, J., 2019. Character of Community Response to Volcanic Crises at Sinabung and Kelud Volcanoes. *Journal of Volcanology and Geothermal Research*, 382, pp.298–310.

Ashraf, I., Ahmad, S.R., Ashraf, U., & Khan, M., 2023. Community Perspectives to Improve Flood Management and Socio-Economic Impacts of Floods at Central Indus River, Pakistan. *International Journal of Disaster Risk Reduction*, 92, pp.103718.

Beek, K., Drysdale, R., Kusen, M., & Dawson, A., 2021. Preparing for and Responding to Sexual and Reproductive Health in Disaster

Settings: Evidence from Fiji and Tonga. *Reproductive Health*, 18(1).

Bera, M.K., 2023. Flood Emergency Management in a Municipality in the Czech Republic: A Study of Local Strategies and Leadership. *Natural Hazards Research*, 3(3), pp.385–394.

Boland, S.T., Nylen, A., Bates, M., Alejandria, M.C., Grace, R., Tayyeb, Z., & Levine, A.C., 2024. Armed Actor Interventions in Humanitarian and Public Health Crises: Examining Perspectives of Crisis-Affected Community Members. *Conflict and Health*, 18(1).

Booth, L., Schueller, L. A., Scolobig, A., & Marx, S., 2020. Stakeholder Solutions for Building Interdisciplinary and International Synergies Between Climate Change Adaptation and Disaster Risk Reduction. *International Journal of Disaster Risk Reduction*, 46, pp.101616.

Dariagan, J.D., Atando, R.B., & Asis, J.L.B., 2021. Disaster Reparedness of Local Governments in Panay Island, Philippines. *Natural Hazards*, 105(2), pp.1923–1944.

Gerges, F., Assaad, R.H., Nassif, H., Bou-Zeid, E., & Boufadel, M.C., 2023. A Perspective on Quantifying Resilience: Combining Community and Infrastructure Capitals. *Science of The Total Environment*, 859, pp.160187.

Gozzoli, R.B., Gozzoli, P.C., & Wattanacharoensil, W., 2024. Resilience Model for a Destination Support: Pattaya, Thailand. *Heliyon*, 10(4), pp.e26599.

Graham, O., Edwards, S., & Robertson, R., 2022. Managing Stakeholder Relationships for Improved Situation Awareness During Volcanic Emergencies: An Eastern Caribbean Case Study. *International Journal of Disaster Risk Reduction*, 67(June), pp.102656.

Guzmán-Cortés, D.C., Gonzaléz-Rodríguez, L., Franco, C., & Guerrero, W.J., 2022. A Simulation Approach for Collaborative Humanitarian Aid Distribution Management: The Case of Bogotá City. *Heliyon*, 8(11), pp.e11465.

Haifani, S., & Paripurno, E.T., 2022. Strategi Pentahelix Dalam Pengurangan Risiko Bencana Pandemi COVID-19 di Kelurahan Semaki Kecamatan Umbulharjo, Yogyakarta. *Jurnal Kesehatan Komunitas Indonesia*, 2(1), pp.22–33.

Haksama, S., Lusno, M.F.D., Hendrati, L.Y., Wulandari, A., Surantini, S., Rejeki, D.S., Shedyta, S.Z., & Shedysni, S.N., 2022. Peran Keluarga Tangguh Bencana dalam Penanggulangan Bencana Multi Hazard di Kabupaten Sigi Sulawesi Tengah. *Jurnal Layanan Masyarakat (Journal of Public Services)*, 6(2), pp.282–290.

Handayani, N., Sriatmi, A., Martini., Jati, S.P., Kusumawati, A., Budiyono, B., Armunanto, A., Friska, E., & Asfiya, N.A., 2024. Referral Flow for Maternal and Child Health in Central Java Province during Health Crises Management. *Kemas*, 20(2), pp.175–186.

Hardy, F.R., Pulungan, R.M., & Permatasari, P., 2020. Inovasi Berbasis Masyarakat Desa Tangguh Bencana (Destana) Berbasis Komunitas. *Jurnal Pengabdian Masyarakat Indonesia Maju*, 1(1), pp.24–28.

Hasbi, S., Hanim, Z., & Husain, S.B., 2023. The Implementation Optimization of School Development Plan in Flood Disaster Mitigation Policy in Tropical Rainforest (Case Study at State Junior High School 5 Samarinda). *Social Sciences & Humanities Open*, 7(1), pp.100440.

