

Original Article

Disaster Risk Reduction, Preparedness, and Resilience in the Philippines: A Systematic Narrative Literature Review

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Abstract. The Philippines faces frequent natural hazards, including typhoons, floods, and earthquakes, highlighting the need for effective Disaster Risk Reduction and Management (DRRM) strategies. This study presents a systematic narrative review of 20 peer-reviewed publications from 2021 to 2025, selected to capture the most recent advances in DRRM research. Following the PRISMA framework, studies were screened and analyzed for disaster type, affected populations, methods, and key findings. Unlike prior reviews, this synthesis identifies gaps in the integration of governance, community resilience, and technological tools in DRRM practice. Findings are organized into three overarching categories: Community Preparedness and Resilience, Institutional and Policy Support, and Technological and Risk Assessment Tools. Analysis reveals that while awareness and literacy underpin preparedness, household, community, and institutional measures collectively strengthen resilience. However, longitudinal evaluation of interventions, multi-hazard strategies, and community-level technology applications remains limited. Based on these insights, the components of the proposed framework are derived from the recurring themes identified in the reviewed literature, illustrating hierarchical relationships among DRRM components and guiding future research. These findings provide actionable recommendations for policymakers and practitioners, offering a comprehensive evidence base to enhance disaster governance and resilience in the Philippines and comparable multi-hazard contexts globally.

Keywords: *Community resilience; Disaster Risk Reduction and Management; Philippines; Preparedness; Systematic narrative review.*

The Philippines is among the most disaster-prone countries globally, consistently ranking high on the World Risk Index due to its exposure to typhoons, floods, earthquakes, and other hazards, compounded by socioeconomic vulnerabilities (Chong et al., 2025). These disasters have profound consequences for human life, economic growth, and environmental sustainability, disproportionately affecting disadvantaged populations. The Super Typhoon Rai (Odette) in 2021, for example, caused over 400 deaths, displaced millions, and incurred economic losses approaching USD 950 million, underscoring the urgency of effective disaster preparedness and response systems (Cahigas et al., 2023; Esteban et al., 2023). Despite robust DRRM policies and national frameworks, challenges remain in integrating community preparedness, institutional readiness, technological

tools, and socio-environmental factors into cohesive disaster management strategies. This raises a managerial problem—how can DRRM stakeholders coordinate and implement strategies effectively?—and a theoretical puzzle regarding how empirical practices align with disaster resilience and governance frameworks.

Existing research on DRRM in the Philippines can be grouped into three interrelated domains. First, studies on community preparedness and resilience emphasize disaster literacy, household-level measures, and behavioral factors such as risk perception and attitudes (Mideksa, 2021; Gumasing et al., 2022). Second, research on institutional and policy support highlights the role of barangays, schools, local government units, and higher education institutions in fostering awareness, coordination, and operational readiness (Gabriel, Santiago, & Casimiro, 2021; Mendoza, 2025; Stagen et al., 2022). Third, investigations into technological tools and risk assessment demonstrate the utility of GIS, AHP, TOPSIS, and behavioral frameworks for evaluating vulnerability and informing interventions (Dizon et al., 2025; Singh et al., 2024; Kurata et al., 2023). Collectively, these studies illustrate the multifaceted nature of disaster preparedness, where social, cognitive, technological, and institutional dimensions intersect. However, the literature remains fragmented, often focusing on specific hazards, regions, or populations without synthesizing these elements into a holistic understanding of DRRM.

Institutional and policy integration further enhances the effectiveness of disaster management frameworks. Gabriel et al. (2021) found that DRRM and climate change adaptation were successfully mainstreamed into comprehensive development planning in Nueva Ecija. Mendoza (2025) reviewed DRRM practices in local universities and colleges across Central Luzon, highlighting the important role of higher education institutions in advancing disaster awareness and preparedness. Similarly, Stagen et al. (2022) stressed the need for robust communication strategies by local government units—particularly during the COVID-19 pandemic—to ensure the timely dissemination of DRRM information to residents.

