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BUILDING RESILIENCE IN URBAN SETTLEMENT: POLICY ANALYSIS ON DISASTER-RESISTANT HOUSING STANDARDS

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ABSTRACT
This paper examined the implementation of disaster-resistant housing standards in urban settlements in the Philippine through a policy analysis of Republic Act 10121 (Philippine Disaster Risk Reduction and Management Act of 2010) and Presidential Decree 1096 (National Building Code of the Philippines). Using a systematic review approach, thirty (30) publications met the eligibility criteria. The studies consisted of qualitative (53%), quantitative (33%), and mixed-method (14%) designs, with data drawn from both primary (43%) and secondary (57%) sources. Using a qualitative research design, the study analyzed policy documents, local ordinances, and key-informant interviews from selected local government units (LGUs). Based on the analysis, six (6) key factors affecting the implementation of disaster-resistant housing standards were identified. These include LGU enforcement capacity, institutional coordination, resource allocation, technical expertise, community awareness, and compliance monitoring mechanisms. Six (6) recurring implementation gaps also emerged, such as weak policy enforcement at the local level, limited funding for housing programs, lack of technical personnel, inadequate building inspection systems, informal settlement challenges, and poor inter-agency coordination between national and local agencies. The study further revealed that while comprehensive legal frameworks exist under RA 10121 and PD 1096, persistent 'implementation deficits' continue to undermine the translation of national mandates into safe and disaster-resilient housing for vulnerable urban communities. These findings underscore the need for strengthened LGU capacity-building, improved policy coherence, and sustained investment in disaster-resistant housing initiatives.

Keywords:
Disaster-resistant housing, Urban resilience, Policy implementation, Building standards, Disaster risk reduction, Local governance, Housing Policy, Urban settlements

INTRODUCTION

The capacity of urban settlements to withstand and rapidly recover from major disasters is not merely a matter of geographic luck, but the direct result of well-designed and rigorously implemented policy. As the global community faces escalating threats from climate change and natural hazards, international frameworks like the Sendai Framework for Disaster Risk Reduction (2015-2030) and Sustainable Development Goal (SDG) 11 have urged nations to integrate disaster risk reduction (DRR) into routine governance, particularly through strictly enforced building regulations and land-use planning.

In the Philippines, consistently ranked as one of the world's most disaster-prone nations, this imperative is enshrined in landmark legislations such as the **Philippine Disaster Risk Reduction and Management Act of 2010 (RA 10121)** and the **National Building Code (PD 1096)**. These policies provide the legal backbone for disaster-resilient

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infrastructure. However, despite strong national mandates, a critical disconnect remains between policy intent and ground-level reality.

This gap is starkly visible in Region XI (Davao Region), where rapid urbanization in areas like Davao City, Tagum, Panabo, and Digos has outpaced regulatory capacity. The result has been proliferation of informal settlements in hazard-prone zones. While the laws exist, their application remains inconsistent due to varying levels of local enforcement capacity and resource constraints.

Addressing this disconnect requires moving beyond a simple review of existing laws to a systematic analysis of why they fail to translate into safer housing. Therefore, the primary objective of this study is to analyze the gap between national disaster-resistant housing standards and their local execution in Region XI, specifically determining how local government enforcement capacity and community participation interact to influence the resilience of urban settlements.

To achieve this general objective, this study aims to accomplish the following specific objectives:

a) To evaluate the extent to which Local Government Units (LGUs) in Region XI enforce compliance with disaster-resistant housing standards in high-risk urban settlements;
b) To identify the institutional and socio-economic factors that hinder the full implementation of these housing resilience standards at the local level;
c) To examine the mediating role of community participation in bridging the gap between government enforcement efforts and the actual structural safety of housing; and
d) To propose concrete policy recommendations and intervention strategies designed to strengthen the translation of national standards into local resilience outcomes.

