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A Sendai Framework-Based Assessment of Disaster Risk Management in the Municipalities of Northern Samar: Basis for Enhancing the Local DRRM Plan

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Abstract

This study assessed disaster risk management knowledge among municipalities in Northern Samar using the four priority areas of the Sendai Framework for Disaster Risk Reduction (2015–2030) and examined its relationship with selected municipal profile characteristics. Guided by the Sendai Framework and supported by Resource Dependence Theory and Human Capital Theory, the study employed a quantitative descriptive-correlational research design. Data were collected through a researcher-developed and validated questionnaire administered to local government officials and personnel directly involved in disaster risk reduction and management activities across the municipalities of Northern Samar. Descriptive and inferential statistics, including frequency counts, percentages, weighted means, and Pearson Product-Moment Correlation Coefficient, were used in analyzing the data. The findings revealed that most municipalities belonged to lower municipal and income classifications, had relatively small populations, were predominantly coastal, and operated within modest fiscal environments. Despite these constraints, respondents demonstrated a very high level of disaster risk management knowledge across most Sendai Framework priority areas. Knowledge was strongest in strengthening disaster risk management governance, followed by disaster preparedness and disaster risk understanding, while investing in disaster risk reduction for resilience received the lowest, though still high, rating. Significant positive relationships were found between disaster risk management knowledge and municipal classification level, income classification, National Tax Allotment allocation, and annual disaster risk reduction and management allocation. In contrast, population size, number of barangays, geographic location, and land area were not significantly related to disaster risk management knowledge. The study concludes that fiscal capacity, institutional commitment, and governance resources play important roles in strengthening disaster risk management competencies among municipalities. Continued investments in capacity development, disaster risk reduction financing, and institutional strengthening are recommended to enhance local resilience and disaster governance. This study supports SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action) by promoting stronger local disaster resilience, preparedness, and risk-informed governance. Its sustainability contribution lies in strengthening institutional capacity, community resilience, and evidence-based disaster risk reduction practices that support long-term sustainable local development.

Keywords: Climate Action, Disaster Governance, Disaster Risk Management Knowledge, Local Government Units, Resilience, Sendai Framework, Sustainable Cities and Communities

1. Introduction

Disaster risk reduction and management (DRRM) has become a critical component of sustainable development as communities face increasing exposure to natural hazards and climate-related risks. Effective disaster governance requires not only preparedness and response mechanisms but also risk knowledge, institutional capacity, and investments that strengthen resilience. Guided by the Sendai Framework for Disaster Risk Reduction 2015–2030, this study examines disaster risk management knowledge among municipalities in Northern Samar and its relationship with selected municipal profile characteristics.

1.1 Disaster Risk Management Knowledge and Municipal Resilience

Disasters continue to threaten sustainable development, particularly in developing countries where vulnerability to environmental and climate-related hazards remains high. Recognizing this challenge, the United Nations Office for Disaster Risk Reduction emphasized the need to shift from reactive disaster response toward proactive risk reduction and resilience-building strategies (UNDRR, 2015). This approach is reflected in the Sendai Framework for Disaster Risk Reduction 2015–2030, which prioritizes understanding disaster risk, strengthening disaster risk governance, investing in disaster risk reduction for resilience, and enhancing disaster preparedness for effective response and Build Back Better in recovery, rehabilitation, and reconstruction. In the Philippines, Republic Act No. 10121 established a decentralized disaster risk reduction and management system that assigns primary responsibility for disaster management to local government units (Republic Act No. 10121, 2010). Municipal governments are therefore expected to integrate DRRM into local planning, strengthen preparedness systems, invest in resilience-building initiatives, and ensure effective recovery processes.