Socio-environmental factors and local contexts also profoundly influence preparedness and resilience. Gumasing et al. (2022) emphasized the interplay among cognitive, social, and environmental elements, while Kurata et al. (2023) and Pantaleon Jr. et al. (2024) showed that targeted environmental interventions, such as infrastructure enhancements, can effectively reduce the impacts of disasters. Collectively, these studies affirm that disaster preparedness is inherently multifaceted, demanding the seamless integration of social, cognitive, technological, and environmental strategies.

Resilience and disaster preparedness in the Philippines have been studied with respect to numerous factors. Cognitive and behavioral factors, including risk perception, knowledge, and attitudes, play an important role in preparedness, especially among students and households (Mideksa, 2021; Gumasing et al., 2022). There has been an increasing use of environmental and technological tools, such as Geographic Information Systems (GIS), to measure vulnerability and assess risk reduction strategies (Dizon et al., 2025; Singh et al., 2024). Additionally, research investigating flood-prone regions in Northern and Central Luzon, Surigao del Sur, and the National Capital Region can also inform on community coping, mitigation efforts, and resilience-building interventions (Guingab, Cureg, and Santiago, 2025; Kurata et al., 2023; Pantaleon Jr. et al., 2024).

Despite this progress, the literature remains rather fragmented, and researchers tend to concentrate on a particular area, risk, or population. The synthesized comprehension that ties the cognitive, institutional, technological, and social aspects of disaster preparedness in the nation is lacking. A systematic literature review of the narratives offers an opportunity to summarize and explain these studies, identify patterns, tendencies, and gaps, and provide a holistic, thematic perspective on disaster risk reduction, preparedness, and resilience in the Philippine context.

To address these gaps, this study conducts a systematic narrative review of 20 recent publications (2021–2025) to identify patterns, trends, and research gaps across the Philippines. A novel conceptual framework is proposed that integrates awareness, preparedness, resilience, institutional capacity, response, and technological applications into a unified model. By synthesizing empirical evidence across regions, populations, and disaster types, this review contributes both theoretically—linking DRRM practices to resilience and governance theories—and practically, offering actionable insights for policymakers, local governments, educators, and communities aiming to enhance disaster preparedness and resilience nationwide.

The conceptual framework for this systematic narrative review illustrates the hierarchical and interconnected components of Disaster Risk Reduction and Management (DRRM) in the Philippines. It begins with Awareness

and Knowledge, which form the cognitive foundation of preparedness, encompassing disaster literacy and risk perception, enabling individuals to understand potential hazards (Bernal & Apdohan, 2023; Babaran et al., 2025). Building on this foundation, Household and Community Preparedness translates knowledge into tangible actions such as emergency planning, mitigation measures, and infrastructure readiness at both family and community levels (Talplacido et al., 2022; Pantaleon Jr. et al., 2024). Behavioral and Cognitive Determinants, including individual motivation, self-efficacy, attitudes, and social norms, influence whether these preparedness measures are consistently adopted and sustained (Mideksa, 2021; Gumasing et al., 2022).

Disaster Risk Reduction, Preparedness, and Resilience in the the Philippines



Figure 1. Conceptual framework

At the next level, Community and Barangay-Level Resilience highlights the role of local governance, participation, and risk communication in reinforcing preparedness and adaptive capacity within neighborhoods and barangays (Guingab et al., 2025; Nanta & Pisueña, 2025). This is complemented by Institutional and Policy Support, where Local Government Units (LGUs), educational institutions, and policy frameworks provide legal, organizational, and educational backing to ensure systematic and coordinated disaster management (Gabriel et al., 2021; Mendoza, 2025). Technological and Risk Assessment Tools, such as GIS mapping, vulnerability assessments, and early warning systems, provide empirical data to identify hazards, prioritize interventions, and enhance precision in disaster planning (Dizon et al., 2025; Singh et al., 2024).

Disaster Response and Recovery represents the operational phase, in which preparedness and planning are activated during emergencies to ensure effective relief distribution, emergency management, and socio-economic recovery, ultimately achieving the goal of resilience (Gundran et al., 2023; Esteban et al., 2023; Cahigas et al., 2023). Finally, the framework culminates in Synthesis and Research Gaps, the meta-analytical layer where all themes are integrated to identify patterns, trends, and gaps in the Philippine disaster literature. Together, this framework provides a comprehensive, sequential, and multi-level view of DRRM, highlighting the interactions between cognitive, behavioral, community, institutional, and technological factors in building disaster resilience across the country.