METHOD

Research Design. This study utilizes a qualitative research design centered on a systematic policy analysis to evaluate the implementation gap of disaster-resistant housing standards in the urban settlements of Region XI (Davao Region). To ensure a comprehensive and unbiased evaluation of existing national laws, local ordinances, and related empirical literature, this research adopted the criteria of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). PRISMA was employed to ensure that the review of policy documents and studies followed a rigorous, transparent, and reproducible protocol. This framework was designed to clearly report the search strategy, screening process, and final selection of documents, thereby reducing selection bias (Page et al., 2021; Moher et al., 2009). Consistent with the standard guidelines, the PRISMA model followed the structured processes of: a) defining eligibility and exclusion criteria; b) identifying information sources (legal repositories and academic databases); c) formulating search terms; d) screening and study selection; and e) data collection and thematic synthesis. Furthermore, the findings from this systematic review were triangulated with primary qualitative data to contrast policy intent with local implementation realities.

Eligibility Criteria. To ensure the relevance and quality of the data, specific inclusion and exclusion criteria were established. Materials were eligible for inclusion if they were: 1.) presenting empirical evidence or policy analysis related to disaster-resistant housing standards and urban resilience; 2.) directly relevant to the implementation gap, enforcement mechanisms, or community participation within Urban Settlements (specifically in the Philippines or Region XI context); 3.) papers and policy documents that were published or enacted between 2010 (the enactment of the DRRM Act / RA 10121) to Present; and 4.) published in peer-reviewed journals, official government gazettes, or recognized institutional reports (e.g., ADB, JICA). Additionally, studies that focused primarily on rural or agricultural resilience; purely technical engineering papers without policy analysis; materials not written in English; and papers that were not available in full text were excluded in this study.

Information Sources. The researcher followed various methods to obtain as many relevant studies as possible from legal repositories, online databases, and search engines. For the information sources, the researcher made ensured that

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there were no other existing reviews conducted following the same agenda or specific locale (Region XI) explored by the researcher. For the record, no existing systematic policy analyses were conducted yet following the objectives of the researcher regarding the interaction of LGU enforcement and community participation. After that, the researcher conducted an organized, systematic, and comprehensive search on three (3) primary categories of databases: The Official Gazette of the Philippines (for legal mandates), ScienceDirect (for empirical studies), and Institutional Repositories (ADB and USEP). The reason why the researcher used these 3 databases was due to the fact that these databases were considered the most pertinent and provided the highest-impact journals and policy documents. The researcher utilized also the search engine Google Scholar as a source of information. It should be noted that each database and search engine have its own search engine features. Hence, different search strings had been tried in different information sources. To do it, search was recorded following the details: source category, source name, search method, and date of search for each database. This was presented in Table 1 below.

Source Category	Source Name	Search Method	Date of Search
Legal Repository	Official Gazette / LGU Transparency Seals	Full Text, Title, and Legislation Number	2025-11-28
Online Database	ScienceDirect / ResearchGate / Emerald/Springer / MDPI	Abstract, Title, and Keywords	2025-12-08
Search Engine	Google Scholar	Full Text, Abstract, Title, and Keywords	2025-12-08

Table 1. Search space for selected databases.

Search Terms. The search terms were meticulously developed to align directly with the Statement of the Problem and the study's three core conceptual pillars: Policy Mandates, Implementation Factors, and Resilience Outcomes. This focused approach ensured that the search retrieved highly relevant legal documents and empirical studies that specifically addressed the "implementation gap" in Region XI. To achieve this, the researchers categorized keywords into three distinct groups. The first group, targeting Policy and Legislation, utilized terms such as "Disaster-Resistant Housing," "Building Code," "RA 10121," and "PD 1096" to identify foundational legal frameworks. The second group, focusing on Implementation Factors, employed keywords like "LGU Enforcement," "Policy Implementation," "Compliance," and "Community Participation" to capture the process variables related to execution. The third group, defining the Context, limited the search to "Region XI," "Davao Region," "Urban Settlement," and "Informal Settlers" to ensure geographical and socio-economic relevance.

