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Disaster Emergency Management and Preparedness of Naga City

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ABSTRACT

This study examined the influence of disaster emergency management on the disaster preparedness of the Local Government Unit (LGU) of Naga City, with the ultimate goal of developing a contingency plan to strengthen local resilience for the calendar year 2025. Specifically, the research assessed the level of disaster emergency management along planning and policy, response and coordination, recovery management, mitigation, and system performance, and evaluated preparedness in terms of training and capacity, early warning systems, public awareness and engagement, resources and equipment readiness, and simulation exercises. It determined the significant relationship between the level of disaster emergency management and the level of disaster preparedness, and measured the extent of the influence. Then, developed a contingency plan to enhance the disaster emergency management and preparedness in response to natural disasters. Using a descriptive-correlational design, the study employed purposive sampling to select 48 respondents composed of LGU officials, staff, and barangay representatives directly involved in disaster risk reduction and management. Data were gathered through a structured survey questionnaire adapted from the UNISDR "Making Cities Resilient" tool, complemented by interviews and qualitative inputs. Weighted mean analysis was used to assess levels of management and preparedness, while Pearson Product-Moment Correlation and Coefficient of Determination (R^2) measured relationships and influence between variables. LGU-Naga demonstrates substantial preparedness, with strong institutional planning, recovery management, and resource readiness. The strongest correlations were observed between recovery management and training and capacity, recovery management and early warning systems, and mitigation/system performance with resources and equipment readiness. Disaster emergency management significantly influences preparedness, providing a solid foundation for the development of a contingency plan aligned with RA 10121 and UNDRR standards to enhance resilience in Naga City.

Keywords: Institutional continuity, community resilience, risk reduction strategies, capacity building, emergency response systems.

INTRODUCTION

Disaster emergency management and preparedness have become critical global concerns, amidst intensifying climate-induced hazards such as typhoons, floods, and earthquakes. Worldwide, recurring disasters expose

systemic weaknesses in evacuation planning, resource mobilization, and community participation. In the worldwide landscape, there is an increasing reliance on technological innovations, including early warning systems, satellite mapping, and AI-driven risk assessments, yet these tools often fail to reach vulnerable populations, thereby underscoring inequities in resilience (International Telecommunication Union [ITU], 2024; United Nations Office for Disaster Risk Reduction [UNDRR], 2025). The international community, through frameworks such as the Sustainable Development Goals (SDG 11: Sustainable Cities and Communities; SDG 13: Climate Action), emphasizes resilience, adaptive capacity, and the reduction of disaster-related losses as essential components of sustainable development (United Nations, 2020).

In the Philippines, the legal foundation for disaster risk reduction and management is established under Republic Act 10121 (Philippine DRRM Act of 2010), complemented by issuances such as the National Climate Change Action Plan (Climate Change Commission, 2023) and NDRRMC Memorandum Circulars (Presidential Communications Office, 2025). These frameworks mandate the creation of Local DRRM Councils (Section 11) and the allocation of the Local DRRM Fund (Section 21), providing institutional and financial mechanisms for preparedness. However, their effectiveness depends on compliance, funding adequacy, and active community involvement (Senate of the Philippines, 2010).

At the local level, Naga City and the Bicol Region remain highly vulnerable to typhoons and flooding. Despite investments in advanced tools such as LiDAR mapping and the reconstitution of the city's disaster council, significant gaps persist. Evacuation centers often fail to meet national standards, technological innovations are underutilized, and community participation is inconsistent. Residents remain unevenly informed about disaster protocols, weakening grassroots resilience. These deficiencies reflect a disconnect between policy and practice, where resilience frameworks exist but are not fully translated into effective local action (Cipres, 2026).

The academic and societal value of this study lies in its ability to bridge global frameworks, national policies, and local realities. For vulnerable communities, such as the poor, elderly, children, and persons with disabilities, it offers stronger protection and support during disasters. Local government units benefit from clearer guidance on aligning strategies with national laws and global frameworks, while policymakers gain localized evidence to inform broader DRRM programs. Academic institutions and researchers are provided with a foundation for further study, and the private sector and civil society organizations can strengthen partnerships and resource mobilization.

