

Disaster Management and Mitigation Practices of Schools Basis for A Proposed Project Salba Bida (Strategies and Approaches in Leading Basic Actions In Building Integrated Disaster Awareness)

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Abstract

This study assessed the disaster management practices of public schools in Legislative District III of Isabela Province and served as the basis for the development of the SALBA BIDA framework for strengthening disaster resilience in educational institutions. Anchored on the Community of Practice Theory, Organizational Change Theory, Needs Assessment Theory, and Program Evaluation Theory, the study examined disaster management practices in terms of safe learning facilities, school disaster management, and disaster risk reduction in education. A mixed-methods research design was employed, combining quantitative and qualitative approaches. Data were collected from 100 purposively selected school administrators, School Disaster Risk Reduction and Management (DRRM) coordinators, and administrative officers through a structured questionnaire and semi-structured interviews. Quantitative data were analyzed using descriptive statistics, the Kruskal-Wallis H Test, Mann-Whitney U Test, and Kendall Tau Coefficient. Findings revealed that schools generally demonstrated high compliance in maintaining safe learning facilities, implementing school disaster management systems, and integrating disaster risk reduction in education. Strong performance was observed in safety measures, preparedness activities, communication systems, documentation, coordination, and community engagement. However, financial constraints emerged as the most significant challenge, while technical and human-related concerns were only slightly encountered. Significant differences in disaster management practices were observed according to school type, school size, and School-Based Management (SBM) level, with schools exhibiting more developed institutional systems demonstrating stronger preparedness and management practices. The study concluded that disaster management practices were generally evident across schools but require continuous improvement in preparedness programs, infrastructure, resource allocation, and stakeholder capacity-building. Enhanced policy implementation, regular training initiatives, and stronger collaboration with disaster risk reduction agencies are recommended to further strengthen school resilience. The study supports SDG 4 (Quality Education), SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals). Its sustainability contribution lies in promoting educational continuity, institutional resilience, effective governance, community engagement, and long-term disaster risk reduction in educational settings.

Keywords: Community Resilience, Disaster Management Practices, Disaster Risk Reduction and Management, Safe Learning Facilities, SALBA BIDA Framework, School-Based Management, School Disaster Management, School Heads, Sustainability, Sustainable Development Goals

1. Introduction

Disasters continue to threaten educational institutions, affecting the safety, well-being, and continuity of learning among students, teachers, and school personnel. The increasing frequency and severity of natural hazards have heightened the need for effective disaster preparedness, response, and recovery systems in schools. Despite the existence of disaster management policies and programs, many educational institutions continue to face challenges related to preparedness, resource availability, training, communication, and implementation. This study evaluates the disaster management practices of schools in Legislative District III of Isabela Province, focusing on the awareness, challenges, communication systems, and preparedness of school heads and officials. The findings serve as the basis for the development of the SALBA BIDA framework to strengthen disaster resilience in educational institutions.

1.1 Disaster Management Practices in Educational Institutions and the Role of School Heads and Officials

Educational institutions are highly vulnerable to disasters and are responsible for ensuring safe learning environments through effective preparedness and response mechanisms. However, many schools continue to experience limitations in disaster management planning and implementation due to inadequate resources, insufficient training, and weak

communication systems (UNESCO, 2015; Komives et al., 2017). Studies revealed that only 50% of public schools in the United States had disaster management plans and only 30% conducted disaster drills, demonstrating deficiencies in preparedness efforts (National Center for Education Statistics, 2016; American Red Cross, 2018). Similarly, school leaders in Brazil recognized the importance of disaster management but lacked the necessary knowledge and resources to effectively implement disaster management plans. These findings highlight the need for capacity building and institutional support for school administrators. In disaster-prone areas such as Isabela, where geological hazards including fault lines pose significant risks, strengthening disaster management capacities among school leaders becomes increasingly important.