Methodology

Research Design

This study conducted a systematic narrative literature review of Disaster Risk Reduction and Management

(DRRM) in the Philippines. The review aimed to synthesize recent empirical and conceptual research, identify recurring patterns, gaps, and trends, and propose a conceptual framework integrating preparedness, resilience, institutional capacity, and technological interventions.

The review followed the PRISMA framework (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to ensure transparency, replicability, and methodological rigor. To operationalize inclusion and extraction criteria, the review also drew on elements from the SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research type) and PICOS (Population, Intervention, Comparator, Outcome, Study design) frameworks. SPIDER guided the selection of qualitative, quantitative, and mixed-methods studies, while PICOS provided structured guidance for evaluating empirical outcomes. This dual approach ensured that all relevant dimensions of DRRM—community, institutional, and technological—were captured.

Identification of Literature Studies

A comprehensive literature search was performed across multiple databases, including Google Scholar, ScienceDirect, Scopus, and ResearchGate. Keywords used in combination with Boolean operators were: “Disaster risk reduction Philippines”, “Disaster preparedness Philippines”, “Community resilience Philippines”, “Barangay disaster management”, “Disaster response and recovery Philippines.” The search was limited to peer-reviewed articles, conference papers, and academic reports published in English from 2021 to 2025, ensuring relevance to recent disasters such as Typhoon Rai (Odette).

Screening and Eligibility of the Literature

Following PRISMA guidelines, the literature selection process involved four stages: (1) Identification: A total of 105 records were initially retrieved from the databases, (2) Screening: Duplicate records (n = 25) were removed, leaving 80 unique articles. Titles and abstracts were screened for relevance to DRRM in the Philippines. Articles not focused on the Philippine context, non-peer-reviewed, or unrelated to disaster preparedness and resilience were excluded (n = 40), (3) Eligibility: The full text of the remaining 40 articles was reviewed for inclusion criteria: (a) Focus on DRRM, preparedness, or resilience, (b) Empirical, conceptual, or case study evidence, (c) Clear methodology and relevance to disaster types in the Philippines. Articles failing to meet these criteria (n = 20) were excluded, (4) Included: A final set of 20 studies was included in the review for thematic synthesis.

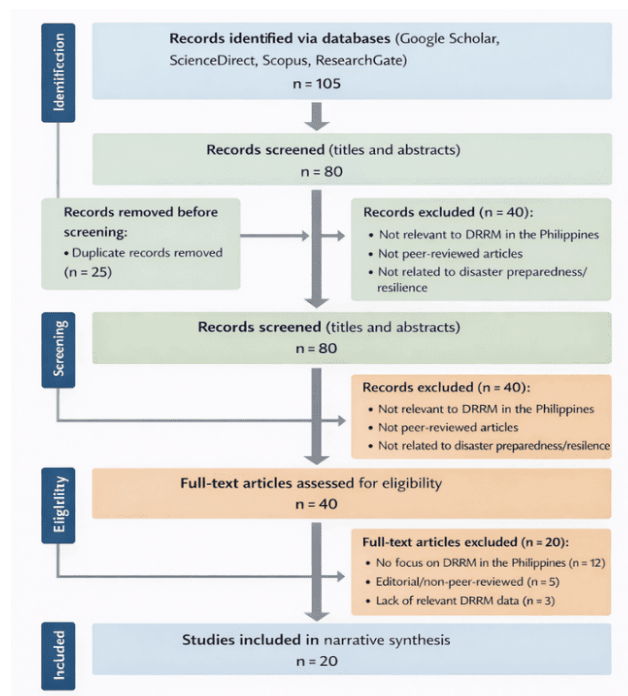


Figure 2. PRISMA Flow Diagram for Systematic Narrative Review

Data Extraction Procedure

For the 20 studies included in this review, data were systematically extracted to create a comprehensive, comparable, and traceable dataset. Two reviewers independently conducted the extraction, with all references managed in Zotero to ensure consistency, avoid duplication, and maintain a clear link to the sources. Any discrepancies between reviewers were resolved through discussion, and interrater reliability was calculated to confirm consistency in the extracted information. For each study, bibliographic details such as author(s), year of publication, and geographic location were recorded to contextualize findings within specific regions of the Philippines. Disaster characteristics, including the type of hazard (e.g., typhoon, flood, fire) and the affected population (e.g., households, schools, barangays), were captured to understand the scope and applicability of each study. Research objectives and methodological details, including qualitative, quantitative, and mixed-method approaches, were documented to assess study rigor and diversity.