The motivation for this research is rooted in Naga City's geographic exposure to recurring climate threats, which demand stronger preparedness measures. By evaluating local practices against global and national standards, the study ensures that disaster management evolves into a multidimensional effort, linking governance, technology, and community participation. This study underscores the urgent need to strengthen institutional capacity, improve grassroots participation, and integrate technology into everyday disaster management practices to safeguard lives and livelihoods.

Research Objectives

This study examined the influence of the level of disaster emergency management on disaster preparedness in the Local Government Unit (LGU) of Naga City, serving as the foundation for developing a contingency plan. It first assessed disaster emergency management across planning and policy, response and coordination, recovery management, mitigation, and system performance, then evaluated disaster preparedness in terms of

training and capacity, early warning systems, public awareness and engagement, resource and equipment readiness, and simulation exercises and drills. The research further analyzed the significant relationship between disaster emergency management and preparedness, determining the extent to which management practices influence readiness. Based on these findings, a contingency plan was formulated to strengthen Naga City's disaster emergency management and preparedness, ensuring more effective responses to natural disasters.

METHODOLOGY

This study adopted a descriptive-correlational research design to assess the current state of disaster emergency management and preparedness in Naga City and to examine the relationship between these two variables. The descriptive component captured existing practices, policies, and capacities in planning, response, recovery, mitigation, and preparedness activities, while the correlational component analyzed the extent to which management influences preparedness, providing evidence for contingency planning. Similar approaches have been applied in local government disaster assessments, such as Cruz (2024) in Bulacan and Bolina et al. (2022) in Baybay City, Leyte, while international studies by the Pacific Disaster Center (2021), Eduardo (2022), and Guingab, Cureg, and Santiago (2025) emphasized the value of descriptive and correlational designs in establishing baselines and linking management systems to preparedness outcomes. The study involved 48 purposively selected respondents from the LGU of Naga City, including officials and staff of the City Disaster Risk Reduction and Management Office (CDRRMO), barangay DRR committees, and other departments directly engaged in disaster management. Purposive sampling was employed to ensure that participants possessed specialized knowledge and direct responsibilities in disaster preparedness and management, consistent with practices in regional and international studies such as ESCAP (2021), World Vision International (2024), Lunga et al. (2025), and Saber et al. (2025).

Data collection utilized structured survey questionnaires and key informant interviews (KII)**.** The survey instrument was adapted from the United Nations International Strategy for Disaster Reduction (UNISDR) "Making Cities Resilient – My City is Getting Ready!" tool, widely recognized for evaluating local government disaster risk reduction capacities. The questionnaire covered two domains: disaster emergency management (planning, response, recovery, mitigation, system performance) and disaster preparedness (training, early warning systems, public awareness, resources, drills). Supporting studies confirm the effectiveness of structured survey instruments in disaster research, including UNDRR (2021) in Asia-Pacific cities, Escamilla, Hernández, and López (2022) in Mexico, Alexander (2021) in Europe, and Akinyemi, Adeola, and Oladipo (2023) in Nigeria. Quantitative analysis employed the weighted mean to determine average ratings across indicators, the Pearson Product-Moment Correlation (PPMC) to examine relationships between management practices and preparedness indicators, and the coefficient of determination (R^2) to measure the proportion of variance in preparedness explained by management practices, consistent with applications in disaster risk reduction studies (Al Thobaity et al., 2017; Al-Hajj & Al-Khalifa, 2020; Mockrin et al., 2018; Chakraborty et al., 2014; Kapucu et al., 2013). For qualitative analysis, the study adopted the Modified ADDIE Model (Analyze, Design, Develop) to structure contingency planning, guiding gap identification, intervention design, and development of actionable strategies, reflecting its successful use in disaster education and training programs internationally (Henstra, 2018; Abramson et al., 2015; Montz &

Tobin, 2011). These techniques ensured methodological rigor, integrating statistical precision with structured qualitative planning to provide a reliable basis for contingency plan development.