1.2 Themes and Insights on School Disaster Risk Reduction and Management Practices

Disaster Risk Reduction Management (DRRM) is a comprehensive approach that integrates preparedness, mitigation, response, and recovery while supporting sustainable development objectives (Asih, 2023). According to UNDRR (2023), DRRM aims to prevent new disaster risks, reduce existing vulnerabilities, and manage residual risks to enhance community resilience. A recurring theme in the literature is the importance of community engagement in disaster preparedness and resilience building. Community participation contributes to effective hazard assessment, planning, implementation, response, and recovery processes (DILG, 2024; Philippines NDRRMP, 2024). Participatory approaches promote ownership, improve planning effectiveness, strengthen coordination, and foster a culture of resilience (WIT Press, 2011; PrepareCenter, 2023; International Federation of Red Cross and Red Crescent Societies (IFRC), 2023). Another major theme is the integration of DRRM into education. Educational programs improve disaster awareness, preparedness, and response capabilities among students and school personnel (Aghaei, Seyedin, and Sanaeinasab, 2018). Research in the Philippines revealed inadequate preparedness measures in many schools, emphasizing the need for comprehensive DRRM implementation (Bello, 2020). Integrating DRRM into curricula has been shown to enhance student awareness and foster a culture of safety (Cabilao-Valencia et al., 2019). The role of teachers is equally important, as disaster experiences positively influence their engagement in DRRM initiatives (Astutil, Werdhiana, and Wahyono, 2021). Child-centered disaster risk reduction programs further strengthen resilience among students and households (Ronan et al., 2016). Studies from other Asian countries also support curriculum integration, community engagement, and the use of formal, informal, and non-formal education pathways to strengthen resilience against disasters (Partini and Hidayat, 2024).

1.3 Global, National, and Local Disaster Risk Context of Schools in Legislative District III, Isabela

Globally, DRRM has evolved from a reactive disaster response model toward proactive prevention and resilience-building approaches. The Sendai Framework (2015) reinforced the importance of community engagement, preparedness, and institutional resilience. Nationally, the Philippine Disaster Risk Reduction and Management Act of 2010 established a comprehensive framework for disaster risk reduction, preparedness, response, and recovery (Cruz et al., 2021; Philippine Congress, 2010). The Philippines remains highly vulnerable to natural hazards such as typhoons, floods, and earthquakes due to its geographic location. Major disasters, including the 1990 Luzon earthquake and the 2019 Mindanao earthquakes, caused significant damage to school infrastructure and disrupted educational continuity (Dela Cruz et al., 2022; Philippine Institute of Volcanology and Seismology, 2019). Region II, particularly Cagayan Valley and Isabela Province, experiences frequent typhoons, floods, landslides, and earthquakes. Typhoon Vamco (Ulysses) severely affected the region, causing extensive flooding, displacement, infrastructure damage, and disruption of educational services (NASA Earth Observatory, 2020; GMA News, 2024). Flooding and landslides have repeatedly damaged school facilities and educational resources, highlighting the urgent need for effective school-based disaster management systems (Think Hazard, 2023). To address these challenges, the Philippines has implemented several DRRM initiatives including Temporary Learning Spaces, School DRRM Teams, the DepEd DRRM Manual, Child-Centered Disaster Risk Reduction programs, and School-Based Disaster Risk Management initiatives (Department of Education, 2015; UNICEF, 2018).

1.4 Theoretical and Conceptual Foundations of the SALBA BIDA Framework for School Disaster Management

The SALBA BIDA Framework was developed to strengthen disaster preparedness, response, mitigation, and recovery practices in schools through a systematic and evidence-based approach. The framework emphasizes the importance of institutional readiness, continuous improvement, stakeholder participation, and effective decision-making in disaster risk reduction and management. It recognizes that schools play a critical role in promoting safety, resilience, and preparedness among learners, teachers, and the community. The framework is grounded on the assessment of existing disaster management practices, challenges encountered by schools, and areas requiring improvement. It highlights the need for strategic planning, capacity-building activities, resource mobilization, communication systems, and collaboration among stakeholders to enhance disaster resilience. The framework also promotes regular monitoring and evaluation of disaster preparedness initiatives to ensure that programs remain responsive to the changing needs and risks faced by educational institutions. Through the integration of awareness-building activities, leadership initiatives, preparedness programs, and community engagement strategies, the SALBA BIDA Framework seeks to strengthen the ability of schools to anticipate, prepare for, respond to, and recover from disasters. It serves as a guide for school administrators, teachers, disaster risk reduction coordinators, and other stakeholders in implementing sustainable and effective disaster management practices that contribute to safer and more resilient learning environments.