Key findings were cataloged according to their relevance to disaster awareness, household and community preparedness, resilience, institutional support, technological interventions, and response strategies. Any frameworks, theoretical models, or assessment tools used, such as GIS-based vulnerability mapping or Protection Motivation Theory, were also recorded to illustrate how DRRM concepts were operationalized. All extracted information was then organized into a thematic matrix, with studies represented as rows and data categories as columns. This structured approach enabled systematic cross-study comparison, facilitated identification of recurring themes and patterns, and highlighted gaps in the current literature, providing a robust foundation for the subsequent narrative synthesis and conceptual framework development.

Data Synthesis Procedure

After data extraction and quality appraisal, the studies were synthesized using a structured narrative approach, following guidance from Popay et al. (2006) and Petticrew & Roberts (2006). Each study was assigned to one or more of the seven pre-defined thematic areas—Awareness & Knowledge, Household & Community Preparedness, Behavioral & Cognitive Determinants, Community & Barangay-Level Resilience, Institutional & Policy Support, Technological & Risk Assessment Tools, and Disaster Response & Recovery—based on the content of their objectives, interventions, and reported findings. Assignment to themes was performed systematically through content coding within a thematic matrix, thereby identifying patterns, trends, and gaps across studies.

Within each theme, recurring findings, emerging patterns, and inconsistencies were analyzed to identify areas of strength, convergence, or evidence gaps. These insights directly informed the construction of a conceptual framework, illustrating the interconnections among individual, community, institutional, and technological factors that underpin disaster preparedness and resilience in the Philippine context. By mapping each theme to components of the framework, the review provides a holistic, evidence-based synthesis of DRRM practices and highlights priorities for research, policy, and practice.

Justification for Narrative Synthesis

A narrative approach was chosen over meta-analysis because the included studies were highly heterogeneous across study design, outcomes, populations, disaster types, and measurement tools, making quantitative pooling infeasible. Narrative synthesis allowed integration of qualitative, quantitative, and mixed-method evidence while preserving the richness of context-specific insights and facilitating thematic interpretation.

Risk of Bias and Quality Considerations

The methodological quality of each study was appraised using the CASP checklists (Table 1), and findings were interpreted with consideration of identified limitations. Key risks included reporting bias, regional concentration of studies, limited longitudinal evaluation, and variability in outcome measures, which may affect confidence in generalizability. Nevertheless, the synthesis emphasized transparency, systematic coding, and traceability to original studies (all linked in Zotero), minimizing potential bias in the review process.

Sensitivity Analyses and Subgroup Considerations

Given the qualitative nature of the synthesis and the heterogeneity of the evidence, formal sensitivity analyses, subgroup exploration, and heterogeneity assessments were not performed. Instead, heterogeneity was accounted for descriptively, and gaps in evidence were highlighted to inform future targeted research.

Ethical Considerations

This study relied solely on published, publicly available literature; no human or animal participants were involved. Ethical standards were maintained through accurate citation of all sources, respect for intellectual property rights, and the objective presentation of synthesized findings without misrepresenting the original studies.

