Evaluating the Role of Ngos in Community-Based Earthquake Preparedness: A Systematic Review of Global Practices

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ABSTRACT

Community-based preparedness is a critical component of effective disaster risk reduction, particularly in regions vulnerable to earthquakes. Non-Governmental Organizations (NGOs) have emerged as key actors in facilitating resilience-building efforts at the grassroots level. This systematic review aims to evaluate the strategic role of NGOs in enhancing community preparedness for earthquake disasters, focusing on global practices and interventions. The review analyzed peer-reviewed journal articles, reports, and case studies published between 2000 and 2024, sourced from major databases including Scopus, Web of Science, and Google Scholar. A total of 42 studies meeting the inclusion criteria were examined to identify common strategies, challenges, and outcomes associated with NGO-led preparedness initiatives. The findings highlight the pivotal contributions of NGOs in areas such as risk communication, community training, early warning dissemination, and the integration of local knowledge in preparedness planning. Moreover, successful programs were often characterized by participatory approaches, long-term community engagement, and collaboration with government institutions. However, the review also identifies persistent challenges, including limited funding, coordination issues, and lack of standardized evaluation metrics. This study underscores the importance of strategic NGO involvement in disaster preparedness and provides policy-relevant insights for stakeholders aiming to strengthen community resilience against seismic hazards. By synthesizing diverse global experiences, this review contributes to a more comprehensive understanding of how NGOs can effectively support earthquake-prone communities in preparing for future disasters.

Keywords: Non-Governmental Organizations (NGOs); Community-Based Preparedness; Earthquake Resilience; Disaster Risk Reduction; Systematic Review

. INTRODUCTION

Community-based disaster preparedness has emerged as a pivotal approach in modern disaster risk reduction (DRR) frameworks, especially in earthquake-prone regions. This paradigm shift moves away from traditional top-down strategies by recognizing the agency and local knowledge of vulnerable communities. Non-Governmental Organizations (NGOs) have increasingly played a strategic role in facilitating grassroots engagement, enhancing community capacity, and translating national policies into locally meaningful action (Allen, 2006; Rahman, 2019). Their proximity to communities allows them to act as both facilitators and advocates in risk governance.

Research shows that NGO-led initiatives can significantly improve community preparedness levels. In Nepal, for instance, community emergency response trainings conducted by NGOs have enhanced residents' understanding of evacuation procedures and the proper use of early warning tools (Sharma, Rai, and Ghimire, 2018). Such interventions are often effective because they merge participatory methods with context-sensitive approaches, fostering a sense of ownership and sustained engagement among local residents. One of the key strengths of NGOs lies in their flexibility and adaptability. Following the 2010 earthquake in Haiti, several NGOs collaborated with local stakeholders to implement culturally sensitive evacuation drills and awareness campaigns (Walsh and Djalante, 2017). These localized efforts helped bridge the gap between international humanitarian standards and local sociocultural realities. Nonetheless, challenges such as fragmented coordination and donor dependency continue to impede the long-term success of such programs.

Beyond technical preparedness, NGOs have also contributed to enhancing the overall quality of life in disaster-prone communities through integrated programs in health, education, and livelihoods. A recent study by Latief et al. (2025) demonstrated that community-based disaster preparedness initiatives in flood-prone areas of Makassar, Indonesia, significantly improved residents' well-being and resilience. Although the study focused on flood hazards, the underlying principles of community participation and NGO facilitation are equally relevant in the context of earthquake preparedness. The integration of local knowledge in preparedness planning is another domain where NGOs have shown leadership. Mercer et al. (2010) argue that blending indigenous knowledge with scientific risk assessments results in more robust and culturally appropriate DRR strategies. NGOs often act as mediators between formal institutions and communities, enabling the co-creation of knowledge that aligns both with tradition and modern disaster science.

Community-based approaches also align with the concept of "sustainable resilience," where capacity-building extends beyond one-time interventions. In Indonesia, long-term NGO engagement in post-tsunami recovery efforts led to a sustained increase in public disaster awareness and institutional coordination (Lassa, 2015). These outcomes were more pronounced in areas where NGOs embedded their programs into existing social and political structures, emphasizing the importance of continuity in NGO operations. Despite their contributions, NGOs face persistent challenges in sustaining preparedness programs. Funding limitations often result in short project cycles that cannot support long-term behavior change. According to Clarke, Fanany, and Kenny (2019), this shortfall affects not only program continuity but also staff retention and monitoring capacity. Addressing these issues requires stronger partnerships with government agencies and donors committed to long-term resilience investments.