1.5 Research Gaps in School Disaster Management Practices and Rationale for the SALBA BIDA Framework

Although existing literature extensively discusses disaster preparedness plans, curriculum integration, and disaster drills, limited research has examined the effectiveness of various disaster management strategies, the influence of community engagement, and the practical implementation challenges faced by school leaders. Existing studies also indicate persistent problems related to limited resources, inadequate training, weak policy integration, and insufficient stakeholder awareness. Furthermore, a significant gap exists in understanding the psychological dimensions of disasters and the long-term effects of DRRM initiatives on student well-being and academic performance. The literature also identifies the need for localized assessments in disaster-prone areas to determine context-specific vulnerabilities and intervention requirements. Given the susceptibility of Isabela Province to multiple hazards, assessing disaster management practices among school heads and officials is necessary to identify gaps and develop a framework responsive to local conditions.

1.6 Alignment of School Disaster Risk Reduction and Management with Relevant Sustainable Development Goals (SDGs)

This study aligns with several Sustainable Development Goals. It supports SDG 4 – Quality Education by promoting safe, resilient, and uninterrupted learning environments through strengthened disaster preparedness and management systems. It contributes to SDG 11 – Sustainable Cities and Communities by enhancing community resilience and reducing disaster-related vulnerabilities within educational institutions. The study also supports SDG 13 – Climate Action through preparedness, adaptation, and risk reduction strategies that address the increasing impacts of natural hazards. Additionally, its emphasis on collaboration among schools, communities, government agencies, and stakeholders reflects the objectives of SDG 17 – Partnerships for the Goals.

1.7 Importance of School Disaster Management to Multidisciplinary Sustainability and Community Resilience

The study contributes primarily to socio-economic, educational, community, institutional, and policy sustainability. By strengthening disaster preparedness and management practices, it supports the continuity of education and protects human capital during emergencies. Enhanced preparedness promotes safer learning environments, strengthens institutional resilience, improves governance and decision-making processes, and fosters stronger partnerships among schools and communities. The proposed SALBA BIDA framework contributes to sustainable disaster risk reduction by improving awareness, communication, coordination, and preparedness among educational stakeholders. Ultimately, the study supports long-term community resilience and institutional sustainability by enabling schools to effectively anticipate, prepare for, respond to, and recover from disasters.

2. Material and methods

2.1 Research Design

The study utilized a mixed-methods research design combining quantitative and qualitative approaches. Quantitative methods were used to gather numerical data related to awareness levels, participation rates, perceptions of effectiveness, and disaster management practices. Qualitative methods were employed to obtain deeper insights into community perspectives, challenges, barriers, and recommendations for improvement. The integration of quantitative and qualitative findings provided a comprehensive understanding of community engagement and school disaster risk reduction and management practices within Legislative District III of Isabela. This approach facilitated the identification of key challenges, evaluation of existing programs, and development of evidence-based recommendations for strengthening disaster preparedness and resilience.

2.2 Locale of the Study

The study was conducted in Legislative District III of the Province of Isabela, focusing on public schools located in disaster-prone communities. The area was selected because it is frequently affected by natural hazards such as typhoons, floods, and earthquakes, making it an appropriate setting for examining school disaster risk reduction and management practices. The locale provided valuable opportunities to gather information from educational institutions actively involved in disaster preparedness and response initiatives.

2.3 Respondents of the Study

The respondents consisted of school administrators, School Disaster Risk Reduction and Management (DRRM) coordinators, and administrative offices serving as alternate coordinators to school heads. These individuals were selected because of their direct responsibilities in planning, implementing, and monitoring disaster preparedness and response measures within their respective schools. Their experiences and responsibilities provided relevant insights into school-based disaster management practices, resource allocation, preparedness efforts, and response strategies.

2.4 Sample and Sampling Procedure

The study employed purposive sampling to select participants with direct involvement and experience in disaster risk reduction and management activities. A total of 100 respondents were selected from schools within Legislative District III

of Isabela. The sample size was considered adequate for exploratory research and allowed the collection of meaningful information from participants possessing specialized knowledge in disaster management. Selection criteria required participants to have at least one year of experience in disaster risk reduction and management and to voluntarily agree to participate through informed consent. Purposive sampling ensured that only individuals with relevant expertise and responsibilities were included, thereby increasing the relevance and reliability of the data collected. This approach enabled the study to capture both administrative and operational perspectives on school disaster management and informed the development of the proposed SALBA BIDA framework.