Table 1. CASP Quality Appraisal of Included Studies

| Study | Study Design | Clear Aims / Objectives | Appropriate Methodology | Study Design Justified | Sampling / Participants | Data Collection | Data Analysis / Rigor | Findings Clearly Stated | Risk of Bias / Limitations | Overall Quality |
|------------------------------------|--------------|-------------------------|-------------------------|------------------------|-------------------------|-----------------|-----------------------|-------------------------|--|-----------------|
| Babaran et al., 2025 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – single school context | High |
| Bernal & Apdohan, 2023 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – limited to senior high school students | High |
| Cahigas et al., 2023 | Mixed-method | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – focused on one locality | High |
| Chong et al., 2025 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – uses survey data only | High |
| Dizon et al., 2025 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | High methodological rigor; | High |
| Esteban et al., 2023 | Qualitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – regional focus only | High |
| Gabriel, Santiago & Casimiro, 2021 | Qualitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – policy focus, not population-level | High |
| Guinab, Cureg & Santiago, 2025 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – focused on flood-prone barangays | High |
| Gumasing et al., 2022 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – perceived preparedness only | High |
| Gundran et al., 2023 | Mixed-method | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – simulation-based, not a real disaster | High |
| Kurata et al., 2023 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – single hazard focus | High |
| Mendoza, 2025 | Qualitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – limited institutional focus | High |
| Mideksa, 2021 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – focused on students only | High |
| Nanta & Pisueña, 2025 | Qualitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – focused on fire safety only | High |
| Pantaleon Jr. et al., 2024 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – infrastructure focus | High |
| Singh et al., 2024 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – duplicate study / overlapping dataset | High |
| Stagen, De Torres & Vargas, 2022 | Qualitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – COVID-19 pandemic context only | High |
| Talplacido et al., 2022 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – single barangay focus | High |
| Tamayo, Foronda & Tabago, 2025 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Moderate – WASH only, not full DRRM | High |
| Tanguid & Tanguid, 2022 | Quantitative | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | ✓ Yes | Low – limited to resident knowledge | High |

Results and Discussion

This systematic narrative review synthesizes evidence from 20 studies on Disaster Risk Reduction and Management (DRRM) in the Philippines. Across the literature, several clear trends emerge: disaster awareness and literacy are generally moderate; household and community preparedness measures improve resilience when combined with local engagement; behavioral and cognitive factors significantly influence the translation of knowledge into action; and institutional, technological, and response mechanisms shape overall disaster outcomes.

Despite progress, persistent gaps remain, particularly in multi-hazard approaches, longitudinal assessments of

interventions, and integration of technology at the barangay and household levels. These patterns inform the hierarchical, multi-level conceptual framework proposed in this study, linking individual, community, institutional, and technological factors to overall DRRM effectiveness.

Table 2. Literature Matrix for Disaster Risk Reduction Management Review of Literatures