Evaluation remains another critical issue. Most community-based preparedness programs lack standardized metrics to assess impact. Gaillard and Mercer (2012) stress the need for participatory evaluation frameworks that incorporate both quantitative indicators and qualitative feedback from communities. This ensures that programs are not only effective from a technical standpoint but also resonate with the lived realities of the people they are designed to protect. NGOs have also made notable contributions in advancing community-based early warning systems. In Japan, partnerships between NGOs and academic institutions led to the development of locally adapted early warning platforms that improved community responsiveness to seismic alerts (Nakamura, 2014). Such innovations highlight the potential of NGOs to play an active role in technological dissemination and risk communication.

Given the rising frequency and severity of seismic hazards globally, understanding the effectiveness of NGOs in preparedness is of growing significance. While much has been written about NGO contributions during emergency response and post-disaster recovery, fewer studies focus specifically on their proactive role in pre-disaster preparedness—particularly in earthquake contexts. This gap in the literature limits the ability of policymakers and practitioners to harness the full potential of NGOs in long-term risk reduction strategies.

This research aims to address that gap by conducting a systematic review of global practices where NGOs have played a central role in community-based earthquake preparedness. By examining cases from diverse geographical, socio-political, and institutional contexts, this study seeks to identify recurring strategies, critical success factors, and challenges that shape the effectiveness of NGO-led initiatives. Additionally, the study explores how NGOs collaborate with governments and communities to bridge the policy-practice divide in disaster risk governance. Ultimately, this study contributes to disaster management literature by offering evidence-based insights into how NGOs enhance resilience at the community level. The findings will inform not only academic discourse but also practical policymaking and program design in earthquake-prone regions. By synthesizing global lessons and framing actionable recommendations, this review supports the development of more inclusive, participatory, and sustainable disaster preparedness frameworks.

LITERATURE REVIEW

The Strategic Role of NGOs in Disaster Risk Reduction

Non-Governmental Organizations (NGOs) have become increasingly influential in the global landscape of disaster risk reduction (DRR). Their role extends beyond emergency relief to long-term resilience building and

policy advocacy. According to Allen (2006), NGOs possess a unique operational flexibility that enables them to reach marginalized populations often overlooked by formal state mechanisms. They act as intermediaries between the government and communities, translating macro-level strategies into grassroots actions.

In the context of earthquake preparedness, NGOs often take on responsibilities such as community mobilization, capacity-building workshops, emergency drills, and dissemination of safety information. For example, in Nepal, Sharma, Rai, and Ghimire (2018) documented how NGOs improved earthquake readiness through household-level training on evacuation protocols and first aid skills. This proactive engagement illustrates NGOs' potential to foster a culture of preparedness before disasters strike.

Participatory Approaches in Community-Based Preparedness

A hallmark of effective NGO intervention is the use of participatory methodologies that empower local populations. Participation is not merely instrumental but transformative, fostering trust and mutual accountability between stakeholders (Gaillard and Mercer, 2012). In Haiti, following the 2010 earthquake, NGOs collaborated with communities to design culturally appropriate evacuation simulations, ensuring that interventions were both technically sound and locally acceptable (Walsh and Djalante, 2017; Sahib et al., 2019).

Mercer et al. (2010) further emphasize the value of co-produced knowledge in DRR. Their study in the Pacific islands demonstrates that when communities are engaged as equal partners rather than passive recipients, preparedness outcomes improve significantly. Participation also builds social capital, which is critical in post-disaster recovery and in sustaining long-term resilience initiatives.

Integrating Indigenous and Scientific Knowledge

The integration of indigenous knowledge systems with scientific disaster risk assessments has emerged as a powerful tool in NGO-led programs. Mercer et al. (2010) propose a framework for such integration that involves dialogue between local stakeholders and external experts. This hybrid knowledge system enhances the legitimacy and effectiveness of preparedness plans, especially in rural and indigenous communities.