Hermawan, A., Guntoro, B., & Sulhan, M., 2024. Community Engagement for Disaster Preparedness in Rural Areas of Mount Merapi, Indonesia. *International Journal of Sustainable Development and Planning*, 19(4), pp.1505–1518.

Hermawan, D.Y., Widyaningrum, H., Lee, S.F., Indarjo, S., Nugroho, E., Raharjo, B.B., Nisa, A.A., Ediyarsari, P., Wahyono, B., Isniyati, H., Wasono, E., Prihatno, B.E., & Rozali, A., 2023. Integration of Minimum Initial Service Package for Reproductive Health in the Sister Village Program. *Jurnal Kesehatan Masyarakat*, 19(2), pp.287–294.

Huang, H., Chen, W., Xie, T., Wei, Y., Feng, Z., & Wu, W., 2021. The Impact of Individual Behaviors and Governmental Guidance Measures on Pandemic-Triggered Public Sentiment Based on System Dynamics and Cross-Validation. *International Journal of Environmental Research and Public Health*, 18(8).

IFHV., 2022. *World Risk Report 2022*.

Indarjo, S., Azinar, M., Raharjo, B.B., & Salma, W.M., 2022. The Effect of Competence on Health Promotors Performance in Central Java Indonesia. *Kemas*, 17(4), pp.614–620.

Jardine, A., Selby, K., & Higgins, D., 2023. A Multidisciplinary Investigation of Storms Ciara and Dennis, February 2020. *International Journal of Disaster Risk Reduction*, 90, pp.103657.

Jayasekara, R., Siriwardana, C., Amaratunga, D., & Haigh, R., 2022. Evaluating the Network of Stakeholders in Multi-Hazard Early Warning Systems for Multiple Hazards Amidst

Biological Outbreaks: Sri Lanka as a Case in Point. *Progress in Disaster Science*, 14, pp.100228.

Jayasekara, R.U., Jayathilaka, G.S., Siriwardana, C., Amaratunga, D., Haigh, R., Bandara, C., & Dissanayake, R., 2023. Identifying Gaps in Early Warning Mechanisms and Evacuation Procedures for Tsunamis in Sri Lanka, with a Special Focus on the Use of Social Media. *International Journal of Disaster Resilience in the Built Environment*, 14(1), pp.1–20.

Kanteler, D., & Bakouros, I., 2024. A Collaborative Framework for Cross-Border Disaster Management in the Balkans. *International Journal of Disaster Risk Reduction*, 108, pp.104506.

Khaledi, H., Marzaleh, M.A., Peyravi, M., & Rezaee, R., 2023. Non-Governmental Organizations (NGOs) in Disaster Management: A Qualitative Study. *Trauma Monthly*, 28(1), pp.678–686.

Krongthaeo, S., Piaseu, N., Junda, T., & Wall, B.M., 2021. Community-Based Flood Preparedness for Thai Dependent Older Adults. *International Journal of Disaster Risk Reduction*, 63, pp.102460.

Lalancette, A., & Charles, A., 2022. Factors Influencing Hazard Management by Municipalities: The Case of Coastal Communities. *Global Environmental Change*, 73, pp.102451.

Latvakoski, J., Öörni, R., Lusikka, T., & Keränen, J., 2022. Evaluation of Emerging Technological Opportunities for Improving Risk Awareness and Resilience of Vulnerable People in Disasters. *International Journal of Disaster Risk Reduction*, 80, pp.103173.

Márquez-Lameda, R.D., 2022. Predisposing and Enabling Factors Associated with Venezuelan Migrant and Refugee Women's Access to Sexual and Reproductive Health Care Services and Contraceptive Usage in Peru. *Journal of Migration and Health*, 5, pp.100107.

Mas'Ula, N., Siartha, I.P., & Citra, I.P.A., 2019. Kesiapsiagaan Masyarakat Terhadap Bencana Banjir Di Desa Pancasari Kecamatan Sukasada Kabupaten Buleleng. *Jurnal Pendidikan Geografi Undiksha*, 7(3), pp.103–112.

Najib, N., Nisa, A.A., Nugroho, E., Widowati, E., & Yang, C.E., 2020. Developing Reproductive Health Communication in Early Marriage. *Jurnal Kesehatan Masyarakat*, 15(3), pp.441–449.

