

Community Disaster Resilience across Indonesia: A Systematic Review of Place-Based Knowledge and Regional Variation

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ARTICLE INFO	ABSTRACT
Article History: Received: 2026-07-11 Accepted: 2026-09-20 Published: 2026-09-30 Keywords: Community disaster resilience; Indonesia; Place-Based knowledge; Social capital; Systematic literature review Corresponding author: Martina Ayu Sejati Email: martina_sejati@staf.undana.ac.id DOI: 10.37905/jgej.v7i2.40361 Copyright © 2026 The Authors  This open access article is distributed under a Creative Commons Attribution-NonCommercial (CC-BY-NC) 4.0 International License	Disaster resilience is a key concept in disaster risk reduction, with local communities playing a central role in its development. As one of the world's most disaster-prone countries, Indonesia possesses rich local wisdom and social capital with strong potential to strengthen community resilience. This study uses a Systematic Literature Review (SLR) following PRISMA guidelines to synthesize local communities' contribution to disaster resilience in Indonesia. Literature was searched across Scopus, Google Scholar, Web of Science, and ProQuest, covering publications from 2010–2026, with the search conducted up to 5 July 2026. From 1,250 records initially identified, 47 articles met all inclusion criteria following duplicate removal, screening, and full-text eligibility assessment. Findings were derived through qualitative thematic analysis of these 47 studies, complemented by a keyword frequency and co-occurrence analysis based on the 45 articles reporting explicit author keywords. Four main dimensions of contribution emerged: (1) local wisdom and traditional knowledge as informal early warning systems and mitigation guidance; (2) social capital and community networks cooperation, trust, and local leadership in post-disaster response and recovery; (3) active participation in community-based DRR programs such as Desa Tangguh Bencana (Destana) and Kampung Siaga Bencana (KSB); and (4) adaptive livelihood strategies involving vulnerable groups, including women and youth. Studies were geographically concentrated in Java (53.2%), highlighting a research bias toward densely populated, disaster-prone regions and a need for wider coverage. Key gaps include weak integration of local knowledge into formal DRR policy, limited representation of vulnerable groups, and insufficient institutional linkage between informal social capital and formal governance. Policy recommendations include formally recognizing local communities' roles, strengthening Destana and KSB, and building capacity through participatory, wisdom-based approaches.

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1. Introduction

Indonesia is one of the countries with the highest disaster risk in the world, owing to its geographical location within the Pacific Ring of Fire and at the convergence of three major tectonic plates: the Eurasian, Indo-Australian, and Pacific plates. Every year, various types of natural disasters including earthquakes, tsunamis, floods, landslides, volcanic eruptions, and forest and land fires affect numerous regions across Indonesia, resulting in significant loss of life and property (Fuady et al., 2021). This complex geographical condition places almost the entire territory of Indonesia within the category of disaster-prone areas, with varying hazard characteristics across regions ranging from volcanic zones in Java and Sumatra, earthquake- and tsunami-prone areas along the western coast of Sumatra and southern coast of Java, to flood-prone areas in lowland and coastal regions.

In addressing such substantial disaster threats, the concept of disaster resilience has become a central focus on the global disaster risk reduction (DRR) agenda, particularly since the adoption of the Sendai Framework for Disaster Risk Reduction 2015–2030 by the United Nations (Mizutori, 2020). Disaster resilience is understood not merely as the capacity to withstand the impacts of disasters, but also as the capacity to adapt, recover, and even transform into an improved state in the aftermath of a disaster (Graveline & Germain, 2022). In this context, local communities play a highly crucial role, as they are the first to face the impacts of a disaster and often respond before external assistance arrives.

Empirical studies indicate that Indonesia possesses a rich diversity of local wisdom derived from various ethnic groups and cultures, which has proven to be an important source of knowledge in facing

disasters. The Smong and Nandong Smong traditions in Aceh, for instance, have long functioned as tsunami early warning mechanisms passed down across generations through songs and oral narratives, and have been shown to contribute to the safety of the Simeulue people during the 2004 Indian Ocean tsunami (Suciani et al., 2018). Similar practices are also found in the Larung Sesaji ritual on the slopes of Mount Kelud (Utomo et al., 2026a), and the Barong Ider Bumi tradition among the Osing community in Banyuwangi (Rochsun & Jasuli, 2020). Such local wisdom demonstrates that traditional knowledge across various parts of the world can serve as an important complement to modern early warning systems and disaster mitigation efforts.

In addition to local wisdom, social capital encompassing trust, social networks, norms of reciprocity, and local leadership has also been recognized as an important factor in disaster resilience. Studies show that communities with strong social capital tend to be more resilient in facing disasters, as their members find it easier to coordinate, share resources, and provide emotional support to one another (Zhao et al. 2025). In Indonesia, this social capital is largely manifested in the tradition of gotong royong (mutual cooperation), which, as demonstrated among communities on the slopes of Mount Merapi, serves as a dominant resilience mechanism and was identified by the majority of informants as the primary factor in post-disaster recovery (Hermawan et al., 2024).

The Indonesian government has developed various community-based programs to strengthen disaster resilience, including the Disaster-Resilient Village/Sub-district Program (Desa/Kelurahan Tangguh Bencana, or Destana), coordinated by the National Disaster Management Authority (Badan Nasional Penanggulangan Bencana, or BNPB) through the Regional Disaster Management Agency (Badan Penanggulangan Bencana Daerah, or BPBD) in various districts/cities, as well as Kampung Siaga Bencana (Disaster Alert Village, or KSB) in the Special Region of Yogyakarta, which emphasizes the importance of local leadership and cross-sector collaboration (Ruslanjari et al., 2024). Nevertheless, a number of studies indicate that the implementation of these policies still faces structural constraints, including limited authority of local governments, rigid bureaucracy, and insufficient formal recognition of pre-existing community organizations grounded in local wisdom.

Although a growing body of research acknowledges the importance of local communities' role in disaster resilience, existing systematic reviews on this topic remain limited in scope and conceptual integration. Prior Indonesian-focused reviews, such as Djalante and Thomalla's (2012) bibliometric mapping of hazards and disaster risk reduction research, primarily catalogue publication trends and authorship patterns rather than synthesizing the substantive mechanisms through which communities contribute to resilience. Meanwhile, international systematic reviews on social capital and disaster resilience Zhao et al., (2025) offer conceptual synthesis at a global scale but do not capture the specific interplay between local wisdom, social capital, and formal institutional structures that characterizes the Indonesian context, where customary knowledge systems, religious institutions, and government-led programs such as Destana and KSB coexist and interact in distinctive ways. Most existing Indonesian studies, moreover, remain sectoral in nature, based on single case studies, or focused on specific hazard types (volcanic, flood, or earthquake/tsunami) examined in isolation, with comparisons rarely drawn across hazard types, community scales, or geographical settings. Consequently, no existing review has systematically examined how resilience mechanisms vary according to place, hazard type, and community scale, nor how local knowledge, social capital, and formal institutions interrelate across these variations (Utomo et al., 2026b). This study addresses that conceptual gap by synthesizing evidence across diverse hazard contexts and geographical settings in Indonesia to explain not merely that local communities contribute to disaster resilience, but how and under what conditions this contribution varies, thereby offering a more integrative, cross-contextual understanding than has previously been available in either the Indonesian or international literature.