1.2 Themes and Insights on Disaster Risk Knowledge, Governance, and Investment

Disaster risk management knowledge plays a vital role in effective local disaster governance. Understanding disaster risks enables governments and communities to identify vulnerabilities, anticipate hazards, and implement appropriate risk reduction measures (Cutter et al., 2008). Likewise, disaster resilience is strengthened when institutions possess adequate knowledge of hazard assessment, vulnerability analysis, and risk communication (Birkmann, 2006). Access to reliable information supports evidence-based decision-making and enhances the implementation of disaster risk reduction initiatives. Effective disaster management also depends on governance capacity. The Sendai Framework highlights the importance of institutional arrangements, stakeholder participation, accountability mechanisms, and policy integration in managing disaster risks (UNDRR, 2015). Governance quality influences disaster outcomes through its impact on coordination, resource allocation, and policy implementation (Tierney, 2012). Moreover, adaptive and collaborative governance systems are better positioned to address complex disaster challenges and promote long-term resilience (Djalante et al., 2011). Investments in disaster risk reduction further contribute to community resilience. Proactive investments in mitigation and preparedness generate long-term social and economic benefits by reducing future disaster losses (Mechler, 2016). However, the capacity to make such investments often depends on the financial resources of local governments. Municipalities with stronger fiscal capacity are generally more capable of supporting infrastructure development, personnel training, hazard assessment, and institutional capacity-building initiatives (Israel & Briones, 2014).

1.3 Local, National, and Global Context of Disaster Risk Reduction

Globally, the Sendai Framework serves as a guiding policy for strengthening disaster resilience and reducing disaster losses (UNDRR, 2015). Nationally, the Philippines has institutionalized DRRM through Republic Act No. 10121, emphasizing local government responsibility in disaster governance (Republic Act No. 10121, 2010). At the local level, Northern Samar provides a relevant setting for disaster risk studies because of its location along the Pacific seaboard and its frequent exposure to typhoons, flooding, storm surges, and other climate-related hazards. These recurring events highlight the need to strengthen local disaster risk reduction and management systems.

1.4 Theoretical or Conceptual Basis: Sendai Framework for Disaster Risk Reduction

This study is anchored on the Sendai Framework for Disaster Risk Reduction 2015–2030 (UNDRR, 2015). The framework emphasizes four priority areas: understanding disaster risk; strengthening disaster risk governance; investing in disaster risk reduction for resilience; and enhancing disaster preparedness for effective response and Build Back Better during recovery, rehabilitation, and reconstruction. These priorities provide the analytical lens for assessing disaster risk management knowledge among municipalities in Northern Samar.

1.5 Research Gaps and Rationale

Previous studies have explored disaster preparedness, vulnerability, and DRRM implementation. However, limited research has examined disaster risk management knowledge across the four priority areas of the Sendai Framework and the municipal characteristics associated with such knowledge. Given Northern Samar's high exposure to disaster risks, understanding the level of municipal disaster risk management knowledge and its relationship with municipal profile variables can provide valuable evidence for improving local disaster governance and resilience-building efforts.

1.6 Alignment with Relevant Sustainable Development Goals (SDGs)

This study aligns with SDG 11 (Sustainable Cities and Communities) by supporting efforts to strengthen community resilience and disaster preparedness. It also contributes to SDG 13 (Climate Action) through its focus on disaster risk reduction, climate-related hazards, and adaptive local governance. The assessment of municipal disaster risk management knowledge supports the development of strategies that enhance disaster resilience and risk-informed decision-making.

1.7 Importance of the Study to Multidisciplinary Sustainability

The study contributes to community, institutional, and policy sustainability by providing evidence on disaster risk management knowledge among municipalities. Its findings may support capacity development initiatives, strengthen local governance systems, and inform disaster risk reduction policies and programs. By promoting evidence-based decision-making and resilience-building, the study contributes to sustainable local development and long-term disaster preparedness in hazard-prone communities.

2. Material and methods

2.1 Research Design

The study utilized a quantitative descriptive-correlational research design. The descriptive approach was used to determine the profile of municipalities and assess disaster risk management knowledge across the four priority areas of the Sendai Framework for Disaster Risk Reduction (2015–2030). The correlational component examined the relationship between selected municipal profile variables and disaster risk management knowledge. This design was appropriate because it

enabled the description of existing conditions and the determination of significant associations between municipal characteristics and disaster risk management knowledge.

2.2 Locale of the Study

The study was conducted in the Province of Northern Samar, Philippines, located in the Eastern Visayas Region on the northeastern portion of Samar Island facing the Pacific Ocean. The province is highly susceptible to hydro-meteorological hazards such as typhoons, storm surges, flooding, and landslides due to its geographic location along the Pacific seaboard. The study included all twenty-four (24) municipalities of the province to provide a comprehensive assessment of disaster risk management knowledge among local government units.