RESULTS AND DISCUSSION

This section presents the key findings of the study and interprets their significance in relation to the research objectives. It highlights the outcomes derived from the data, examines their implications, compares them with existing literature, and explores possible explanations for observed trends to provide a deeper understanding of the results within the broader context of the field.

Level of Disaster Emergency Management of the LGU-Naga

The key findings of the study, their significance in relation to the objectives, and situate them within the broader context of disaster management research. Presented in Table 1 are the overall assessment results. The leading aspect was "Planning and Policy," with an average weighted mean of 4.26, interpreted as "Comprehensive." The lowest-rated domain was "System Performance," with an average weighted mean of 3.43, interpreted as "Substantial." Meanwhile, "Response and Coordination" scored 4.11, "Mitigation" scored 3.90, and "Recovery Management" scored 3.86, all interpreted as "Substantial." The Overall Average Weighted Mean was 4.01, which falls under the "Substantial" interpretation.

Table 1
Level of Disaster Emergency Management

Aspects	AWM	Interpretation
Planning and Policy	4.26	Comprehensive
Response and Coordination	4.11	Substantial
Mitigation	3.90	Substantial
Recovery Management	3.86	Substantial
System Performance	3.43	Substantial
Overall Average Weighted Mean	4.01	Substantial

Note: 1.00-1.80=Minimal; 1.81-2.60=Limited; 2.61-3.40=Moderate; 3.41-4.20=Substantial; 4.21-5.00=Comprehensive

The results show that LGU-Naga demonstrates comprehensive strength in planning and policy, reflecting robust governance and institutional frameworks, while substantial ratings in response, mitigation, and recovery indicate reliable but not fully comprehensive performance in operational and post-disaster phases. The lowest rating in system performance highlights weaknesses in monitoring, evaluation, and integration mechanisms, underscoring the need for stronger operational alignment and accountability. These findings suggest that while strategic planning is strong, translating policy into practice remains a challenge, requiring enhanced evaluation tools, interoperability, and community-centered approaches to achieve holistic resilience. Comparative studies reinforce these findings, Martínez and Torres (2025) noted similar gaps in system interoperability in cross-border disaster preparedness between El Paso and Ciudad Juárez; Srisuwan and Charoensuk (2024) emphasized limited monitoring in Thailand's disaster governance; Nguyen and Pham (2023) found uneven integration of community awareness in Vietnam; Vong and Sisavath (2022) reported

reliable but incomplete recovery strategies in Laos; and Gonzalez and Rivera (2021) highlighted strong institutional planning but weaker evaluation in Mexico. These parallels situate Naga's performance within a global context of substantial but uneven disaster management execution. The Disaster Management Cycle Theory (Coetzee & van Niekerk, 2012; Khan et al., 2023) underscores the need for continuous monitoring across all phases, while Protection Motivation Theory (Rogers, 1975; Ballaa & Hagger, 2025) explains behavioral drivers of compliance, and Community Resilience Theory (Kulig & Hanson, 1996; Derakhshan, 2025) highlights the role of engagement in sustaining resilience. These uphold that LGU-Naga's strengths in governance must be complemented by improved system performance, adaptive evaluation, and community participation to achieve holistic disaster resilience.

Level of Disaster Preparedness of the LGU-Naga

The level of disaster preparedness of LGU-Naga is assessed across five domains: training and capacity, early warning system, public awareness and engagement, resources and equipment readiness, and simulation exercises and drills, revealing strengths in training and early warning but highlighting simulation drills as the area needing further reinforcement. Table 2 shows the consolidated assessment results. The foremost indicators were "Resources and Equipment Readiness" and "Early Warning System," both with an Average Weighted Mean of 3.99, interpreted as "Substantial." The lowest-rated indicator was "Simulation Exercises and Drills," with an AWM of 3.81, also interpreted as "Substantial." Meanwhile, "Public Awareness and Engagement Coordination" scored 3.85, and "Training and Capacity" scored 3.84, both interpreted as "Substantial." The Overall Average Weighted Mean was 3.90, which falls under the "Substantial" interpretation.