This study aims to address this gap through a comprehensive Systematic Literature Review (SLR) on the contribution of local communities to disaster resilience in Indonesia, examining 47 articles published between 2010 and 2026. Specifically, this study aims to: (1) identify the temporal and methodological distribution, hazard types, and study locations of publications related to this topic; (2) synthesize the forms of local community contribution to disaster resilience documented in the literature and compare how these contribution mechanisms vary across place and regional characteristics; and (3) identify research gaps and relevant policy implications for the development of community-based disaster adaptation strategies at the regional and national levels.

2. Method

2.1 Research Design

This study employs a Systematic Literature Review (SLR) approach to examine the contribution of local communities to disaster resilience in Indonesia.

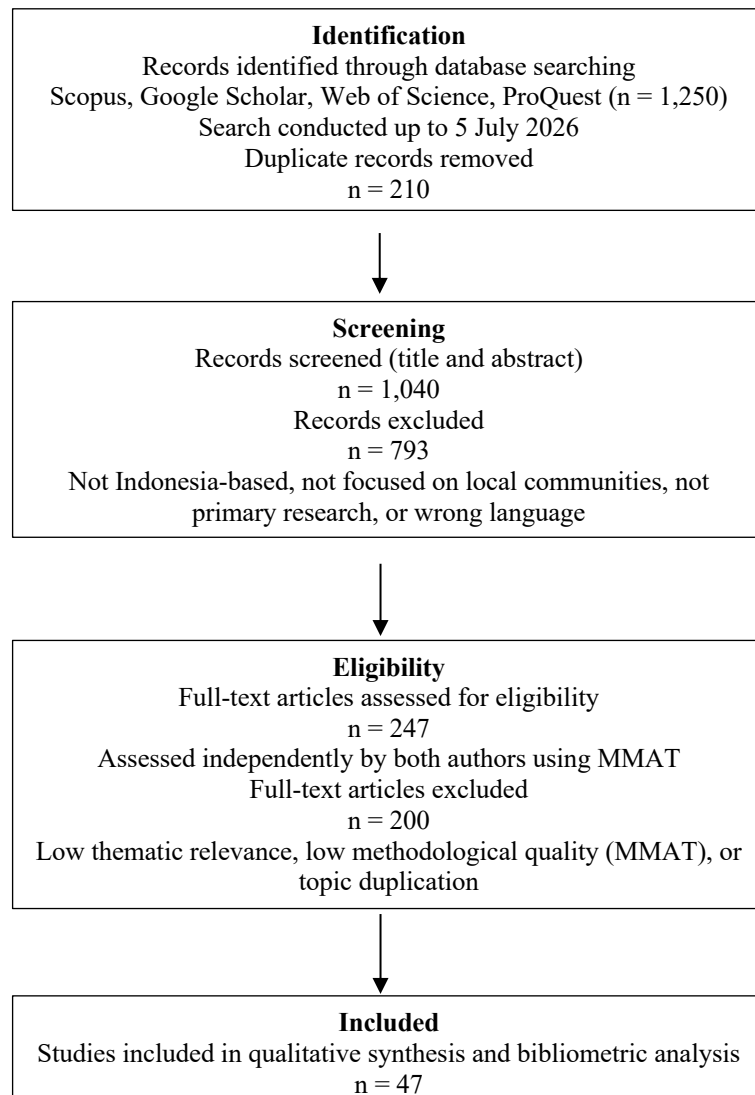


Figure 1. PRISMA 2020 Flow Diagram

The SLR approach was selected for its capacity to provide a comprehensive and structured synthesis of scattered literature, as well as to enable the systematic and replicable identification of common patterns and research gaps. This review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 (PRISMA 2020) statement (Page et al., 2021) to guide reporting at each stage of literature selection and analysis; the completed PRISMA 2020 checklist and flow diagram are provided in Appendix A. No formal review protocol was registered prior to the search. Title/abstract screening and full-text eligibility assessment were conducted independently by both authors, with disagreements resolved through discussion until consensus was reached. The methodological quality of full-text articles was appraised using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018), applied independently by both reviewers given the predominance of qualitative, quantitative, and mixed-methods designs across the included corpus. It is important to note that adherence to PRISMA reporting standards enhances the transparency and traceability of the review process but does not by itself guarantee the rigor of the synthesis; such rigor is instead evidenced through the reproducibility of the search strategy, the consistency of the quality appraisal process, and the systematic procedures used for data extraction and thematic coding.

Figure 1 illustrates the four-stage PRISMA 2020 flow, showing how the initial pool of 1,250 records identified across the four databases was progressively narrowed through duplicate removal, title/abstract screening, and full-text eligibility assessment to the final set of 47 studies included in the review.

2.2 Search Strategy and Data Sources

Literature searches were conducted systematically across four databases: Scopus, Web of Science, ProQuest, and Google Scholar covering the publication period of 2010–2026, with the final search executed on 5 July 2026. Searches were run against title, abstract, and keyword fields in each bibliographic database. The Boolean string was adapted to each database's syntax as follows: Scopus TITLE-ABS-KEY(("community resilience" OR "local community" OR "disaster resilience" OR "local wisdom" OR "indigenous knowledge" OR "social capital" OR "disaster risk reduction") AND "Indonesia"); Web of Science TS(("community resilience" OR "local community" OR "disaster resilience" OR "local wisdom" OR "indigenous knowledge" OR "social capital" OR "disaster risk reduction") AND "Indonesia"); ProQuest ab(("community resilience" OR "local community" OR "disaster resilience" OR "local wisdom" OR "indigenous knowledge" OR "social capital" OR "disaster risk reduction") AND "Indonesia"). For Google Scholar, whose interface does not support field-restricted Boolean search, the same term combinations were entered as a plain-text query, screening was limited to the first 100 results ranked by relevance, and titles were manually checked against the inclusion criteria. This process retrieved 320 records from Scopus, 362 from Web of Science, 259 from ProQuest, and 309 from Google Scholar, totaling 1,250 records. A complete search log, including query strings, retrieval dates, and per-database export files, is provided in the supplementary materials.

2.3 Inclusion and Exclusion Criteria

Inclusion criteria were as follows: (a) the article constituted a primary study (journal article, conference proceeding, or book chapter) published in English or Indonesian between 2010 and 2026; (b) the study location was within Indonesia; (c) the focus of discussion encompassed the role, contribution, or participation of local communities in disaster resilience, mitigation, preparedness, response, or recovery. Exclusion criteria were as follows: (a) opinion pieces, editorials, or reviews without primary empirical data; (b) studies discussing disasters outside the Indonesian context; (c) articles that did not specifically address the role of local communities; and (d) duplicate records across databases.