To optimize the retrieval process, the search strategy utilized Boolean operators (AND, OR) to combine these keywords effectively, allowing for both breadth through synonyms and specificity through concept intersection. For instance, to address the first specific objective regarding the extent of enforcement, search strings such as "PD 1096 AND LGU Enforcement AND Davao City Ordinance" were employed in legal repositories. To investigate hindering factors, academic databases were queried with strings like "("Disaster-Resistant Housing" OR "Building Code") AND ("Implementation Gap" OR "Hindering Factors") AND "Region XI"." Furthermore, to explore the mediating role of the community, combinations such as "Community Participation AND Resilience AND Mindanao AND Enforcement" were utilized. This systematic layering of categorized keywords and Boolean logic ensured that the documents included in the PRISMA flow were centrally focused on the policy implementation gap and the interplay of governance and community engagement, rather than general disaster topics.

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Study Selection. A structured and systematic study selection process was implemented to identify the most relevant and methodologically sound articles and policy documents for inclusion in this review. The stages of this process are outlined in Table 2, and the overall selection flow is illustrated in the PRISMA diagram.

Stage	Description
S1	Identification of studies and policies related to disaster-resistant housing standards, urban resilience, and implementation gaps in the Philippines.
S2	Selection of studies gathered from all identified information sources.
S3	Exclusion of duplicate studies and mandates retrieved from databases.
S4	Exclusion of studies based on a title, abstract, and keyword screening against the eligibility criteria.
S5	Exclusion of studies based on a full-text screening.

Table 2. Stages of the study selection process

The selection began with the Identification stage, during which all potentially relevant studies related to disaster-resistant housing standards, urban resilience, and policy implementation in the Philippines were retrieved from the three selected platforms: The Official Gazette/LGU Seals, ScienceDirect, and Google Scholar. Using the predefined search strings, a total of 130 records were initially gathered across these databases. The next step involved the removal of duplicate entries, which eliminated 32 overlapping studies retrieved from multiple sources. This reduced the dataset to 98 unique records, all of which progressed to the Screening phase. During this stage, the titles, abstracts, and keywords of each study were examined to determine their relevance to the eligibility criteria set by the researchers. Specifically, studies were screened for a clear focus on urban settlements, housing compliance, and governance enforcement within the Region XI or Philippine context. As a result of this screening, 48 studies were excluded for lacking alignment with the key variables or for focusing on rural agricultural resilience, purely technical engineering assessments without policy analysis, or non-Philippine settings. A total of 50 studies advanced to the Eligibility stage, where full-text assessments were conducted to evaluate the methodological rigor, contextual relevance, and empirical contribution of each article. Studies that did not provide empirical evidence on implementation gaps, did not explicitly address disaster-resistant standards, or were purely opinion-based were excluded at this stage. Consequently, 20 full-text articles were removed due to insufficient relevance or methodological limitations. Ultimately, 30 studies met all inclusion criteria and were deemed suitable for systematic synthesis. These studies offered substantial, evidence-based insights on the implementation gap and resilience of urban settlements in Region XI, and thus formed the final dataset for review, analysis, and data extraction.