| Theme | Key References (Year) | Core Findings | Implications / Links to Broader DRRM Context |
|--|--|--|---|
| Awareness & Knowledge | Bernal & Apdohan (2023); Babaran et al. (2025); Talplacido et al. (2022) | Disaster literacy and risk perception are foundational but vary across students, households, and regions; moderate awareness exists, yet knowledge rarely translates directly to consistent preparedness actions due to gaps in practical understanding and application. | Highlights the persistent "knowledge-to-action" gap in Philippine DRRM; aligns with Sendai Priority 1 (Understanding Disaster Risk) but reveals the need for targeted, context-specific education to bridge perception and behavior, especially in rural/student populations. Demonstrates value of structural + participatory approaches in resource-limited settings; supports Sendai Priority 3 (Investing in DRR for Resilience); effective in Mindanao/Northern Luzon, but scalability depends on local maintenance and resources. |
| Household & Community Preparedness | Pantaleon Jr. et al. (2024); Guingab et al. (2025); Tamayo et al. (2025) | Physical measures (e.g., rainwater catchment, WASH facilities, community mitigation) significantly enhance resilience; localized, low-cost interventions prove effective in flood- and typhoon-prone areas when combined with community cooperation. | Psychological factors explain why awareness fails to convert to action; integrates theories (e.g., Protection Motivation Theory, Theory of Planned Behavior); calls for interventions addressing attitudes/norms alongside knowledge to boost multi-hazard resilience. |
| Behavioral & Cognitive Determinants | Mideksa (2021); Gumasing et al. (2022); Cahigas et al. (2023); Kurata et al. (2023) | Self-efficacy, risk perception, motivation, attitudes, prior experience, and behavioral intentions strongly influence the adoption of preparedness actions; cognitive/social/environmental domains shape readiness for typhoons, floods, and post-disaster recovery. | Reinforces RA 10121's emphasis on barangay-led DRRM; effective in building bottom-up resilience but uneven due to varying official capacity/knowledge; key for isolated or rural areas like Cagayan Valley. |
| Community & Barangay-Level Resilience | Nanta & Pisueña (2025); Guingab et al. (2025); Tanguid & Tanguid (2022) | Local governance, community participation, and effective risk communication improve adaptive capacity; barangay officials are critical for coordination, enforcement (e.g., fire safety), and frontline response in decentralized DRRM systems. | Shows progress in policy coherence (Sendai Priority 2: Strengthening Governance); universities/LGUs play growing roles, but sustained funding and cross-level coordination remain challenges for equitable nationwide implementation. |
| Institutional & Policy Support | Gabriel et al. (2021); Mendoza (2025); Stagen et al. (2022) | Mainstreaming DRRM into LGU development plans, higher education programs, and crisis communication strengthens systemic preparedness; integration with climate change adaptation (CCA) is essential for long-term effectiveness. | Advances Sendai Priority 1 and 3 through data-driven decisions; potential for Cagayan Valley's multi-hazard profile (typhoons + floods + earthquakes), yet adoption barriers include technical skills and access in non-urban settings. |
| Technological & Risk Assessment Tools | Dizon et al. (2025); Singh et al. (2024); Kurata et al. (2023) | GIS-based models (AHP/TOPSIS), vulnerability mapping, and behavioral-tech integration enable precise identification of high-risk areas and evidence-based planning; tools improve targeting but are underutilized at community scales. | Exposes operational weaknesses (Sendai Priority 4: Enhancing Preparedness for Response/Recovery); post-Typhoon Rai lessons emphasize pre-event resilience as key to reducing cascading impacts. |
| Disaster Response & Recovery | Gundran et al. (2023); Esteban et al. (2023); Cahigas et al. (2023) | Gaps in coordination, logistics, simulation training, and relief distribution persist; response/recovery effectiveness depends heavily on prior preparedness levels and socio-economic factors influencing post-disaster intentions/behaviors. | Synthesis reveals fragmented evidence needing holistic, integrated approaches; prioritizes future research on underrepresented regions (e.g., Cagayan Valley), long-term intervention impacts, and systemic risk management amid climate change. |
| Multi-Level Synthesis / Gaps | World Risk Poll Contributors (2025); Gabriel et al. (2021); Talplacido et al. (2022) | Overall: Moderate progress in awareness/mitigation but persistent gaps in longitudinal evaluation, multi-hazard strategies, technology-community integration, regional/cross-hazard comparisons, and behavioral-policy-tech bridging. | |

Awareness and Knowledge

Disaster literacy forms the essential foundation for preparedness, but awareness levels differ across population groups. Bernal and Apdohan (2023) reported moderate environmental and disaster risk literacy among senior

high school students in Sibagat, Agusan del Sur, while Babaran et al. (2025) found that private school students in Northeastern Luzon demonstrated adequate DRRM knowledge but inconsistent practical application. Talplacido et al. (2022) extended these findings to households in flood-prone barangays in Nueva Ecija, revealing moderate preparedness, with deficiencies in emergency planning and resource allocation.

These studies highlight the persistent “awareness-to-action” gap. Knowledge alone is insufficient without practical skills, self-efficacy, and context-specific interventions. Linking these findings to the conceptual framework, awareness is a necessary but not sufficient condition; behavioral, community, and institutional support must amplify knowledge into actionable preparedness.

Household and Community Preparedness

Physical and localized mitigation measures are effective enhancers of resilience when implemented at the household and community scales. Pantaleon Jr. et al. (2024) demonstrated that rainwater catchment and storage systems significantly improved flood resilience among residences in Surigao del Sur (Caraga Region), particularly in uptown communities, through technical solutions combined with community cooperation. Guingab et al. (2025) reinforced this in flood-prone barangays in the Northern Philippines, showing that actionable risk communication and community mitigation efforts markedly boosted adaptive capacity. Tamayo et al. (2025) further highlighted WASH (water, sanitation, and hygiene) and related interventions as critical in disaster-prone areas.

While interventions are effective, sustaining them is challenging. Maintenance requirements, resource limitations, and uneven community engagement affect scalability. These findings reinforce the conceptual framework’s link between community-level preparedness and broader resilience outcomes. They suggest that low-cost, participatory strategies are particularly feasible in resource-limited areas such as Mindanao and remote barangays in Luzon.