2.4 Article Selection Process (PRISMA)

The article selection process followed the PRISMA 2020 flow, comprising four stages: identification, screening, eligibility assessment, and inclusion. At the identification stage, 1,250 records were retrieved from the four databases; after removing duplicates, 1,040 records remained. During title/abstract screening, 793 records were excluded for failing to meet the inclusion criteria outlined (not set in an Indonesian context, not addressing the role of local communities, not a primary research article, or not published in English/Indonesian), leaving 247 articles for full-text eligibility assessment. At the eligibility stage, all 247 full-text articles were independently assessed by both authors (AUTHOR 1 and AUTHOR 2) against the inclusion/exclusion criteria and appraised for methodological quality using the MMAT; disagreements were resolved through discussion until consensus was reached, with no third-party adjudicator required. Of the 247 articles, 200 were excluded for the following mutually exclusive reasons. A summary of the selection process is presented in Table 1.

Table 1 shows that the pool of records narrowed considerably at each stage of the PRISMA process: from 1,250 records identified across the four databases, to 1,040 after duplicate removal, to 247 full-text articles carried forward following title/abstract screening. Of these 247 articles, 200 were subsequently excluded at the eligibility stage for insufficient methodological quality, low thematic relevance, or topic duplication, leaving a final set of 47 articles included in the qualitative synthesis and bibliometric analysis.

Table 1. Summary of the Article Selection Process (PRISMA)

Stage	Description	Total (n)
Identification	Articles were identified through the Scopus, Google Scholar, Web of Science, and ProQuest databases using a combination of keywords	1,250
Duplicate Removal	Duplicate records across databases were removed using Mendeley and manual checking	1,040
Screening	Titles and abstracts were screened; records were excluded for not being set in an Indonesian context, not addressing local communities, not being primary research articles, or being in a language other than English/Indonesian	247
Eligibility	Full-text articles were assessed for eligibility based on inclusion criteria and methodological quality	247
Exclude (full-text)	Excluded due to lack of relevance to the local community contribution focus, low methodological quality, or thematic duplication without novel findings	200
Include in SLR	Studies meeting all inclusion and quality criteria, used in the synthesis and bibliometric analysis	47

Source: Analysis Results, 2026

2.5 Data Analysis

The data extracted from the 47 selected articles were analyzed using two approaches. First, a quantitative descriptive analysis (n = 47) was conducted to map the characteristics of the studies based on year of publication, methodological approach, disaster type, and study area. Second, a qualitative thematic analysis (n = 47) was conducted on the findings of each study to identify patterns and mechanisms of local community contribution to disaster resilience, which were subsequently grouped into four main themes.

As a complement, a frequency analysis of author keywords, together with a keyword co-occurrence network mapping in VOSviewer version 1.6.19 (van Eck & Waltman, 2014), was conducted on the 45 articles that explicitly listed author keywords (2 of the 47 included articles did not list keywords and were excluded from this sub-analysis only).

Table 2. Top Ten Author Keywords by Frequency

Author Keywords	Frequency of Occurrence	Article Percentage (n = 45)
Local wisdom / indigenous knowledge	22	48.9%
Community resilience / disaster resilience	19	42.2%
Disaster risk reduction / CBDRR	13	28.9%
Social capital	10	22.2%
Disaster mitigation	9	20.0%
Disaster preparedness	8	17.8%
Tsunami	5	11.1%
Flood	5	11.1%
Destana (Desa Tangguh Bencana)	3	6.7%
Gender / women's participation	2	4.4%

Source: Analysis Results, 2026

The keyword dataset was exported from [Scopus / manually compiled from the 45 articles specify] and analyzed using [full counting / fractional counting specify], with a minimum occurrence threshold

of [n] occurrences per keyword, the [association strength / LinLog modularity specify] normalization method, and a resolution parameter of [value]. A custom thesaurus file was applied to merge spelling variants, synonyms, and closely related term forms prior to mapping; the thesaurus file and the underlying 45-article keyword dataset are provided in Supplementary Material S1 and S2 to allow the mapping to be reproduced. The keyword network visualization is presented in Figure 2. A more comprehensive bibliometric analysis, for instance using Biblioshiny/R Bibliometrix (Aria & Cuccurullo, 2017), applied to complete metadata export data from bibliographic databases, is recommended for future research.

Table 2 shows that, of the 45 articles with explicit author keywords, the issue of local wisdom/indigenous knowledge emerged as the most frequently discussed theme, appearing in nearly half of the articles (48.9%). This is unsurprising given that Indonesia, while being an archipelagic nation with high disaster risk, is also rich in traditional community knowledge ranging from inherited early warning systems to customary spatial arrangements that have long proved instrumental in helping communities cope with disasters. This theme does not stand alone but is consistently linked to community resilience (42.2%), disaster risk reduction/CBDRR (28.9%), and social capital (22.2%). These four themes are mutually reinforcing: local wisdom serves as a knowledge base, social capital acts as a binding force among community members, while resilience and CBDRR represent the tangible manifestation of how communities mobilize themselves in facing disasters. In contrast, more technical themes such as disaster mitigation (20.0%) and disaster preparedness (17.8%) appeared less frequently, suggesting that recent research has been more inclined toward examining the socio-cultural dimensions of communities rather than merely the technical aspects of disaster management. Similarly, keywords specific to particular disaster types, such as tsunami and flood (11.1% each), were less prevalent compared to the broader conceptual themes mentioned above.

Node size in VOSviewer represents total occurrence, the cumulative count of a keyword's appearances across the 45 articles with explicit author keywords, after applying the researcher-prepared thesaurus to merge exact spelling variants and pre-specified synonymous terms into a single label. VOSviewer does not merge terms automatically on the basis of semantic similarity; any such grouping reflects only the thesaurus entries specified manually beforehand. The colored clusters in Figure 2 group keywords according to patterns of co-occurrence association across articles, not by collapsing multiple terms into a single node.