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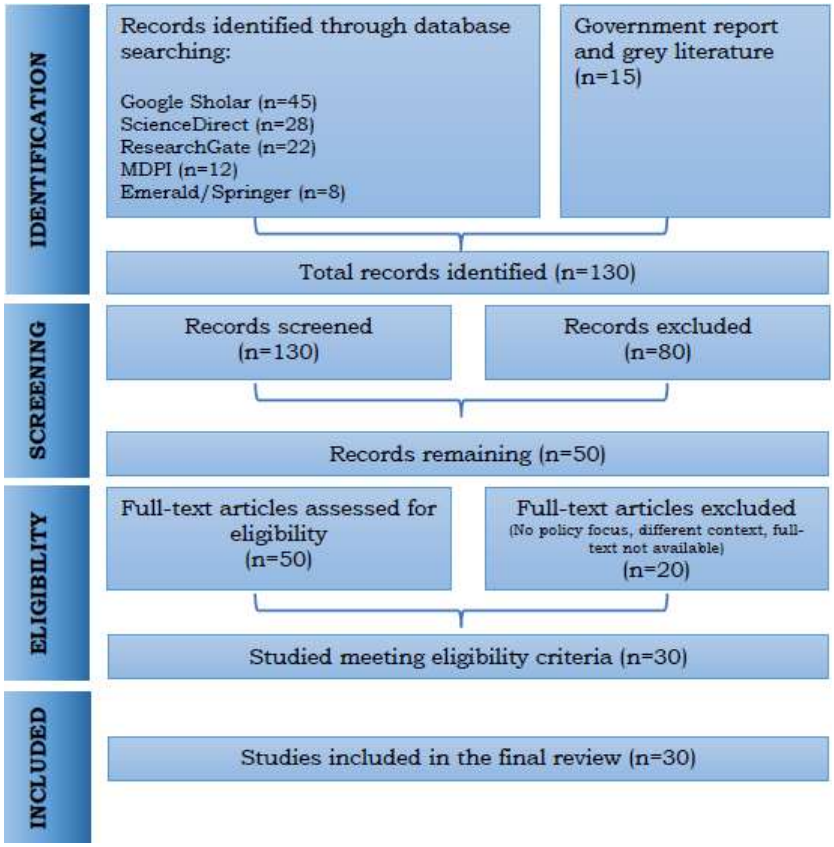

Figure 1. Contextualized PRISMA Flow Diagram.

Table 3 illustrates the distribution of publications across four academic databases before and after application of the selection criteria. Out of the 236 articles initially retrieved from Google Scholar, ScienceDirect, ResearchGate, and MDPI, a total of 30 articles met the inclusion criteria and were included in the final analysis. These 30 publications serve as the foundational evidence base for this systematic review.

Source	Before	After
Google Scholar	45	12
ScienceDirect	28	8
ResearchGate	22	5
MDPI	12	5
Total	**130**	**30**

Table 3. Before and after the selection process

Data Extraction and Synthesis. A standardized extraction form was used to collect key information from the thirty (30) selected publications, including author(s), year, research design, geographic focus, and major finding. The extracted data were organized into a matrix and thematically categorized based on the study's conceptual framework. Due to the heterogeneity of the research designs, a narrative synthesis approach was employed to identify patterns and commonalities across the literature, with emphasis on Philippines and developing country contexts. This process led

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to the identification of six (6) key factors affecting implementation and six (6) recurring policy gaps, which served as the foundation for the study's findings.

RESULTS AND DISCUSSION

This section presents the findings of the systematic review conducted using the PRISMA framework, focusing on the implementation of disaster-resistant housing standards in urban settlements in the Philippines, particularly within Region XI. The discussion integrated insights from the thirty (30) studies included in the final selection, emphasizing how national policies such as RA 10121 and PD 1096 are interpreted, adapted, and enforced at the local level. The results highlight several recurring themes related to local government enforcement capacity, institutional and social-economic barriers, community participation, and the resilience outcomes of urban settlements.

Distribution and Characteristics of the Reviewed Studies

The characteristics of the included studies are summarized in Table 4, which shows that distribution of articles based on their sources, research design, and type of data. The majority of the studies came from Google Scholar (40%) and ScienceDirect (27%), reflecting the wide availability of policy-focused and disaster-related literature in these databases. ResearchGate and MDPI contributed smaller shares but provide region-specific studies, especially on urban resilience and settlement vulnerabilities.

In terms of research design, qualitative studies (53%) were the most prominent. This is consistent with the nature of policy implementation research, which often requires in-depth understanding of governance processes, institutional behaviors, and community experiences. Quantitative studies (33%) contributed empirical evidence through surveys and hazard-exposure assessments, while mixed-method designs (14%) offered more holistic interpretations by combining statistical patterns with field insights.