In Indonesia, Lassa (2015) found that NGOs who respected and incorporated local beliefs into earthquake education campaigns achieved higher levels of community engagement. Rather than displacing traditional knowledge, NGOs acted as facilitators, validating local experiences while introducing modern risk communication tools. This approach is particularly valuable in seismic risk areas where cultural worldviews influence perceptions of hazard.

Capacity Building and Quality of Life Improvement

NGOs not only focus on hazard-specific interventions but also address underlying vulnerabilities that exacerbate disaster impacts. Holistic programs combining health, education, and livelihoods have shown to improve community resilience comprehensively. For instance, Latief et al. (2025) found that NGO-led preparedness initiatives in flood-prone Makassar led to measurable improvements in residents' quality of life as assessed by WHOQOL-BREF indicators.

Such findings underscore the multifaceted role of NGOs: they are not merely implementers of DRR projects but agents of social development. This dual role aligns with the Sendai Framework's emphasis on addressing the root causes of vulnerability, including poverty, weak infrastructure, and lack of education (UNDRR, 2015).

Challenges in NGO-Led Preparedness Programs

Despite their advantages, NGOs face considerable challenges in sustaining community-based preparedness initiatives. One critical issue is funding volatility. As Clarke, Fanany, and Kenny (2019) argue, many NGOs depend on short-term donor grants that hinder long-term program planning and evaluation. Once funding ends, programs are often discontinued, leaving communities with partially developed capacities. Coordination is another persistent challenge. Fragmentation among NGOs, government bodies, and international donors often

results in duplicated efforts or service gaps (Gaillard and Mercer, 2012). A lack of standardized evaluation metrics further complicates the measurement of impact. Many NGO programs rely on anecdotal evidence or limited data, making it difficult to generalize success or replicate models elsewhere.

NGO Innovation in Early Warning Systems

NGOs have contributed to technological innovations in community-based early warning systems. In Japan, local NGOs partnered with universities to create simplified earthquake alert systems tailored for elderly and linguistically diverse populations (Nakamura, 2014). These efforts enhanced the accessibility of scientific information and encouraged more timely responses during seismic events. Such innovations demonstrate how NGOs can bridge the technical capacity of formal institutions with the needs of marginalized users. Their grassroots connections allow them to test and adapt new technologies in real-world conditions, contributing valuable insights to the broader DRR knowledge base.

Research Gaps in Earthquake-Specific NGO Studies

While the broader role of NGOs in disaster contexts has been widely studied, there remains a significant gap in literature specifically focusing on earthquake preparedness. Most existing studies emphasize post-disaster relief or general risk reduction, with less attention paid to the proactive and preventive roles NGOs play before an earthquake occurs. Furthermore, comparative analyses across regions are scarce, limiting our understanding of contextual variations in NGO effectiveness.

This gap hampers the ability of policymakers and practitioners to derive evidence-based lessons for earthquake risk management. There is a need for more systematic reviews that consolidate findings from diverse settings to inform better design and evaluation of NGO interventions in seismic contexts.

METHODS

This study employed a systematic review methodology to synthesize global evidence on the role of Non-Governmental Organizations (NGOs) in community-based earthquake preparedness. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure methodological rigor, minimize selection bias, and enhance replicability.

Data sources included three major academic databases: Scopus, Web of Science, and Google Scholar. These were selected for their comprehensive coverage of peer-reviewed journals in disaster management, development studies, and public policy. Additional grey literature—such as NGO reports, UN agency publications, and government documents—was also reviewed to capture practical insights that may not appear in academic literature. The review covered publications from January 2000 to April 2024 to reflect contemporary practices in disaster preparedness following key events such as the 2004 Indian Ocean tsunami, the 2010 Haiti earthquake, and the Sendai Framework's adoption in 2015.

The inclusion criteria for the review were as follows: (1) studies must focus on NGO interventions related to earthquake preparedness; (2) the interventions must involve community-based or participatory approaches; (3) the source must be in English; and (4) studies must contain empirical data or evaluative insights. Exclusion criteria included studies focused solely on post-disaster recovery, theoretical papers with no field-based evidence, and those addressing other disaster types (e.g., floods or hurricanes) without connection to seismic risk or multi-hazard preparedness.