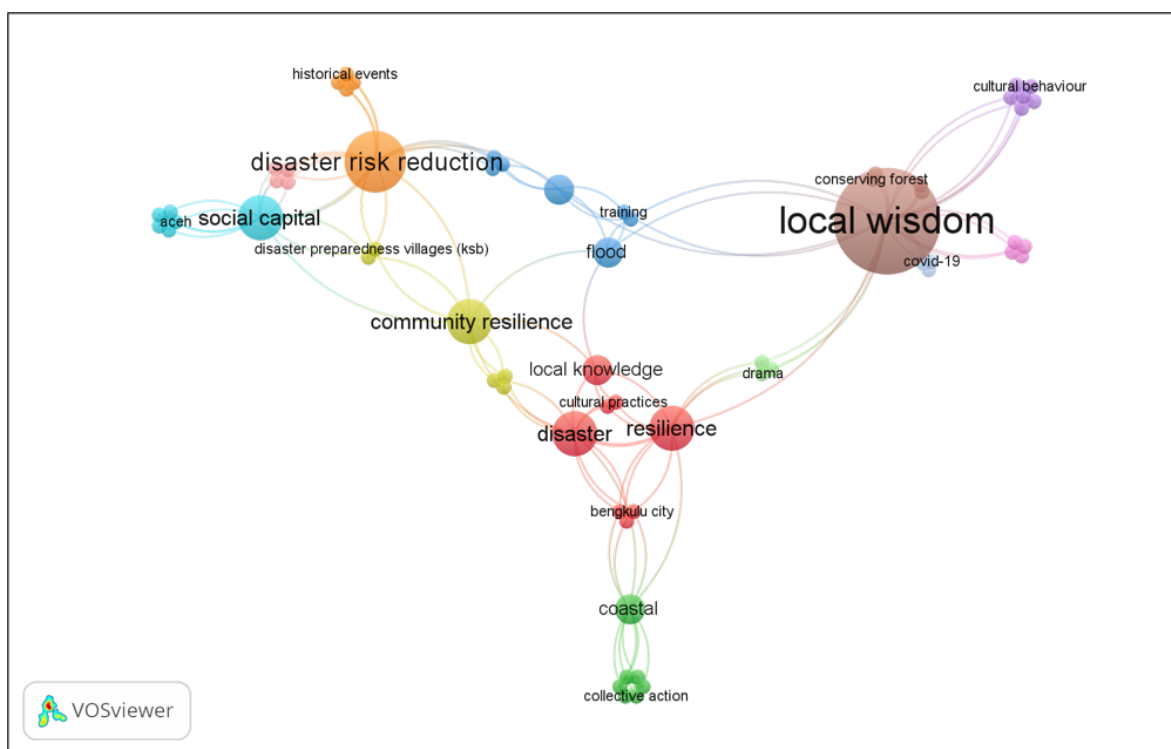


Figure 2. Network Map of Author Keyword Co-occurrence (VOSviewer, n=45 articles with explicit keywords)

As [Figure 2](#) shows, "local wisdom" and "local knowledge" remain distinct nodes, indicating that these two terms were not merged under the thesaurus applied for this analysis. [Table 2](#), by contrast, was constructed through manual article-level categorization, in which each keyword was counted based on the number of unique articles containing it (article count), and terms that are substantively related but not identical for instance, local wisdom versus cultural practices or cultural behaviour were deliberately kept separate. This difference in construction, rather than any automatic term merging, explains the differing prominence and frequency distribution between [Table 2](#) and [Figure 2](#).

These two methods are essentially complementary: VOSviewer is more appropriate for identifying the overall thematic structure and interrelationships among keywords, whereas [Table 2](#) is more appropriate for precisely measuring the prevalence of each term at the individual article level. The discrepancies in numbers and dominance ranking between the two are therefore not indicative of data inconsistency, but rather a natural consequence of the differing units of analysis and levels of aggregation employed.

2.6 Methodological Quality Appraisal

The methodological quality of the 247 full-text articles assessed for eligibility was appraised using the Mixed Methods Appraisal Tool (MMAT), version 2018 ([Hong et al., 2018](#)). The MMAT was selected because the included corpus comprised a mix of qualitative, quantitative, and mixed-methods studies, and the tool provides category-specific quality criteria for each of these designs within a single, unified instrument. Prior to appraisal, each article was first classified according to its methodological category (qualitative, quantitative descriptive, quantitative non-randomised, quantitative randomised controlled trial, or mixed-methods), after which the corresponding set of five MMAT criteria was applied.

Quality appraisal was conducted independently by both authors for all 247 full-text articles. Each criterion was rated as "yes," "no," or "can't tell," and an overall quality rating was assigned per article based on the number of criteria met, following current MMAT guidance, which recommends reporting the appraisal by criterion rather than collapsing it into a single numerical score. Discrepancies between the two independent appraisals were resolved through discussion until consensus was reached; no third-party adjudicator was required, as consensus was reached in every case.

Articles that met fewer than 60% of the applicable MMAT criteria (i.e., three or more of the five criteria not met or unclear) were classified as of insufficient methodological quality and excluded at the full-text stage. This threshold, combined with assessments of thematic relevance and topic duplication, accounted for the exclusion of 200 articles, resulting in the final set of 47 articles retained for qualitative synthesis and bibliometric analysis (see the PRISMA 2020 flow diagram above). It should be noted that MMAT scores were used solely as a threshold for inclusion and were not employed to weight individual studies' contribution within the thematic synthesis, consistent with current MMAT guidance against using appraisal scores as a composite quality index.

3. Results and Discussion

3.1 Study Selection and Quality Appraisal Outcomes

Of the 1,250 records identified across the four databases, 210 duplicates were removed, leaving 1,040 records for title/abstract screening ([Table 1](#)). Screening excluded 793 records for not being set in an Indonesian context, not addressing local communities, not being a primary research article, or not being published in English/Indonesian, leaving 247 full-text articles for eligibility assessment. Following independent methodological quality appraisal by both authors using the MMAT, 200 full-text articles were excluded for insufficient methodological quality (i.e., meeting fewer than 60% of applicable MMAT criteria), low thematic relevance, or topic duplication, resulting in a final set of 47 articles retained for qualitative synthesis and bibliometric analysis ([Figure 1](#); [Table 1](#)).

3.2 General Characteristics of the Studies

Of the 47 articles examined, the number of publications increased descriptively over time, from a single article in 2012 and 2017 to 3 articles in 2018, 8 in 2021, 9 in 2023, and 8 in 2025. Notably, 2026 alone had already yielded 5 articles by the time of the search (5 July 2026), despite covering only half a calendar year. Because the publication periods compared in earlier syntheses (2010–2017, 2018–2021, 2022–2026) span unequal durations and the final period remains incomplete, these aggregated

percentages should be interpreted as indicative of scholarly attention rather than evidence of a statistically significant trend, as no formal trend test was conducted.