Regarding data type, 57% of the studies used secondary data, such as policy documents, DRRM plans, building codes, and hazard maps. Primary data (43%) came from key informant interviews, community surveys, and case studies documenting local government enforcement practices and resident experiences. This balance shows that building resilience in urban settlements is both a policy-level and community-level issue.

Distribution of Articles	***n***	***%***
Based on Sources		
Google Scholar	12	40%
ScienceDirect	8	27%
ResearchGate	5	17%
MDPI/Others	5	16%
Based on Research Design		
Quantitative	10	33%
Qualitative	16	53%
Mixed Method	4	14%
Based on the Type of Data		
Primary	13	43%
Secondary	17	57%
Key Factors Identified	6	-
Implementation Gaps Identified	6	-

Table 4. Articles Based on Sources, Research Design, and Type of Data

Collectively, the distribution of studies confirms that housing resilience is a multidimensional topic involving governance, land-use planning, technical standards, and community involvement.

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In summary, the reviewed literature reflects a diverse methodological landscape, with qualitative approaches dominating the field, and highlights the need for both policy-level and community-level interventions in addressing disaster-resistant housing challenges.

Key Factors Affecting the Implementation of Disaster-Resistant Housing Standards

Across the thirty (30) articles, six (6) dominant factors repeatedly emerged as influencing the success or failure of disaster-resistant housing standards in urban settlements. These factors are discussed below in relation to the conceptual framework of the study.

LGU Enforcement Capacity. Many studies emphasized that local governments vary greatly in terms of technical personnel, inspection capacity, and availability of trained engineers or building officials. While cities like Davao have relatively strong DRRM offices, smaller LGUs in Region XI experience shortages of building inspectors, geologists, and trained DRRM staff. This discrepancy directly affects compliance monitoring and the ability to enforce PD 1096 provisions such as structural integrity requirements, hazard-based zoning, and issuance of building permits.

Institutional Coordination. Several studies highlighted that overlapping mandates among national agencies (DHSUD, NDRRMC, DPWH, HLURB) and LGUs often create confusion regarding responsibilities. Weak coordination slows down inspection processes, delays housing approvals, and causes inconsistencies in implementing resilience-related standards. This factor strongly contributes to the "implementation gap" identified in the literature.

Resource Allocation and Funding. Budget limitations significantly affect the ability of LGUs to enforce housing regulations, upgrade informal settlements, and conduct routine safety inspections. Studies focusing on Mindanao noted that limited financial support delays retrofitting programs and hinders the relocation of households living in high-risk areas.

Technical Expertise and Availability of Professionals. The absence of engineers, architects, and geohazard specialists in some LGUs affects the quality of building assessments and the evaluation of compliance with hazard-resilient standards. This is especially apparent in fast-urbanizing cities like Tagum and Panabo, where construction growth outpaces regulatory capacity.

Community Awareness and Understanding of Resilient Housing. Many studies found that households – especially in informal settlements – are unaware of the safety requirements for disaster-resistant housing. Limited knowledge about building codes, hazard maps, and safe construction practices leads to the proliferation of unsafe structures.

Compliance Monitoring Mechanism. Even when policies are present, several LGUs lack systematic monitoring mechanisms. Few conduct regular inspections, and enforcement often depends on citizen complaints. As a result, informal extensions, makeshift homes, and non-compliant construction increase vulnerability to natural hazards.
These factors are interconnected and collectively shape how national housing standards are translated into real-world safety outcomes in urban settlements.

In summary, the six key factors are deeply interconnected. Addressing them holistically is essential for effective policy implementation.

Implementation Gaps in Disaster-Resistant Housing Standards

The review also identified six (6) recurring implementation gaps that hinder the effective translation of RA 10121 and PD 1096 into local practice. These gaps are consistent across studies discussing urban resilience in Mindanao and other developing regions of the Philippines.

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Weak Enforcement at the Local Level. Even with adequate laws in place, many LGUs lack the ability to enforce them consistently. This results in unregulated construction and the continued growth of vulnerable settlements in hazard-prone areas.