Behavioral and Cognitive Determinants

Cognitive and motivational factors strongly mediate the adoption of preparedness behaviors. Mideksa (2021) identified self-efficacy, prior experience, and risk perception as key shapers of typhoon readiness among students. Gumasing et al. (2022) delineated the cognitive, social, and environmental domains that influence perceived preparedness for super typhoons. Cahigas et al. (2023) linked post-disaster socioeconomic factors to recovery intentions (e.g., revisiting Siargao after Typhoon Rai/Odette), while Kurata et al. (2023) integrated protection motivation theory with planned behavior models to explain flood-preparedness intentions.

These findings demonstrate that psychological barriers significantly mediate preparedness, emphasizing that interventions must target attitudes, norms, and perceived control in addition to knowledge. Within the conceptual framework, behavioral determinants operate as a critical link between awareness and community-level resilience.

Community & Barangay-Level Resilience

Resilience at the community level was reinforced by local governance, participation, and collective action. Nanta and Pisueña (2025) reported that barangay officials played a pivotal role in implementing fire safety, while Guingab et al. (2025) emphasized the importance of risk communication in enhancing community-level preparedness. Tanguid and Tanguid (2022) observed that both residents and local officials in Oriental Mindoro possessed knowledge on DRRM but required coordinated action to improve overall resilience.

Regional differences and variable official capacity affect outcomes. Effective governance strengthens resilience, but uneven training and resource allocation across barangays limit nationwide impact. The framework positions community-level resilience as the bridge between individual behavior and institutional support.

Institutional and Policy Support

Institutional frameworks and policies were central to sustainable disaster management. Gabriel et al. (2021) highlighted the integration of DRRM and climate change adaptation in comprehensive development planning in Nueva Ecija, whereas Mendoza (2025) documented proactive DRRM measures among universities and colleges in Central Luzon. Stagen et al. (2022) showed that local government units adapted risk communication strategies before and during the COVID-19 pandemic, underscoring the role of institutional support in both preparedness and crisis communication.

While policy alignment exists, coordination gaps, variable LGU capacity, and inconsistent funding remain challenges. The conceptual framework highlights institutional support as the structural backbone enabling the translation of knowledge, behavior, and community engagement into measurable outcomes.

Technological and Risk Assessment Tools

The use of technological tools for hazard identification and risk mitigation was evident in several studies. Dizon et al. (2025) and Singh et al. (2024) applied GIS-based building vulnerability assessments in Naic, Cavite, demonstrating how spatial analysis can guide targeted interventions. Kurata et al. (2023) integrated Protection Motivation Theory and the Theory of Planned Behavior to assess flood preparedness, illustrating the combined application of behavioral models and technological tools in risk assessment.

Tools improve precision in risk assessment but are underutilized in community and household contexts, mainly due to technical skill gaps and limited access in remote areas. The framework positions technology as a supportive layer that enhances preparedness, mitigates exposure to hazards, and informs institutional decision-making.

Disaster Response and Recovery

Operational response and recovery efforts were key in translating preparedness into effective outcomes. Gundran et al. (2023) highlighted simulation training for agencies in the National Capital Region to ensure readiness for actual disaster events. Esteban et al. (2023) conducted a field survey following Typhoon Rai (Odette) to document the immediate impacts and recovery processes. Cahigas et al. (2023) further demonstrated that societal responses, including tourism behavior, were influenced by disaster experiences, reflecting the socio-economic dimensions of recovery.

Response outcomes are contingent on both individual and community readiness. Pre-event interventions, training, and resource allocation determine the speed and efficiency of recovery, demonstrating the interconnectivity among behavioral, community, institutional, and technological dimensions.

Multi-Level Synthesis and Research Gaps

Across studies, awareness, preparedness, behavioral, community, institutional, and technological dimensions interact to shape DRRM effectiveness. Persistent gaps include:

1. Limited longitudinal evaluation of intervention effectiveness.
2. Sparse evidence on multi-hazard resilience strategies.
3. Underexplored integration of technological tools at the community level.
4. Insufficient examination of behavioral, socio-cultural, and psychological factors in shaping resilience.

The findings underscore the need for holistic, multi-level approaches that bridge individual awareness, behavioral action, community participation, institutional frameworks, and technological tools. Linking these patterns to the conceptual framework, resilience emerges not as a single-factor outcome but as a dynamic, interconnected system where gaps in any dimension reduce overall effectiveness. Quantifying trends and gaps in tables (as in Table 2) further clarifies comparative insights and priorities for future research.