Table 3. General Characteristics of the Reviewed Studies (n=47)

Characteristic	Category	Number of Articles	Percentage
Publication period	2010–2017	2	4.3%
	2018–2021	15	31.9%
	2022–2026	30	63.8%
Methodological approach	Qualitative (ethnography, case study, interviews)	34	72.3%
	Quantitative / survey	8	17.0%
	Mixed-methods	5	10.6%
Dominant disaster type	Volcanic (volcanic eruption)	6	12.8%
	Flood / tidal flood	10	21.3%
	Earthquake / tsunami	8	17.0%
	Multi-hazard / non-specific	23	48.9%
Study area	Java (Central, East, Daerah Istimewa Yogyakarta)	25	53.2%
	Sumatra (Aceh, West Sumatra, Jambi, etc.)	11	23.4%
	Nusa Tenggara & Bali	4	8.5%
	Other regions / national	7	14.9%

Source: Analysis Results

In terms of methodology, the majority of studies (72.3%) employed qualitative approaches, particularly ethnography and case studies, consistent with the contextual and culturally embedded nature of local wisdom and social capital as research topics, while quantitative studies (17.0%) and mixed-methods approaches (10.6%) were relatively less common. In terms of disaster type, nearly half of the studies (48.9%) addressed multi-hazard issues or were not specific to a single disaster type, followed by studies on flood/tidal flood-prone areas (21.3%), earthquake/tsunami (17.0%), and volcanic hazards (12.8%). In terms of geographical distribution, Java Island was the most frequently studied location (53.2%), followed by Sumatra (23.4%), reflecting a concentration of research in densely populated regions with a history of major disasters, such as the 2010 Merapi eruption, the 2006 Yogyakarta earthquake, and the 2004 Aceh tsunami, while Nusa Tenggara & Bali (8.5%) and other regions/national-level studies (14.9%) were relatively underrepresented. The complete characteristics of the studies are presented in Table 3.

The temporal increase in publications was not evenly distributed across space. While Java accounted for the largest overall share of studies (53.2%), its dominance fluctuated over time: non-Java regions matched or exceeded Java's output during 2020, 2022, and 2024, before Java's share rose again in 2026. This pattern suggests that recent growth in publication volume has been accompanied by a modest broadening of geographical coverage, even as Java remains the most-studied context overall a spatial gap that merits continued attention in future research.

Table 3 and Figure 3 illustrate that the 47 reviewed studies were distributed unevenly across Indonesia, with Java alone accounting for just over half of the corpus (53.2%, n=25), followed at a considerable distance by Sumatra (23.4%, n=11). Studies conducted in other regions or at the national level made up 14.9% (n=7), while Nusa Tenggara & Bali contributed only 8.5% (n=4), and no studies from Kalimantan, Sulawesi, or Papua met the inclusion criteria. Read together with Table 3, Figure 3 visually reinforces the concentration of research in Java and Sumatra, two regions with a well-documented history of major disasters and shows that geographical coverage falls off sharply outside these areas, underscoring the spatial research gap discussed further in the Evidence Gaps section.

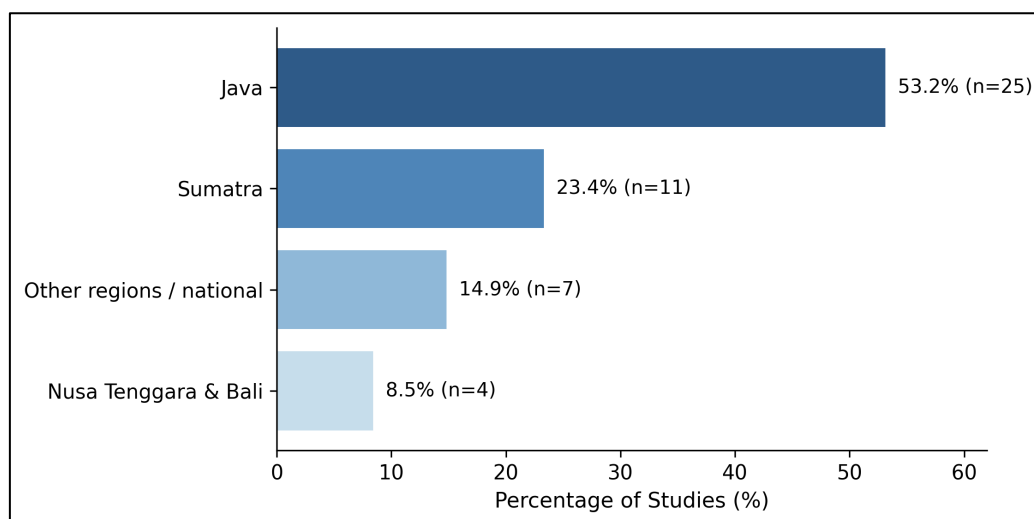


Figure 3. Geographical Distribution of Reviewed Studies Across Indonesia (n=47),

3.3 Local Wisdom and Traditional Knowledge as Informal Early Warning Systems

The first prominent theme emerging from the literature synthesis is the role of local wisdom and traditional knowledge as an informal early warning system and disaster mitigation guidance. The Smong/Nandong Smong tradition among the Simeulue community in Aceh represents the most widely cited example of how intergenerational oral narratives were able to save thousands of lives during the 2004 tsunami, and this knowledge continues to be revitalized through contemporary pedagogical approaches such as drama-based learning and role-play in schools, which have been shown to significantly enhance students' resilience to tsunamis (Aziz et al. 2026). A similar pattern is found among communities around Mount Kelud through the Larung Sesaji ritual, which, in addition to serving as a spiritual mechanism, also practically reinforces the mental mapping of evacuation routes and the internalization of emergency protocols within the community (Utomo et al., 2026a).

A study on the slopes of Mount Merapi Rasidi et al. (2025) found that traditional ecological knowledge, comprising dozens of environmental indicators, was able to provide a longer early warning lead time compared to official notifications, although its effectiveness is highly dependent on its integration with leadership structures and formal institutional support. Local knowledge proved most effective when combined with modern scientific knowledge, a conclusion also affirmed in a study on knowledge integration around Anak Krakatau (Firdaus et al., 2023).

Nevertheless, not all forms of local wisdom receive adequate formal recognition. A study on the juru kunci (traditional gatekeepers) of Mount Slamet found that the role of local wisdom is still informally acknowledged by the community, but has not yet been formally accommodated within the national disaster risk reduction regulatory framework (Widodo & Eldo, 2021). This formal-informal gap represents one of the major challenges in mainstreaming local wisdom into DRR policy in Indonesia. This pattern of place-based mitigation knowledge recurs across multiple hazard settings and ethnic groups. On Mount Kelud, the minimal casualties recorded during the 2014 eruption have been attributed to a locally embedded disaster mitigation model passed down through generations (Hariyono & Liliarsari, 2018), while at Mangkang Kulon village, Semarang, specialized, shared, and common local knowledge were found to be integral components of community-based disaster risk management (Kapiarsa & Sariffuddin, 2018). Similar knowledge-action linkages are evident among the Kampung Kuta indigenous community in Alor, whose forest-conservation practices function simultaneously as an expression of resilience to extreme climate-related hazards (Setiawan, 2023), and among earthquake-prone communities more broadly, where the incorporation of indigenous knowledge alongside instrumental data has been shown to strengthen resilience learning (Kurnio et al., 2021). A comparable integration of indigenous knowledge with modern disaster risk reduction systems was documented in the Mentawai Islands (Karnoto et al., 2025). Ritual and customary traditions likewise continue to encode disaster mitigation values, as seen in the Barong Ider Bumi tradition of the Osing community in Banyuwangi (Arifah & Saputra, 2024) and in the Adat Cao Mukak Imbo custom that shapes community participation in disaster mitigation in North Bengkulu (Soni, 2021). A social-resilience-theory

perspective on flood- and earthquake-prone villages in Ambulu, Jember, further confirmed that the sustained practice of local wisdom in daily social life remains a key resilience determinant even amid ongoing hazard exposure (Putra et al., 2026)