Limited Funding for Housing and DRRM Programs. Budget constraints limit the ability of LGUs to conduct hazard assessments, retrofit structures, or develop disaster-resilient social housing. Funding gaps widen the implementation gap, especially in smaller cities.

Shortage of Technical Personnel. Several LGUs lack licensed engineers, building officials, or DRRM specialists. Without adequate personnel, policies remain largely theoretical.

Inadequate Building Inspection Systems. Many cities and municipalities do not conduct periodic inspections, leaving unsafe structures unaddressed. This is particularly problematic in informal settlements that expand rapidly without permits.

Informal Settlements and Socio-Economic Barriers. Poverty, insecure land tenure, and lack of affordable housing push residents into high-risk zones. Even when policies exist, many communities simply cannot comply due to cost and livelihood constraints.

Poor Inter-Agency Coordination. Weak coordination between national agencies and local governments delays implementation and inspection processes. This gap contributes to inconsistent enforcement across different LGUs in Region XI.

In summary, these six implementation gaps reveal systemic challenges that require both structural reforms and targeted interventions at the local level.

Role of Community Participation in Housing Resilience

A recurring theme in several Mindanao-based studies is the vital role of community participation. Community engagement influences resilience in three main ways:

1. **Improve compliance** – Residents who understand the risks and building standards are more likely to follow safe construction practices.

2. **Supporting monitoring efforts** – Communities often serve as the first to identify unsafe structures or hazard-induced damages.

3. **Enhancing adaptive capacity** – Participatory programs such as community-based DRRM strengthen social networks and encourage collective preparedness.

These findings align with Philippine-based DRRM research. Matthies (2017) found that the *purok* system in Cebu Province effectively mobilizes grassroots organizations for disaster information dissemination and evacuation coordination. Meanwhile, Pasamonte (2023) observed that Civil Society Organizations in Bukidnon Province actively engage in DRRM planning but remain underutilized in monitoring and evaluation phases. In summary, community participation bridges the gap between policy and practice by enhancing compliance, supporting monitoring and building collective resilience.

CONCLUSION

This systematic review revealed that while the Philippines has strong national frameworks for disaster-resistant housing through RA 10121 and PD 1096, a persistent implementation gap remains due to varying local capacities,

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institutional limitations, and socio-economic challenges, especially in rapidly urbanizing areas of Region XI. The thirty studies reviewed consistently showed that enforcement of housing standards depends heavily on the technical competence of LGUs, availability of funding, clarity of inter-agency coordination, and the strength of community participation. Although national policies provide clear guidelines for resilient housing, their translation into safe and functional structures in urban settlements is hindered by weak monitoring systems, shortage of trained personnel, inadequate inspections, and the continued growth of informal settlements in hazard-prone areas. Overall, the findings emphasize that urban resilience cannot rely solely on policy presence; it must be supported by strong local implementation mechanisms and community engagement to ensure that disaster-resistant housing standards are consistently applied and effectively protect vulnerable populations. Future research should explore comparative analyses across different regions in the Philippines and examine the long-term effectiveness of community-based interventions in sustaining housing resilience outcomes.

IMPLICATIONS

The results imply that improving housing resilience in Region XI requires strengthening LGU enforcement capacities, enhancing coordination among national and local agencies, and increasing financial and technical support for DRRM and housing programs. Investments in training, staffing, and monitoring systems are necessary to improve compliance with the National Building Code and DRRM policies, while more inclusive and affordable housing options are needed to address the socio-economic barriers faced by informal settlers. The findings also highlight the importance of community participation, as informed and engaged residents significantly improve compliance, monitoring, and adaptive capacity in high-risk areas. Furthermore, integrating continuous risk awareness, education, and local capacity-building into DRRM initiatives will help ensure that disaster-resistant housing standards are not only mandated by policy but are genuinely practiced on the ground. Overall, the study reinforces that achieving resilient urban settlements requires coordinated governance, sustained investment, and active community involvement.

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