2.3 Respondents of the Study

The respondents were local government officials and personnel directly involved in disaster risk reduction and management activities in Northern Samar. These included Municipal Disaster Risk Reduction and Management Officers, Municipal Planning and Development Coordinators, Municipal Engineers, Municipal Social Welfare and Development Officers, members of Local Disaster Risk Reduction and Management Councils, and other municipal officials responsible for DRRM functions. Their involvement in planning, implementation, coordination, preparedness, response, and recovery activities enabled them to provide informed assessments of disaster risk management knowledge within their municipalities.

2.4 Sample and Sampling Procedure

Purposive sampling was employed to select respondents who possessed the necessary expertise, experience, and responsibilities related to disaster risk reduction and management. This approach ensured that participants had direct involvement in DRRM programs and activities, allowing them to provide relevant and reliable information regarding municipal disaster risk management knowledge.

2.5 Research Instrument

Data were gathered using a researcher-developed questionnaire based on the four priority areas of the Sendai Framework for Disaster Risk Reduction (2015–2030). The first part collected municipal profile information, including municipal classification level, income classification, population size, number of barangays, geographic location, National Tax Allocation allocation, land area, and average annual DRRM allocation. The second part assessed disaster risk management knowledge in four dimensions: Understanding Disaster Risk, Strengthening Disaster Risk Management to Manage Disaster Risk, Investing in Disaster Risk Reduction for Resilience, and Enhancing Disaster Preparedness for Effective Response and Build Back Better in Recovery, Rehabilitation, and Reconstruction. Each dimension contained ten statements measuring respondents' level of knowledge regarding disaster risk reduction and management practices. Responses were measured using a five-point Likert scale ranging from Strongly Disagree to Strongly Agree. Mean scores were interpreted as very high, high, moderate, low, or very low levels of disaster risk management knowledge. The instrument underwent content validation by experts in disaster risk reduction and management, public administration, and research methodology. Their recommendations were incorporated into the final version of the questionnaire. Pilot testing was subsequently conducted among respondents outside the study area to determine reliability. Results showed excellent internal consistency, with an overall Cronbach's alpha coefficient of .987. Reliability coefficients for the four dimensions were .922 for Understanding Disaster Risk, .920 for Strengthening Disaster Risk Management, .901 for Investing in Disaster Risk Reduction for Resilience, and .906 for Enhancing Disaster Preparedness and Build Back Better. These values exceeded the acceptable standard of .70, indicating that the instrument was reliable for data collection.

2.6 Data Gathering Procedure

Prior to data collection, permission was obtained from the concerned local government units. The researcher coordinated with municipal officials and designated focal persons to facilitate questionnaire administration. Respondents were informed about the purpose and significance of the study and were assured that their responses would remain confidential and be used solely for academic purposes. Participation was voluntary. The questionnaires were personally administered by the researcher or distributed through designated focal persons. Completed questionnaires were retrieved, checked for completeness, encoded, and prepared for statistical analysis.

2.7 Data Analysis Techniques

The collected data were analyzed using descriptive and inferential statistical methods. Frequency counts and percentages were used to describe municipal profile variables such as municipal classification level, income classification, geographic location, and DRRM allocation categories. Weighted means were computed to determine the level of disaster risk management knowledge across the four Sendai Framework priority areas. To determine the significant relationship between municipal profile variables and disaster risk management knowledge, the Pearson Product-Moment Correlation Coefficient (r) was utilized. Statistical testing was conducted at the 0.05 level of significance. The null hypothesis was rejected when the computed p-value was less than .05 and accepted when the p-value was greater than .05.

2.8 Ethical Considerations

The study adhered to the ethical principles of voluntary participation, informed consent, confidentiality, anonymity, and respect for respondents. Participants were informed of the objectives of the study, the nature of their participation, and their right to decline or withdraw at any time without penalty. No identifying personal information was disclosed, and all data were treated confidentially and used exclusively for research purposes.

3. Results and Discussion

3.1 Disaster Risk Management Knowledge and Municipal Characteristics

3.1.1 Municipal Profile of Northern Samar Municipalities

The findings showed that most municipalities in Northern Samar were classified as Fifth-Class and Fifth Income Class municipalities. The majority had populations below 40,000 residents, consisted of 16–30 barangays, and were predominantly located in coastal areas. Most municipalities received moderate National Tax Allotment (NTA) allocations, had small to moderate land areas, and allocated less than ₱10 million annually for disaster risk reduction and management activities. These results indicate that many municipalities operate within constrained fiscal environments that may limit investments in disaster preparedness, infrastructure development, personnel training, and resilience-building programs. Previous studies have shown that local governments with stronger fiscal capacity are generally more capable of sustaining disaster risk reduction initiatives and long-term resilience measures (Israel & Briones, 2014; Mechler, 2016). The predominance of coastal municipalities further increases exposure to typhoons, storm surges, flooding, and sea-level rise. According to the United Nations Office for Disaster Risk Reduction (2015), geographic exposure significantly increases disaster risk and necessitates stronger preparedness, mitigation, and adaptation measures. Although municipalities allocate resources for DRRM activities, the generally modest allocation levels suggest that disaster management programs often compete with other local development priorities for limited financial resources.