3.4 Social Capital and Community Networks in Disaster Response and Recovery

The second theme consistently emerging from the literature is the role of social capital encompassing trust, networks, norms of reciprocity, and gotong royong as a foundation of community resilience, particularly during the post-disaster response and recovery phases. Gotong royong has been consistently identified as a dominant resilience mechanism across various contexts, ranging from post-eruption recovery on Mount Merapi (Rasidi et al. 2025) to post-disaster job creation through community organizations in Pandes, Central Java, which successfully reduced post-disaster poverty through principles of cooperation and collective networking (Nugroho & Alifa, 2025). Social capital grounded in religious and customary values has also been found to play a significant role, as seen in the integration of Minangkabau religious and customary values into a community-based disaster management model in West Sumatra (Rozi et al., 2021), as well as the role of the Nahdlatul Wathan religious organization in Lombok in distributing aid, facilitating trauma recovery, and strengthening social capital following the 2018 earthquake through the local subawe belief narrative (Koopman, 2023). These findings reinforce the argument of Johnston et al. (2024) that social capital is not a single variable that automatically enhances resilience, but rather requires a balance between internal bonding and external bridging ties to function optimally.

Local leadership also serves as an important determinant of the sustainability of social capital-based initiatives. A study on Kampung Siaga Bencana (KSB) in Yogyakarta found that the sustainability of the program is highly dependent on the quality of local leadership (such as the role of the Jagabaya in Umbulharjo) and the effectiveness of two-way communication between KSB managers and the village government, while the absence of active leadership regeneration risks undermining the program's long-term sustainability (Ruslanjari et al., 2024). Communication innovations grounded in local culture, such as the disaster response volunteer program in the Lembang Fault area, which integrates the Sundanese cultural principles of Katiluan and Panca Wilayah into education and mitigation strategies, further demonstrate how social capital can be participatorily engineered to strengthen community awareness and engagement (Iqbal et al., 2025).

The centrality of social capital to community resilience is further corroborated by comparative and cross-context evidence. Drawing on lessons from Japan's disaster risk management experience, a study of the Lembang Fault area found that community disaster resilience can be strengthened when local social networks are deliberately connected to external technical and institutional support (Abdulharis et al., 2021), a finding that complements the volunteer communication strategies documented by Iqbal et al (2025) in the same area. In post-earthquake tourism recovery on Gili Trawangan, social capital was similarly found to underpin the pace of community recovery, although its benefits were unevenly distributed across community groups (Partelow, 2021), while in post-tsunami relocation settlements in Aceh, social capital and community integration were shown to shape long-term satisfaction and adaptation to resettlement (Daly et al., 2023). Beyond disaster-specific contexts, local wisdom itself has been reconceptualized as a form of social capital that helps traditional communities maintain solidarity and cohesion amid globalization and modernization pressures (Suat et al., 2025), a role that became particularly salient during the COVID-19 pandemic, when local wisdom among the Sasak community of Lombok functioned as a social resource for collective coping (Sumardi & Wahyudiati, 2021).

3.5 Active Participation in Community-Based Disaster Risk Reduction Programs and Forums

The third theme relates to the forms of active community participation in formal disaster risk reduction (DRR) programs and forums facilitated by both government and non-governmental organizations. The Destana program developed by BNPB through BPBD in various regions, such as in Nganjuk Regency (Mahbubah et al., 2021) and Bojonegoro Regency (Hafni, 2021), demonstrates that active community involvement in establishing village-level DRR forums can enhance community preparedness and self-reliance in facing floods and other disasters, although its effectiveness varies across regions depending on the level of local government commitment and the utilization of local resources. The participatory Community-Based Disaster Risk Reduction (CBDRR) approach, such as collaborative risk mapping with residents in Krejengan Village, Probolinggo, has also proven to produce

concrete outputs, including disaster risk maps, evacuation routes, and village DRR action plans developed collaboratively (Priyanto et al., 2026).

Community participation-based disaster training and education have further strengthened preparedness among both youth and adult community groups. Earthquake preparedness training for high school students in Pangalengan, West Java, conducted in collaboration with facilitators from Kitakyushu, Japan, has been shown to significantly improve students' understanding of evacuation routes, safe zones, and the preparation of disaster emergency kits (Rachman et al., 2025). Similar training grounded in Jambi's local wisdom for flood preparedness also showed a significant increase in participants' knowledge and skill scores following the intervention (Subandi et al., 2019). Cross-sector engagement among government, academia, and communities in community service programs, such as community-based disaster preparedness training in Lubuk Village, Jambi, has also strengthened residents' emergency response capacity as well as social cohesion among community members (Chotib et al., 2024).

Although community participation in formal DRR forums continues to develop, a study on risk communication during the 2021 Mount Semeru eruption revealed that inter-agency risk communication protocols among local government institutions remain poorly standardized, resulting in delayed responses to the information needs of affected communities, and that risk communication at the regional level continues to be shaped by power relations among actors (Ida et al., 2023). A study on local governance policy constraints further emphasizes that rigid and centralized central government policies can restrict the autonomy of local governments and community organizations that have already developed independent disaster management capacity, thereby hindering the optimization of community participation in decision-making (Yuniarti et al., 2024).

Individual-level psychological readiness and institutional health literacy also shape the success of participatory DRR initiatives. A study of disaster-prone communities found that a stronger future time perspective was positively associated with community resilience, suggesting that programs cultivating forward-looking orientations may enhance disaster risk reduction outcomes (Achmat & Putera, 2024), while in a volcano-prone community in Yogyakarta, disaster health literacy and risk perception were found to be significant predictors of household-level preparedness (Saifudin, 2023). Faith-based and mass organizations have also mobilized local wisdom for institutional disaster preparedness, as demonstrated by the Muhammadiyah-led disaster-resilient village initiative in Bantul (Surwandono, 2023). Beyond community-level programs, government responsiveness itself shapes public trust and cooperation: an evaluation of Aceh's provincial COVID-19 response found that community satisfaction was closely tied to the transparency and adequacy of government risk communication (Adamy & Rani, 2022), while a review of Indonesia's legal and institutional frameworks for land and forest fire management found persistent gaps between national policy and community-level implementation capacity, echoing the formal-informal disconnect observed around Mount Slamet (Nurhidayah & Djalante, 2017).