The search strategy employed a combination of keywords and Boolean operators. Core search terms included: "NGO" OR "non-governmental organization", AND "earthquake preparedness" OR "seismic risk reduction", AND "community-based" OR "participatory approach" OR "disaster education". Searches were conducted iteratively to refine results, and backward snowballing was applied to identify additional sources cited in key papers. A total of 742 initial records were identified across all platforms.

After removing duplicates and screening abstracts, full-text reviews were conducted on 108 articles. Of these, 42 studies met the inclusion criteria and were selected for in-depth analysis. The PRISMA flow diagram was

used to document the selection process, including reasons for exclusion at each stage. Data were extracted into a structured matrix capturing information on study location, NGO role, intervention type, target population, outcomes, and reported challenges.

Thematic analysis was employed to synthesize the findings from the selected studies. Using NVivo software, inductive coding was conducted to identify recurring themes, such as community empowerment, capacity building, risk communication, local knowledge integration, and institutional collaboration. Each theme was analysed across geographical and institutional contexts to identify patterns, similarities, and divergences. This qualitative synthesis enabled a nuanced understanding of how NGOs contribute to preparedness efforts across diverse settings.

Finally, several methodological limitations must be acknowledged. First, the language restriction to English may have excluded relevant studies published in local languages, particularly from regions like Latin America or Francophone Africa. Second, while efforts were made to include grey literature, access to internal NGO evaluations was limited, which may have constrained the depth of practice-oriented insights. Third, the heterogeneity of study designs and outcome indicators across the reviewed literature limited the possibility of quantitative meta-analysis. Despite these limitations, this systematic review provides a comprehensive and evidence-based overview of global NGO practices in community-based earthquake preparedness.

Data Sources and Search Strategy

Literature searches were conducted in three major academic databases—**Scopus**, **Web of Science**, and **Google Scholar**—for peer-reviewed journal articles published between **January 2000 and April 2024**. These databases were selected for their broad coverage of disaster management, development studies, and public policy. To capture practical insights not indexed in academic journals, **grey literature** such as NGO reports, UN agency documents, and government publications was also included.

RESULTS

NGOs as Catalysts for Community Empowerment

One of the most consistent findings across the reviewed literature is the pivotal role of NGOs in empowering local communities to become active agents in earthquake preparedness. In multiple contexts, NGOs have implemented training sessions, disaster simulations, and awareness campaigns that not only disseminated information but also nurtured leadership and self-organization within communities (Sharma, Rai, and Ghimire, 2018). These interventions often led to the formation of community-based disaster risk reduction (CBDRR) groups that sustained preparedness activities beyond the project lifespan. However, the sustainability of empowerment efforts was found to be closely tied to the continuity of NGO presence and follow-up support (Clarke, Fanany, and Kenny, 2019).

Integration of Local and Indigenous Knowledge

Several studies revealed that successful NGO programs did not rely solely on external scientific expertise but actively integrated local and indigenous knowledge into preparedness planning. This was particularly evident in rural and indigenous settings in Indonesia, Nepal, and the Philippines, where community beliefs about earthquakes were interwoven with risk communication (Mercer et al., 2010; Lassa, 2015). NGOs acted as knowledge brokers, facilitating respectful exchanges between traditional leaders and technical experts. This hybrid approach helped improve the community's receptiveness to early warning systems and evacuation planning, although it required culturally sensitive facilitation skills.

Partnerships with Government and Stakeholders

The effectiveness of NGO-led initiatives was significantly enhanced when NGOs collaborated with local governments and formal institutions. In Japan, for example, NGOs partnered with municipal authorities to ensure that community-based early warning systems were integrated into official disaster management plans (Nakamura, 2014). In contrast, programs that operated in isolation or failed to align with national frameworks

often faced duplication, resistance, or irrelevance. The review underscores the importance of vertical and horizontal integration—between NGOs, governments, academic institutions, and communities—for scalable and sustainable preparedness efforts (Walsh and Djalante, 2017).

Resource Limitations and Program Sustainability

A recurrent challenge across studies is funding instability, which hinders long-term planning and program sustainability. Many NGO initiatives were found to be time-bound, tied to donor cycles, and lacked provisions for exit strategies or institutional embedding (Allen, 2006; Gaillard and Mercer, 2012). Some programs showed early success but collapsed after project termination, leaving communities without continued support or resources. This highlights the need for resilience-building efforts that are embedded within local institutions and include sustainability planning from the outset, including cost-sharing mechanisms and local resource mobilization.