3.1.2 Understanding Disaster Risk

Respondents demonstrated a very high level of knowledge in understanding disaster risk. The findings indicate substantial awareness of hazard identification, vulnerability assessment, risk analysis, and risk communication practices within their municipalities. The results suggest that municipalities recognize the importance of evidence-based planning and the use of scientific information in disaster management. According to Cutter et al. (2008), understanding disaster risk serves as the foundation of effective disaster governance because it enables communities and institutions to identify vulnerabilities and implement appropriate interventions. Likewise, the Sendai Framework emphasizes that disaster risk knowledge is essential for reducing disaster losses and strengthening resilience (UNDRR, 2015).

3.1.3 Strengthening Disaster Risk Management to Manage Disaster Risk

Among the four priority areas, strengthening disaster risk management obtained the highest rating and was interpreted as very high. Respondents demonstrated strong knowledge regarding governance structures, institutional arrangements, stakeholder participation, policy implementation, and accountability mechanisms. This finding suggests that local government officials have internalized the governance principles promoted by Republic Act No. 10121 and the Sendai Framework. Effective governance facilitates coordination, resource allocation, and policy implementation, which significantly influence disaster management outcomes (Tierney, 2012). Furthermore, adaptive governance systems enhance institutional resilience and improve disaster preparedness capacities (Djalante et al., 2011).

3.1.4 Investing in Disaster Risk Reduction for Resilience

Investing in disaster risk reduction for resilience received a high rating but ranked lowest among the four priority areas. This indicates comparatively lower knowledge regarding resilient infrastructure development, land-use planning, environmental protection initiatives, and long-term disaster risk reduction investments. The result may reflect the financial and technical challenges associated with resilience-building investments. Similar observations have been reported in developing-country settings where limited resources constrain investments in mitigation and resilience projects (Mechler, 2016). The relatively lower rating may also be associated with the specialized knowledge required for infrastructure resilience planning and long-term disaster risk reduction strategies.

3.1.5 Enhancing Disaster Preparedness and Build Back Better

Respondents exhibited a very high level of knowledge in enhancing disaster preparedness for effective response and Build Back Better. They demonstrated strong familiarity with emergency response protocols, early warning systems, contingency planning, recovery planning, and post-disaster rehabilitation. This finding may be attributed to Northern Samar's frequent exposure to typhoons and other climate-related hazards, which provide continuous opportunities for preparedness and response learning. Repeated disaster experiences likely contribute to greater awareness of emergency management processes. Kapucu (2008) emphasized that preparedness planning and coordinated response systems are essential components of effective disaster management and community resilience.

3.1.6 Overall Disaster Risk Management Knowledge

The overall level of disaster risk management knowledge among respondents was very high across the four Sendai Framework priority areas. Governance-related knowledge obtained the highest rating, followed by preparedness and recovery, disaster risk understanding, and resilience investment. These findings indicate that municipalities in Northern Samar possess a strong foundation of disaster risk management knowledge. The results suggest that local governments have developed substantial awareness of disaster governance, preparedness, and risk assessment practices that support effective implementation of disaster risk reduction and management programs.