Nick, F.C., Sänger, N., van der Heijden, S., & Sandholz, S., 2023. Collaboration is key: Exploring the 2021 flood response for critical infrastructures in Germany. *International Journal of Disaster Risk Reduction*, 91(April).

Nisa, A.A., Nugroho, E., Istiada, A., Utami, A.N.M., Hermawan, D.Y., & Widyaningrum, H., 2025. Barriers to Contraceptive Access in Disaster Situations: A Systematic Review of Health System Preparedness and Socio-Cultural Challenges. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, 8(4), pp.296–306.

Nugroho, E., Istiada, A., Nisa, A.A., & Hermawan, D.Y., 2025. Health Education Model in Disaster Situations: Systematic Review. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, 8(1), pp.29–41.

Nugroho, E., Nisa, A.A., Alifah, R.N., Raharjo, B.B., Utami, A.N.M., & Hermawan, D.Y., 2025. Implementation of the Minimum Initial Service Package (MISP) as an Effort to Fulfill Reproductive and Sexual Health Services in Disaster Situations: Systematic Review. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, 8(1), pp.42–55.

Nyadenga, D., & Davis, B., 2023. Challenges and Enablers Faced by HIV/AIDS Supporting Organizations During COVID-19. *Kemas*, 19(2), pp.186–193.

Pasaribu, L.P., Apsari, N.C., & Sulastri, S., 2023. Kolaborasi Penta Helix dalam Penanganan Pasca Bencana Gempa Bumi. *Share : Social Work Journal*, 13(1), pp.140.

Sandaran, S.C., & Selvaraj, S., 2021. Government Agencies and Their Discourses of Flood Disaster Preparedness: Impact on Response, Action and Community Empowerment. *GEMA Online Journal of Language Studies*, 21(4), pp.294–313.

Seddighi, H., Lopez Lopez, M., Zwitter, A., Muldoon, M.L., Sajjadi, H., & Yousefzadeh, S., 2023. Non-Formal Disaster Education Programs for School Students in Iran: A Qualitative Study of the Challenges Experienced by Stakeholders. *International Journal of Disaster Risk Reduction*, 86(March), pp.103531.

Vij, S., Russell, C., Clark, J., Parajuli, B.P., Shakya, P., & Dewulf, A., 2020. Evolving Disaster Governance Paradigms in Nepal. *International Journal of Disaster Risk Reduction*, 50(May), pp.101911.

Westcott, R., Ronan, K., Bambrick, H., & Taylor, M., 2020. Natural Hazards and Adaptive Response Choices in a Changing Climate: Promoting Bushfire Preparedness and Risk Reduction Decision-Making. *Social Sciences*

& Humanities Open, 2(1), pp.100065.

Widowati, E., Koesyanto, H., Istiono, W., Sutomo, A.H., & Sugiharto., 2023. Disaster Preparedness and Safety School as a Conceptual Framework of Comprehensive School Safety. *SAGE Open*, 13(4).

Widowati, E., Sutomo, A.H., & Istiono, W., 2021. Are Elementary Schools Ready for Disaster Preparedness and Safety?. *E3S Web of Conferences*, 317.

Windraswara, R., 2009. Keterlibatan Komunitas Dalam Perencanaan Sanitasi Pada Daerah Rawan Bencana. *KEMAS*, 5(1), pp.58–63.

Yulianto, S., Apriyadi, R.K., Aprilyanto, A., Winugroho, T., Ponangsera, I.S., & Wilopo, W., 2021. Histori Bencana dan Penanggulangannya di Indonesia Ditinjau Dari Perspektif Keamanan Nasional. *PENDIPA Journal of Science Education*, 5(2), pp.180–187.

Yuningsih, A., Kurniawan., & Setiadi, A., 2017. Pengaruh Pengetahuan Kebencanaan Penduduk di Wilayah Resiko Tinggi Tanah Longsor terhadap Upaya Pengembangan Program Desa Tangguh Bencana. *Jurnal Medika Cendikia*, 4(2), pp.76–82.

Zander, K.K., Sibarani, R., Lassa, J., Nguyen, D., & Dimmock, A., 2022. How do Australians Use Social Media During Natural Hazards? A Survey. *International Journal of Disaster Risk Reduction*, 81, pp.103207.