Conclusion

This systematic narrative review synthesizes evidence from 20 recent studies on Disaster Risk Reduction and Management (DRRM) in the Philippines, demonstrating that effective disaster resilience is built upon the interplay of awareness, behavior, community engagement, institutional support, technology, and operational readiness. The main insight of this review is that knowledge and disaster literacy form the foundation for preparedness, but must be complemented by behavioral, structural, and institutional measures to achieve meaningful resilience.

At the household and community levels, preparedness measures—including structural mitigation, WASH practices, and emergency planning—enhance resilience. At the same time, behavioral and cognitive determinants, such as self-efficacy, motivation, and social norms, strongly influence the adoption and sustainability of these practices. Barangay governance, community participation, and coordinated risk communication are pivotal in reinforcing resilience. Institutional and policy support, including integration of DRRM into local development plans and educational programs, provides the legal and structural backbone necessary for sustainable disaster management. Technological tools and risk assessment frameworks—such as GIS mapping, vulnerability

assessments, and behavioral models—enable evidence-based planning and targeted interventions. Finally, disaster response and recovery efforts, from simulation exercises to socio-economic recovery programs, operationalize preparedness in real-world contexts.

This review is novel in integrating behavioral, technological, and community dimensions into a unified conceptual framework, emphasizing a hierarchical, multi-level perspective that links individual awareness, community engagement, institutional support, and technology to effective disaster resilience. Findings are also aligned with international frameworks, such as the Sendai Framework for Disaster Risk Reduction, demonstrating broader relevance beyond the Philippine context.

Despite progress, gaps remain, including limited longitudinal evaluation of interventions, a lack of multi-hazard strategies, and insufficient integration of technology at the community and household levels. Addressing these gaps requires holistic, multi-level approaches that bridge individual, community, institutional, and technological dimensions of DRRM.

Recommendation

Based on the findings of this review, several recommendations are proposed to strengthen Disaster Risk Reduction and Management (DRRM) in the Philippines. First, disaster literacy and awareness programs should be enhanced in both schools and communities to improve risk perception and ensure that knowledge is translated into actionable preparedness. Integrating DRRM modules into school curricula and barangay-level training programs can help bridge the gap between awareness and practical readiness. Household and community-level preparedness should be promoted through practical mitigation measures tailored to local hazards, such as rainwater catchment systems, flood-proofing, and emergency planning, complemented by community drills and volunteer networks that foster collective resilience.

Behavioral and cognitive interventions are also essential, emphasizing self-efficacy, motivation, and positive attitudes toward preparedness. The use of models such as the Theory of Planned Behavior and Protection Motivation Theory can guide interventions to promote proactive, sustained disaster readiness. At the community level, barangay officials and local governance structures should be strengthened to lead risk communication, coordinate disaster drills, and promote volunteerism, thereby reinforcing collective resilience. Institutional and policy support must continue to be bolstered through the integration of DRRM into local development plans, university programs, and institutional policies, while encouraging collaboration between local government units, academic institutions, and NGOs to ensure contextually relevant and evidence-based interventions.

The use of technology and risk assessment tools should be expanded at the community and household levels. GIS mapping, vulnerability assessments, and early warning systems can support informed decision-making, enabling precise and evidence-based mitigation strategies. Disaster response and recovery efforts should include regular simulation exercises and drills to test preparedness and ensure rapid socio-economic recovery, particularly for vulnerable populations. Finally, further research is needed to address gaps identified in this review, including longitudinal evaluation of DRRM interventions, multi-hazard and multi-level resilience strategies, and the role of technology in household and community preparedness. Studies exploring socio-cultural and psychological determinants of preparedness will also provide critical insights for designing context-specific interventions. Collectively, these recommendations offer a roadmap for policymakers, educators, and disaster management practitioners to strengthen resilience, improve coordination, and promote a proactive, evidence-based approach to DRRM in the Philippines.

Contributions of Authors

The author conceptualized the study, designed the research, collected and analyzed the data, and prepared and finalized the manuscript.

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Conflict of Interests

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