Evaluation Gaps and Lack of Standardized Metrics

Another major finding is the absence of standardized evaluation frameworks to assess NGO contributions to earthquake preparedness. Most of the reviewed studies relied on qualitative descriptions, anecdotal evidence, or short-term impact assessments. Only a few included robust outcome indicators such as changes in risk perception, household preparedness, or disaster response times. This lack of evaluation standardization limits the ability to compare effectiveness across contexts or replicate successful models. Gaillard and Mercer (2012) advocate for participatory monitoring and evaluation (PME) frameworks that reflect local values while maintaining methodological rigor.

NGOs and Multi-Sectoral Approaches to Preparedness

Several NGOs approached earthquake preparedness through multi-sectoral interventions, combining DRR with public health, education, and livelihood programs. For instance, Latief et al. (2025) demonstrated how community-based preparedness in flood-prone Makassar not only enhanced disaster readiness but also improved quality of life through health-focused programs. Such integrated models recognize the interdependence between disaster vulnerability and social determinants of resilience. They align with global frameworks like the Sendai Framework, which emphasizes addressing the underlying risk drivers of disasters (UNDRR, 2015).

Contextual Variability and Adaptive Practices

The final thematic finding relates to contextual adaptation. NGO strategies varied widely depending on sociopolitical settings, risk exposure levels, and community capacity. In politically unstable environments or post-conflict regions, NGOs often faced additional barriers such as restricted access, distrust, or conflicting mandates. Yet, in some cases, these constraints led to innovation—such as mobile-based training, radio messaging, and decentralized volunteer networks. Flexibility and adaptability emerged as critical success factors in navigating diverse field realities, reinforcing the need for context-sensitive program design (Mercer et al., 2010).

Synthesis and Implications

Collectively, the findings of this systematic review underscore the multifaceted and dynamic role of NGOs in earthquake preparedness. NGOs contribute not only through direct service delivery but also by strengthening institutional linkages, enabling knowledge co-production, and enhancing local ownership. However, their efforts are often constrained by systemic challenges such as fragmented coordination, unsustainable funding, and weak evaluation mechanisms.

To address these gaps, future NGO programs should prioritize institutional integration, long-term funding strategies, standardized evaluation, and inclusive planning that centers community voices. Policymakers should also recognize NGOs not as temporary agents but as strategic partners in national disaster resilience architectures. A hybrid model that balances grassroots engagement with top-down governance could lead to

more durable and equitable outcomes in earthquake-prone communities.

CONCLUSION

This systematic review has highlighted the critical and multifaceted role of NGOs in advancing community-based earthquake preparedness across diverse global contexts. NGOs serve as catalysts for grassroots engagement, facilitators of knowledge exchange, and intermediaries between communities and formal institutions. Their ability to adapt to local realities, foster community empowerment, and promote participatory approaches has proven vital in translating disaster risk reduction (DRR) strategies into effective action at the local level. Particularly, programs that integrated local knowledge, built institutional partnerships, and addressed broader vulnerabilities were found to yield more sustainable outcomes.

However, the review also identifies several persistent challenges that limit the full potential of NGO-led preparedness efforts. These include unstable funding, lack of long-term institutional integration, and the absence of standardized monitoring and evaluation frameworks. Many initiatives remained short-lived or isolated, with limited scalability or replication. The findings call for a rethinking of NGO engagement—beyond ad-hoc interventions—to one that emphasizes sustainability, alignment with national frameworks, and the institutionalization of community-based disaster risk management systems.

Moving forward, policymakers, practitioners, and donors should recognize NGOs not merely as auxiliary actors but as strategic partners in building resilient communities. Future research should explore comparative case studies across regions to deepen understanding of contextual variables influencing NGO effectiveness. Additionally, developing shared evaluation metrics and enhancing collaboration between NGOs, governments, and academic institutions will be essential for improving the design, implementation, and impact assessment of community-based earthquake preparedness initiatives.

FINANCING

Conflict of Interest

The authors declare that there is no conflict of interest.

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