2.5 Research Instrument

The primary research instrument was a structured questionnaire composed of two sections. The first section gathered demographic information about the respondents, while the second assessed the level of disaster management practices among schools. The instrument was adopted from the study conducted by Mubarak et al., which reported a reliability index (Cronbach's alpha) of 0.7852, indicating acceptable internal consistency and reliability. To ensure content validity, the questionnaire was adapted from relevant disaster management assessment frameworks and related studies. The instrument underwent expert evaluation by school administrators, teacher education specialists, and research experts who assessed its clarity, relevance, and alignment with the study objectives. Their recommendations were incorporated into the final version of the questionnaire. A pilot test was conducted among school heads and administrative officers who were not included in the actual study respondents. Reliability testing was performed using Cronbach's alpha, and a coefficient value of 0.7852 or higher was considered acceptable, indicating satisfactory internal consistency and suitability for the study.

2.6 Data Gathering Procedure

Data collection followed a mixed-methods approach utilizing both quantitative and qualitative techniques. Quantitative data were collected through survey questionnaires to determine the level of agreement regarding the effectiveness of School DRRM practices. Simultaneously, semi-structured interviews were conducted in person to obtain detailed qualitative information regarding participants' experiences, challenges encountered, and strategies used to address disaster-related concerns. The combination of survey and interview methods enabled data triangulation, providing a more comprehensive and multidimensional understanding of the research problem. This process enhanced the depth, accuracy, and credibility of the findings.

2.7 Data Analysis Techniques

The collected data were analyzed using the Statistical Package for Social Science (SPSS) and Microsoft Excel. Descriptive statistics, including frequency counts, percentages, and mean values, were used to summarize respondent profiles and determine the level of disaster management practices among schools. Non-parametric statistical tests were employed to examine differences and relationships among variables. These included the Kruskal-Wallis H Test, Mann-Whitney U Test, and Kendall Tau Coefficient. These statistical procedures were used to determine significant differences and relationships between the independent and dependent variables of the study.

2.8 Ethical Considerations

Ethical standards were strictly observed throughout the conduct of the study. Respondents were informed about the purpose of the research, the procedures involved, and their role as participants before data collection commenced. Participation was voluntary, and informed consent was secured from all respondents. Participants were also allowed to skip questions or withdraw from the study at any point without penalty. Confidentiality and anonymity were maintained through the use of codes instead of participant names in all records and reports. All information gathered was treated with strict confidentiality and was used solely for academic and research purposes. The researcher ensured honesty, accuracy, and integrity throughout the processes of data collection, analysis, and reporting in accordance with established ethical principles in educational research.

3. Results and Discussion

3.1 Disaster Management Practices of Schools

3.1.1 Safe Learning Facilities

Schools generally demonstrated a high level of compliance in maintaining safe learning facilities. The highest levels of compliance were observed in ensuring adequate classroom space and seating arrangements, providing sufficient school grounds, and maintaining visible boundaries and safety signages. Most safety-related indicators were highly complied with, although posting safety measures in laboratories and workshops and conducting minor classroom repairs received comparatively lower ratings, indicating only moderate compliance. These findings suggest that schools prioritize structural safety, spatial organization, and basic facility maintenance to support disaster preparedness. Safe and well-organized learning environments contribute to efficient evacuation and reduced risks during emergencies. However, the lower compliance in laboratory safety and routine repairs indicates the need for sustained facility maintenance and hazard-proofing efforts. These findings support the observations of Guo (2025), Seddighi et al. (2023), Opabola et al. (2023),

Osegbue (2025), Arcegono et al. (2024), and Cruz and Ormilla (2022), who emphasized the importance of infrastructure quality, safety signage, preventive maintenance, and continuous facility improvement in achieving disaster-resilient schools.