3.2 Relationship Between Municipal Profile Variables and Disaster Risk Management Knowledge

The analysis revealed that municipal classification level, income classification, National Tax Allotment allocation, and average annual DRRM allocation had significant positive relationships with disaster risk management knowledge across the four Sendai Framework priority areas. In contrast, population size, number of barangays, geographic location, and land area showed no significant relationship with disaster risk management knowledge. The significant relationship between municipal classification level and disaster risk management knowledge suggests that municipalities with higher classifications tend to possess greater DRRM knowledge. Since municipal classification reflects differences in economic capacity and resource availability, higher-class municipalities are generally better positioned to support training, institutional development, and disaster management initiatives. Similarly, municipalities with higher income classifications demonstrated stronger disaster risk management knowledge, indicating that financial resources contribute to knowledge acquisition and competency development. Human Capital Theory explains that investments in education, training, and organizational development enhance knowledge and skills (Becker, 1993). National Tax Allotment allocation and average annual DRRM allocation demonstrated the strongest relationships with disaster risk management knowledge. Municipalities receiving larger fiscal transfers and allocating more resources to DRRM activities consistently exhibited higher knowledge levels across all dimensions. This finding supports the argument of Mechler (2016) that investments in disaster risk reduction promote learning, innovation, institutional strengthening, and knowledge development. Adequate funding enables local governments to conduct training programs, disaster simulations, hazard assessments, planning workshops, and other capacity-building activities. Conversely, population size, number of barangays, geographic location, and land area were not significantly related to disaster risk management knowledge. This suggests that demographic and geographic characteristics alone do not determine the level of DRRM knowledge among local government officials. Rather, knowledge appears to depend more heavily on institutional commitment and resource availability than on physical or demographic factors. These findings support Resource Dependence Theory, which posits that organizational capacity is shaped by access to critical resources (Pfeffer & Salancik, 1978). Likewise, Disaster Governance Theory emphasizes that effective disaster management is influenced primarily by governance structures, institutional arrangements, and stakeholder collaboration rather than geographic characteristics alone (Tierney, 2012). Overall, the results underscore the importance of fiscal capacity and sustained investment in strengthening disaster risk management knowledge, enhancing local resilience, and improving disaster governance among municipalities in Northern Samar.

4. Conclusion and Recommendations

This study found that most municipalities in Northern Samar belonged to lower and middle municipal classifications, had relatively small populations, were predominantly coastal, and operated within modest fiscal environments. Despite financial limitations, municipalities demonstrated a very high level of disaster risk management knowledge, particularly in disaster governance, preparedness, and disaster risk understanding, while knowledge related to disaster risk reduction investments and resilience-building was comparatively lower. The findings further revealed that municipal classification, income classification, National Tax Allotment allocation, and annual DRRM allocation were significantly associated with disaster risk management knowledge, whereas population size, number of barangays, geographic location, and land area were not. Overall, the study highlights the importance of institutional capacity and financial resources in strengthening disaster risk management knowledge and enhancing local resilience.

Local government units should continue strengthening disaster risk management capacities through training and development programs, particularly in disaster risk reduction investments, resilience-building strategies, climate adaptation, ecosystem-based approaches, and disaster risk financing. National agencies should provide sustained technical and financial assistance to resource-constrained municipalities, while local governments should promote organizational learning through training, simulation exercises, collaboration, and participation in DRRM networks. Increased investment in DRRM activities should also be prioritized to enhance preparedness, governance, and community resilience, with future interventions focusing on strengthening institutional and financial capacities.

The study was limited to municipalities in Northern Samar and focused on assessing disaster risk management knowledge using the four priority areas of the Sendai Framework and selected municipal profile characteristics. The analysis concentrated on the relationship between municipal profile variables and disaster risk management knowledge and did not examine other potential factors that may influence disaster management competencies. The findings are therefore limited

to the scope, respondents, and variables included in the study.

Compliance with ethical standards

The author declares no conflict of interest. This study received no external funding and was conducted with the cooperation of the participating local government units and municipal officials in Northern Samar. Participation was voluntary, informed consent was obtained from all respondents, and data were collected through a non-invasive survey questionnaire. All information was treated with strict confidentiality, no identifying personal information was disclosed, and the data were used solely for research purposes.

Author's Bionote

Saul Tuyan Camarillo, the third son of former Vice Mayor Mr. Matias Bello Camarillo and the late Mrs. Bernardita Tuyan Camarillo, a respected businesswoman, is a proud native of Gamay, Northern Samar. A licensed Professional Teacher with a Bachelor's degree in Political Science, he has served as a part time lecturer in several Higher Education Institutions, honing his expertise in academic instruction, curriculum delivery, and student engagement.

He is a graduate of the Master of Arts in Public Administration and holds a Juris Doctor degree from the University of Eastern Philippines, equipping him with a strong foundation in governance, law, and public service. Beyond the academic field, he is also a businessman and currently serves as the Executive Director of the first TESDA-accredited physical school in the Pacific towns of Northern Samar, Philippines.

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