3.6 Adaptation of Livelihood Strategies and the Involvement of Vulnerable Groups

The fourth theme highlights the adaptation of community-based livelihood strategies and the dynamics of vulnerable group involvement, particularly women and youth, in the disaster resilience process. A study on coping strategies among the Nagari Mandeh community in West Sumatra demonstrates how customary institutions, such as the role of Ninik Mamak in collective caregiving, help sustain community resilience capital in facing natural disaster threats (Alhadi et al. 2023), while the livelihood adaptation of the Bajo community in West Muna, based on interaction with the marine environment, reflects how local knowledge concerning taboos, rituals, and oral traditions (pamali) shapes mitigation behavior, although this is currently undergoing transformation due to religious influence and government policy (Marhadi et al., 2024).

From a gender equality perspective, a comparative study in the Lasiana and West Oesapa sub-districts, Kupang, reveals that gender norms, time poverty, and hierarchical power relations continually constrain women's participation in community-based DRR activities, even though women's local knowledge is informally valued (Pradana et al., 2025). A disaster mitigation study in Semarang and Situbondo similarly found that men generally possess better disaster mitigation knowledge and higher involvement in risk-awareness activities compared to women, rendering women a more vulnerable group when disasters occur (Purba et al., 2022). These findings underscore the importance of a DRR

approach that is explicitly gender-responsive and inclusive of other vulnerable groups, in line with the inclusivity principle embedded in the Sendai Framework.

Livelihood-centered recovery has likewise been shown to depend on the extent to which communities retain agency over rebuilding decisions. In Bantul, post-earthquake recovery grounded in local wisdom allowed residents themselves to determine how their houses were rebuilt, with local government providing only supplementary technical and financial assistance (Kusumasari & Alam, 2012). Coastal communities facing chronic flood exposure similarly rely on locally adapted livelihood strategies: on the flood-prone northern coast of Central Java, community resilience was found to be constrained less by a lack of local knowledge than by inadequate physical infrastructure (Isa et al., 2018), while the Kampunglaut community's long-term ecological adaptation to tidal flooding (rob) illustrates how intimate knowledge of the local environment continues to inform sustainable livelihood practices (Andriani et al., 2023). In tsunami-prone Bengkulu City, coastal community resilience was found to vary considerably across sub-districts, underscoring the need for spatially differentiated livelihood and preparedness interventions (Mayasari et al., 2025). Building on these findings, a broader assessment of community resilience determinants in Cisolok, Sukabumi similarly emphasized that disaster risk management strategies must be tailored to the specific livelihood context of each community rather than applied uniformly (Shalih, 2019).

3.7 Evidence Gaps

Across the 47 reviewed studies, several evidence gaps are apparent. The linkage between local knowledge and formal institutional recognition is documented in only isolated cases, such as the juru kunci role on Mount Slamet, where traditional knowledge remains informally rather than formally incorporated into DRR regulation (Widodo & Eldo, 2021). Evidence on how social capital translates into formal decision-making roles for vulnerable groups, particularly women, is limited to two studies, conducted in coastal Kupang and in Semarang/Situbondo (Purba et al., 2022). The reviewed corpus is dominated by single-case, qualitative designs (72.3% of studies), which constrains cross-regional comparison, and coverage of Kalimantan, Sulawesi, and Papua remains sparse relative to Java and Sumatra. No study in the corpus longitudinally evaluates whether long-running programs such as Destana and Kampung Siaga Bencana durably convert social capital and local knowledge into institutional capacity over time.

3.8 Interpreting the Contribution Pathway

Beyond identifying these four recurring themes, this synthesis proposes that local wisdom, social capital, institutional participation, and livelihood adaptation do not operate independently but form an interconnected pathway through which community-based disaster resilience is produced. Local wisdom and traditional knowledge function primarily as a source of place-based guidance for action, shaping how communities interpret environmental signals and decide when and how to respond, as demonstrated by the early-warning role of the Smong tradition in Simeulue Aziz et al., (2026) and the traditional ecological indicators used around Mount Merapi. This knowledge, however, translates into collective resilience only when it is mobilized through social capital, specifically the trust, reciprocity, and leadership structures such as gotong royong that convert individual or family-level awareness into coordinated community action, as seen in post-eruption recovery on Merapi Rasidi et al., (2025) and faith-based mobilization following the 2018 Lombok earthquake (Koopman, 2023). Formal institutions, in turn, act as the connective layer between these community-level capacities and the state: programs such as Destana and KSB provide the organizational channel through which local knowledge and social capital are, at least partially, formalized and linked to government resources and authority (Ruslanjari et al., 2024). Finally, livelihood adaptation is the dimension through which resilience is sustained over the long term, as communities restructure their economic and social practices whether through customary institutions such as Ninik Mamak in West Sumatra Alhadi et al., (2023) or marine-based knowledge among the Bajo of West Muna to remain viable under repeated disaster exposure. Read together, these four dimensions can be understood as a sequential and partly cyclical model: knowledge informs action, social capital mobilizes it, institutions attempt to formalize and scale it, and livelihood adaptation determines whether the resulting resilience is sustained, with lived experience continually reshaping local knowledge in turn.

Recent evidence from Mount Merapi reinforces this integrated view: cultural practices, livelihoods, and formal institutions were found to jointly, rather than independently, shape adaptive capacity to volcanic hazards, with communities drawing on all three simultaneously depending on the phase of the hazard cycle (Rahman et al., 2026). At the same time, emerging and climate-sensitive hazards remain underexplored within this local-wisdom framework: a study linking climate variability to dengue fever transmission suggests that community resilience frameworks devised for geophysical hazards may require adaptation to adequately address slower-onset, climate-mediated health risks (Permatasari & Masjud, 2024), pointing to a promising direction for future research.

3.9 Variation Across Regions and Hazard Types

The relative weight of each dimension, and the strength of the linkages between them, varies systematically across geographical and hazard settings. In volcanic contexts such as Merapi, Kelud, Slamet, and Anak Krakatau, the knowledge dimension is most salient, expressed through ritual and ecologically embedded early-warning practices, but the knowledge–institution linkage is frequently weak: the juru kunci of Mount Slamet remains informally rather than formally recognized within DRR regulation (Widodo & Eldo, 2021), illustrating a break in the pathway between knowledge and institutional formalization. In coastal and tsunami-prone areas such as Simeulue, the knowledge dimension is similarly dominant, but it is more tightly coupled to livelihood, since maritime subsistence and disaster narratives are historically co-constituted. In archipelagic and small-island settings, exemplified by the Bajo community of West Muna, livelihood becomes the primary carrier of resilience, with local knowledge embedded in taboos (pamali) and rituals tied directly to marine subsistence practices, although this linkage is reported to be weakening under religious and policy pressure. In rural, village-based settings such as Nganjuk, Bojonegoro, and Krejengan, the institutional dimension is comparatively stronger, anchored in the Destana program and participatory risk-mapping processes, whereas in peri-urban settings such as Yogyakarta's KSB, the social capital–institution linkage is most developed, contingent on the quality of local leadership. Gender and vulnerability dynamics cut across all these settings rather than being confined to one: even where knowledge and social capital are strong, as in coastal Kupang (Pradana et al., 2025) and Semarang/Situbondo (Purba et al., 2022), the institutional dimension fails to translate informally recognized contributions, particularly women's contributions, into formal decision-making roles, indicating that the knowledge institution and social capital–institution linkages are systematically weaker for vulnerable groups than for the community as a whole.