3.1.2 School Disaster Management

Schools exhibited a very high level of compliance in school disaster management practices. Strong performance was observed in maintaining emergency contact directories, securing important records, coordinating with barangay officials, documenting incidents, and identifying evacuation areas. Although still highly complied with, emergency supply availability received the lowest rating among the indicators. The findings indicate that schools have established effective communication systems, documentation procedures, and coordination mechanisms that strengthen institutional readiness. However, the comparatively lower rating for emergency supplies suggests that material preparedness requires additional attention. These results align with the findings of Opabola and Galasso (2024), Amri et al. (2022), Dzvimbo et al. (2022), Cvetković et al. (2024), and Arikawe et al. (2024), which emphasize the importance of communication systems, stakeholder coordination, documentation, and adequate emergency resources in effective disaster preparedness.

3.1.3 Disaster Risk Reduction in Education

Schools demonstrated high compliance in disaster risk reduction (DRR) education. The strongest areas included student familiarity with assembly areas, community participation in risk reduction activities, awareness of school-based risk reduction measures, and evacuation procedures. Student-family reunification procedures received the lowest rating, although they remained within the highly complied category. These findings suggest that disaster preparedness has been successfully integrated into school activities through awareness programs, drills, and community engagement. However, family-centered preparedness mechanisms require further strengthening. The results support the findings of Gholamzadeh Nikjoo et al. (2022), Oleksiyenko et al. (2023), Calloway et al. (2022), and Ongesa et al. (2025), which highlight the importance of integrating DRR education into daily school practices while strengthening family-school coordination during emergencies.

3.2 Problems Encountered in Disaster Management

3.2.1 Financial Challenges

Schools moderately encountered financial challenges in disaster management. The most common concerns involved lack of funds, limited resources, insufficient budget allocations, and budget realignments for competing priorities. These findings indicate that financial limitations remain the primary obstacle to implementing comprehensive disaster management programs. Funding constraints affect the procurement of equipment, conduct of training activities, and implementation of preparedness initiatives. This supports the findings of Wharton-Beck et al. (2024), Bonfanti et al. (2023), and Farokhzadian et al. (2024), which identified inadequate funding as a major barrier to disaster preparedness implementation.

3.2.2 Technical Challenges

Technical problems were only slightly encountered. Respondents reported relatively low levels of concern regarding information availability, policy clarity, preparedness guidelines, and coordination among stakeholders. The results suggest that schools generally possess sufficient knowledge and basic frameworks for disaster preparedness. Nevertheless, minor gaps in coordination and policy implementation remain. These findings are consistent with Brown and Jones (2025) and Schwarz (2024), who reported improvements in school awareness and preparedness systems despite persistent implementation challenges.

3.2.3 Human Resource Challenges

Human-related challenges were also slightly encountered. Limited training opportunities, lack of volunteers, competing work priorities, and insufficient collaborative time were reported but were not considered major barriers. These findings imply that while schools experience some human resource limitations, personnel-related issues do not significantly hinder disaster preparedness efforts. Continuous professional development and stakeholder engagement remain important. This observation supports Purwanto et al. (2023), who emphasized the need for ongoing capacity-building despite increasing training opportunities.

3.3 Differences in Disaster Management Practices According to School Characteristics

3.3.1 Differences According to Type of School

Schools differed significantly in several aspects of safe learning facilities and disaster risk reduction education. Elementary and integrated schools generally recorded higher compliance levels than senior high schools. Significant differences were observed in accessibility, safety signage, sanitation facilities, hazard awareness, evacuation procedures, lockdown drills, and other preparedness activities. However, most school disaster management indicators showed no significant differences, except for evacuation planning and identification of temporary shelters. These findings indicate that school type influences the implementation of disaster preparedness measures, particularly those involving safety facilities and DRR education.

Elementary schools tend to demonstrate stronger compliance because of stricter supervision requirements and the greater vulnerability of younger learners. This interpretation is supported by Lien et al. (2023), AlDulijand et al. (2023), Opatska et al. (2024), Khirekar et al. (2023), Iqbal et al. (2022), Mutch (2023), Du Plessis et al. (2022), Osunlaja et al. (2024), Isangadighi and Udeh (2023), O'Shea et al. (2022), Brown et al. (2023), Rosales et al. (2023), Satizábal et al. (2022), and Engelman et al. (2022).