Table 2
Level of Disaster Preparedness of LGU-Naga

Aspects	AWM	Interpretation
Resources and Equipment Readiness	3.99	Substantial
Early Warning System	3.99	Substantial
Public Awareness and Engagement Coordination	3.85	Substantial
Training and Capacity	3.84	Substantial
Simulation Exercises and Drills	3.81	Substantial
Overall Average Weighted Mean	3.90	Substantial

Note: 1.00-1.80=Minimal; 1.81-2.60=Limited; 2.61-3.40=Moderate; 3.41-4.20=Substantial; 4.21-5.00=Comprehensive

LGU-Naga's disaster preparedness profile reveals strong institutional prioritization of resources, equipment, and early warning systems, reflecting tangible readiness and effective communication mechanisms, while relatively lower scores in public awareness, training, and simulation exercises suggest that sustainability through community engagement and practice remains less emphasized. This indicates preparedness that is resource-strong but practice-limited, with reduced drill frequency and training potentially weakening long-term retention of disaster response skills. Strengthening these areas would balance institutional capacity with community resilience, elevating preparedness from substantial to comprehensive. Comparative studies

reinforce these findings: Sri Lanka's 2025 climate-driven flood response showed strong shelter mobilization but gaps in coordination (The Conversation, 2025); Pakistan's National Disaster Management Plan emphasized resource mobilization but noted uneven integration (NDMA, 2025); Bangladesh's 2021–2025 plan highlighted proactive frameworks yet limited inclusivity (PreventionWeb, 2021); Nepal's 2024 disaster report revealed strong governance but weak monitoring (DPNet, 2024); and Bhutan's 2025 gap analysis identified robust institutions but financial and social support gaps (ReliefWeb, 2025). These parallels situate Naga's preparedness within a global context where governance and resources are strong, but systemic execution requires reinforcement. The Disaster Management Cycle Theory underscores preparedness as a continuous process requiring consistent drills and evaluation (Coetzee & van Niekerk, 2012; Khan et al., 2023), while Protection Motivation Theory explains behavioral drivers for compliance (Rogers, 1975; Ballaa & Hagger, 2025), and Community Resilience Theory highlights inclusivity and adaptive capacity (Kulig & Hanson, 1996; Derakhshan, 2025). These affirm that LGU-Naga's preparedness must integrate institutional continuity with community resilience to achieve holistic disaster readiness.

Relationship between the Level of Disaster Emergency Management and the Level of Disaster Preparedness of LGU-Naga

Table 3 reveals the correlation results between disaster emergency management domains and disaster preparedness indicators. The strongest relationship was observed between "Recovery Management and Training and Capacity," with an r-value of 0.9926 and p-value of 0.001, interpreted as "Significant." Similarly, "Recovery Management and Early Warning System" ($r = 0.9907$, $p = 0.001$) and "Mitigation/System Performance with Resources and Equipment Readiness" ($r = 0.9917$, $p = 0.001$) also show "very high significant correlations." The lowest relationships were found between "Response and Coordination with Public Awareness and Engagement" ($r = 0.6563$, $p = 0.229$) and "Response and Coordination with Resources and Equipment Readiness" ($r = 0.7413$, $p = 0.152$), both interpreted as "Not Significant." Other indicators such as "Simulation Exercises and Drills under Planning and Policy" ($r = 0.9692$, $p = 0.006$) and "Recovery Management" ($r = 0.9545$, $p = 0.012$) also show "strong significant correlations."

LGU-Naga's disaster preparedness is characterized by strong institutional linkages in recovery management, mitigation, and system performance, particularly through training and early warning systems, underscoring the importance of capacity-building and communication in post-disaster resilience. Significant correlations between mitigation and system performance with resources highlight the role of tangible assets, while weaker correlations in response and coordination with awareness and resources reveal gaps in translating institutional planning into community-level execution.