3.10 Relating Findings to Theory and International Reviews

This conceptual model both extends and qualifies existing theory. It supports the proposition that resilience depends not on social capital alone but on the balance between internal bonding ties and external bridging ties; the Indonesian evidence indicates that bonding capital (gotong royong, customary and religious networks) is consistently strong, while bridging and linking capital, meaning the ties connecting communities to formal governance remains the weakest and most context-dependent link in the model, particularly for volcanic juru kunci roles and for women's participation. Read against Graveline and Germain's (2022) distinction between absorptive, adaptive, and transformative resilience capacities, the reviewed literature suggests that Indonesian communities have well-developed absorptive capacity (via local knowledge) and adaptive capacity (via livelihood adjustment), but comparatively underdeveloped transformative capacity, since structural change in formal governance arrangements is rarely documented or evaluated. This also extends Zhao et al.'s (2025) global synthesis of social capital and disaster resilience: whereas that review theorizes bonding, bridging, and linking capital as a general typology, the present synthesis shows how the strength of these ties varies systematically with hazard type and settlement context within a single decentralized governance system, a level of contextual specificity not previously available for Indonesia. It likewise moves beyond Nurhidayah and Djalante's (2017) bibliometric mapping of Indonesian hazards research by offering a substantive explanatory account of how community contributions operate, rather than a description of publication trends. Finally, the persistent knowledge–institution and social capital–institution gaps identified here complicate the inclusive, multi-stakeholder governance vision articulated in the Sendai Framework (Mizutori, 2020): the aspiration for shared responsibility between communities and government is only partially realized in Indonesia's decentralized context, where local

regulatory autonomy and bureaucratic rigidity condition whether community capacities can be formally integrated (Yuniarti *et al.*, 2024).

3.11 Implications and Limitations

Framed against this model, four research gaps become conceptually rather than merely descriptively significant. First, the knowledge–institution linkage remains weak and inconsistently formalized across regions, as shown by the Mount Slamet case (Widodo & Eldo, 2021) and by regulatory constraints on local governance more broadly (Yuniarti *et al.*, 2024); future research should examine the specific institutional mechanisms such as local regulation, budget allocation, or formal recognition of customary roles that determine whether this linkage strengthens or remains informal. Second, the social capital–institution linkage is systematically weaker for vulnerable groups, particularly women, whose contributions are informally valued but rarely translated into formal DRR decision-making roles (Purba *et al.*, 2022); this points to a need for research that examines the institutional barriers to this translation, rather than only documenting the exclusion itself. Third, the predominance of single-case, qualitative designs constrains the ability to test the proposed model comparatively: it remains unclear whether the relative strength of each dimension and linkage identified here would hold across a larger, cross-regional sample, or whether the model requires modification for hazard types and regions underrepresented in the current corpus, such as Kalimantan, Sulawesi, and Papua. Fourth, the livelihood adaptation and institutional-formalization outcomes of long-running programs such as Destana and KSB have not been evaluated longitudinally, leaving the model's claim that institutions convert social capital and knowledge into durable, long-term capacity empirically untested over time.

These gaps carry both theoretical and policy implications. Theoretically, they point toward a research agenda that treats the four dimensions not as a checklist but as a system of linkages to be tested and compared across contexts particularly the knowledge–institution and social capital–institution linkages, which this synthesis identifies as the weakest points in the pathway. From a policy perspective, the model suggests that interventions aimed only at strengthening one dimension in isolation for instance, disseminating local knowledge without addressing its formal institutional recognition, or expanding participation forums without addressing gendered barriers to entry are unlikely to durably improve resilience. A more effective strategy would explicitly target the linkages: decentralizing local government authority to accommodate customary and community-based institutions, mainstreaming gender-responsive representation within DRR forums, and establishing longitudinal monitoring of Destana and KSB to track whether formal programs actually convert informal social capital and knowledge into lasting structural resilience. Investing in these linkages, rather than in any single dimension alone, is what distinguishes a genuinely integrative, cost-effective, and culturally sustainable DRR strategy from approaches reliant on physical infrastructure or top-down technocratic intervention alone.

This review has several limitations. First, the predominance of qualitative, single-case designs (72.3% of the 47 included studies) limits the extent to which the proposed contribution pathway can be tested comparatively across contexts. Second, the search was restricted to English- and Indonesian-language records from four databases up to 5 July 2026, and the final publication period (2022–2026) remains incomplete, which may understate recent scholarly output. Third, MMAT quality scores were used only as an inclusion threshold rather than to weight individual studies' contribution to the synthesis, consistent with current MMAT guidance, meaning that lower- and higher-quality included studies were treated with equal analytical weight. Fourth, geographical coverage remains concentrated in Java and Sumatra (76.6% of studies combined; Table 3), so the regional and hazard-type variation described above should be read as indicative rather than exhaustive, particularly for underrepresented regions such as Kalimantan, Sulawesi, and Papua.

4. Conclusion

A systematic review of 47 articles addressing the contribution of local communities to disaster resilience in Indonesia finds that local communities contribute through four interrelated mechanisms: local wisdom and traditional knowledge functioning as informal early warning systems; social capital and community networks mobilizing disaster response and recovery; active participation in community-based DRR programs and forums such as Destana and KSB; and the adaptation of livelihood strategies shaped by the dynamics of vulnerable groups, including women and youth. The reviewed

studies consistently suggest that these contributions support community preparedness, response, and recovery, a conclusion that reflects the strength of a narrative synthesis rather than a meta-analytic estimate of effect. Theoretically, the review proposes that these four dimensions operate as a sequential, partly cyclical pathway from knowledge through social capital and institutions to livelihood adaptation, extending existing bonding/bridging capital and absorptive-adaptive-transformative capacity frameworks by showing how the strength of each linkage varies with hazard type and settlement context within Indonesia's decentralized governance system. The evidence base, however, remains geographically uneven, concentrated in Java and Sumatra while Nusa Tenggara, Bali, Kalimantan, Sulawesi, and Papua remain comparatively underexamined. This unevenness, combined with the predominance of single-case qualitative designs, limits the extent to which the findings can be generalized across Indonesia's diverse hazard and institutional contexts. Taken together, these findings point to the need for a disaster risk reduction policy framework that formally recognizes and integrates local wisdom, strengthens the institutional linkages connecting social capital and vulnerable-group participation to formal DRR decision-making, and expands the geographical and methodological base of future research.

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