3.3.2 Differences According to School Size

School size showed limited influence on safe learning facilities, as most indicators did not differ significantly. Significant differences were found only in fire suppression equipment and securing classroom materials. In school disaster management, differences emerged in emergency contact systems, identification cards, record security, and evacuation planning. In DRR education, small schools consistently obtained higher ratings than medium and large schools across several preparedness activities. These findings suggest that smaller schools may benefit from closer supervision, stronger community engagement, and easier dissemination of safety protocols. Medium-sized schools demonstrated strengths in administrative preparedness, while larger schools faced greater challenges related to coordination and logistical complexity. These observations are supported by Li (2025), Knox (2023), Banerjee-Batist et al. (2022), Mohtady Ali et al. (2022), Lassa et al. (2023), Vasileiou et al. (2022), Vandrevale et al. (2024), Sposato (2025), Jackson et al. (2022), Atillo et al. (2025), Reyes and Dizon (2022), Akbaba Altun (2025), Mohammed et al. (2025), and Chatzipanagiotou and Katsarou (2023).

3.3.3 Differences According to School-Based Management Level

Both developing and maturing SBM schools generally demonstrated high compliance across disaster management practices. However, maturing SBM schools consistently recorded higher ratings, particularly in school disaster management indicators such as emergency supplies, communication systems, documentation, coordination, and evacuation planning. Significant differences were also observed in selected safe learning facility indicators, including safety signage and classroom repairs. These findings indicate that higher SBM maturity contributes to stronger governance, improved resource management, and more systematic disaster preparedness implementation. While national policies help maintain high compliance even among developing schools, maturing SBM schools appear better equipped to sustain infrastructure maintenance, emergency logistics, and preparedness systems. This interpretation is supported by Guo et al. (2025), Cruz and Manalo (2025), Seddighi et al. (2023), Opabola et al. (2023), Osegbue (2025), Arcegoni et al. (2024), Cruz et al. (2022), Opabola and Galasso (2024), Amri et al. (2022), and Dzvimbo et al. (2022).

4. Conclusion & Recommendations

The study found that disaster management practices in schools were generally evident in terms of safe learning facilities, school disaster management, and disaster risk reduction in education, although implementation was not fully standardized across institutions. Schools demonstrated strong compliance in safety measures, preparedness activities, and disaster mitigation practices; however, variations existed according to school type, school size, and School-Based Management (SBM) level. Financial, technical, and human-related constraints affected the effectiveness of disaster preparedness and response initiatives, with financial limitations emerging as the most significant challenge. The findings further indicated that schools with more developed institutional systems exhibited stronger disaster management practices, while disaster mitigation efforts such as safety drills, risk assessments, preparedness training, and disaster awareness programs were commonly implemented but still required continuous improvement to strengthen school resilience.

Schools and education stakeholders should strengthen the implementation and monitoring of disaster management policies related to safe learning facilities, school disaster management, and disaster risk reduction in education. Capacity-building initiatives for teachers, staff, and DRRM coordinators should be intensified through regular training, workshops, and simulation exercises, while additional funding support should be sought to improve infrastructure, procure equipment, and sustain preparedness activities. Collaboration with disaster risk reduction agencies and technical experts should also be enhanced to improve planning systems, data management, and the use of updated DRRM tools, thereby promoting more consistent disaster management practices across schools. Future studies may further examine the effectiveness of specific disaster mitigation strategies and expand the scope of investigation to other educational settings and regions.

The study was limited to public schools in Legislative District 3 of Isabela and focused on disaster management practices based on the respondents' perceptions and experiences. The findings were examined in relation to school type, school size, and SBM level, which may limit their generalizability to other educational contexts. In addition, variations in institutional resources, preparedness systems, and local conditions may have influenced the results, suggesting the need for broader investigations involving other school divisions and longer-term assessments of disaster management programs.

Compliance with ethical standards

The study was conducted in accordance with established ethical principles in educational research. Participants were adequately informed about the purpose and procedures of the study prior to their involvement. Voluntary participation, informed consent, confidentiality, and anonymity were upheld throughout the research process. Participants were given the freedom to decline participation, skip questions, or withdraw from the study at any time. All information collected was treated with strict confidentiality and used solely for academic and research purposes. Ethical standards of honesty, accuracy, and integrity were maintained throughout the data collection, analysis, and reporting of findings.

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