Table 3
Relationship between the Level of Disaster Emergency Management and the Level of Disaster Preparedness

Level of Disaster Emergency Management	Level of Disaster Preparedness	r-value	p-value	Int.
Planning and Policy	Training and Capacity	0.8962	0.039	S
	Early Warning System	0.9124	0.031	S
	Public Awareness and Engagement	0.9464	0.015	S

	Resources and Equipment Readiness	0.8930	0.041	S
	Simulation Exercises and Drills	0.9692	0.006	S
Response and Coordination	Training and Capacity	0.9568	0.011	S
	Early Warning System	0.9508	0.009	S
Recovery Management	Training and Capacity	0.9926	0.001	S
	Early Warning System	0.9907	0.001	S
	Simulation Exercises and Drills	0.9545	0.012	S
	Public Awareness and Engagement	0.9149	0.029	S
	Resources and Equipment Readiness	0.9917	0.001	S
	Simulation Exercises and Drills	0.9195	0.027	S
	Public Awareness and Engagement	0.9149	0.029	S
	Resources and Equipment Readiness	0.9917	0.001	S
	Simulation Exercises and Drills	0.9195	0.027	S

Note: < 0.05 = Significant (S); >0.05 =Not Significant (NS)

Comparative studies from South Asia echo these findings, showing that while governance, resources, and training are substantial, inclusivity, evaluation, and community participation remain limited (Perera & Fernando, 2025; Khan & Shah, 2024; Rahman et al., 2023; Sharma & Adhikari, 2022; Dorji, 2021). The Disaster Management Cycle Theory emphasizes preparedness as a continuous process across all phases (Coetzee & van Niekerk, 2012; Khan et al., 2023), while Protection Motivation Theory explains behavioral drivers for compliance (Rogers, 1975; Ballaa & Hagger, 2025), and Community Resilience Theory underscores inclusivity and adaptive capacity (Kulig & Hanson, 1996; Derakhshan, 2025). These made Naga's preparedness within a holistic model, affirming that institutional continuity must be complemented by stronger response coordination, evaluation mechanisms, and community resilience to achieve comprehensive disaster readiness.

Extent of Influence of the Level of Disaster Emergency Management on the Level of Disaster Preparedness

Table 4 presents the correlation results showing the extent of influence between disaster emergency management domains and disaster preparedness indicators. The strongest influences were observed between "Recovery Management and Training and Capacity" ($r = 0.9926$, $r^2 = 0.99$, Very Strong), "Recovery Management and Early Warning System" ($r = 0.9907$, $r^2 = 0.98$, Very Strong), and "Mitigation/System Performance with Resources and Equipment Readiness" ($r = 0.9917$, $r^2 = 0.98$, Very Strong). Similarly, "Planning and Policy with Simulation Exercises and Drills" ($r = 0.9692$, $r^2 = 0.94$, Very Strong) and "Response and Coordination with Training and Capacity" ($r = 0.9568$, $r^2 = 0.92$, Very Strong) also show high levels of influence. The lowest influence was found between "Response and Coordination with Public Awareness and Engagement" ($r = 0.6563$, $r^2 = 0.43$, Moderate) and "Response and Coordination with Resources and Equipment Readiness" ($r = 0.7413$, $r^2 = 0.55$, Moderate).

Table 4
Extent of Influence of the Level of Disaster Emergency Management on the Level of Disaster Preparedness

Level of Disaster Emergency Management	Level of Disaster Preparedness	r-value	r^2-value	Int.
Planning and Policy	Training and Capacity	0.8962	0.80	Strong
	Early Warning System	0.9124	0.83	Very Strong
	Public Awareness and Engagement	0.9464	0.90	Very Strong
	Resources and Equipment Readiness	0.8930	0.80	Strong
	Simulation Exercises and Drills	0.9692	0.94	Very Strong
Response and Coordination	Training and Capacity	0.9568	0.92	Very Strong
	Early Warning System	0.9508	0.92	Very Strong
	Public Awareness and Engagement	0.6563	0.43	Moderate
	Resources and Equipment Readiness	0.7413	0.55	Moderate
	Simulation Exercises and Drills	0.8507	0.72	Strong
Recovery Management	Training and Capacity	0.9926	0.99	Very Strong
	Early Warning System	0.9907	0.98	Very Strong
	Public Awareness and Engagement	0.8098	0.66	Strong
	Resources and Equipment Readiness	0.8518	0.73	Strong
	Simulation Exercises and Drills	0.9545	0.91	Very Strong
Mitigation	Training and Capacity	0.8088	0.65	Strong
	Early Warning System	0.8456	0.72	Strong
	Public Awareness and Engagement	0.9149	0.84	Very Strong
	Resources and Equipment Readiness	0.9917	0.98	Very Strong
	Simulation Exercises and Drills	0.9195	0.85	Very Strong
System Performance	Training and Capacity	0.8088	0.65	Strong
	Early Warning System	0.8184	0.67	Strong
	Public Awareness and Engagement	0.9149	0.84	Very Strong
	Resources and Equipment Readiness	0.9917	0.98	Very Strong
	Simulation Exercises and Drills	0.9195	0.85	Very Strong

Note: 0.00-0.20=Very Weak; 0.21-0.40=Weak; 0.41-0.60=Moderate; 0.61-0.80=Strong; 0.81-1.00=Very Strong

LGU-Naga's disaster preparedness is substantially reinforced by recovery management, mitigation, and system performance, with very strong correlations showing that preparedness is most effective when institutional systems are paired with training and resources. However, weaker correlations in response coordination with awareness and resource mobilization highlight gaps in translating institutional planning into community-level execution, reducing overall integration. Comparative insights from Brunei, Myanmar,

Laos, Timor-Leste, India, and Japan reveal similar patterns where governance and resources are strong but inclusivity, evaluation, and community participation remain limited. These findings affirm that preparedness is most strongly influenced by institutional domains, while community-level engagement requires further reinforcement. The Disaster Management Cycle Theory explains preparedness as a continuous process across planning, response, recovery, and mitigation (Coetzee & van Niekerk, 2012; Khan et al., 2023), while Protection Motivation Theory clarifies behavioral drivers for compliance (Rogers, 1975; Ballaa & Hagger, 2025), and Community Resilience Theory underscores inclusivity and adaptive capacity (Kulig & Hanson, 1996; Derakhshan, 2025). These positions Naga's preparedness within a holistic model requiring both institutional continuity and community resilience to achieve comprehensive disaster readiness.

Contingency Plan for Enhancing Disaster Emergency Management and Preparedness of LGU-Naga

LGU-Naga's disaster preparedness framework can be understood through three stages: analyze, design, and develop. The analysis stage revealed very strong correlations between recovery management, mitigation, and preparedness indicators such as training, early warning systems, and resources, showing that institutional systems are highly effective in shaping outcomes. However, moderate correlations in response coordination with awareness and resource mobilization highlighted gaps in translating institutional strength into community-level execution, identifying priority areas in strengthening coordination, enhancing inclusivity, and institutionalizing evaluation mechanisms. The design stage translated these findings into structured strategies aligned with RA 10121 and UNDRR principles, emphasizing hazard mapping, infrastructure retrofitting, capacity-building, ICT-based early warning systems, multi-sectoral coordination, and inclusive recovery programs. Continuous simulation exercises, monitoring, and feedback systems were embedded to ensure adaptability. The development stage operationalized these strategies into concrete programs, including SOPs for emergency response, training modules for barangays, schools, and hospitals, ICT-based alerts, resource mobilization plans, annual simulation schedules, and formalized partnerships with NGOs and private sectors. A monitoring and evaluation framework ensures accountability and continuous improvement. These placed LGU-Naga's preparedness within a holistic model that integrates institutional continuity, inclusivity, and community resilience to achieve comprehensive disaster readiness.

CONCLUSIONS

LGU-Naga demonstrates substantial disaster preparedness, strongly reinforced by institutional planning, recovery management, mitigation, and system performance, particularly through resources and early warning systems. However, weaker response coordination, limited simulation exercises, and insufficient community engagement highlight gaps in translating institutional strength into participatory execution. Bridging these gaps through enhanced coordination, inclusivity, and evaluation mechanisms is essential to elevate preparedness from substantial to comprehensive, ensuring that both institutional capacity and community resilience are fully integrated into a holistic disaster management framework.

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