Disaster Awareness and Disaster Risk Reduction and Management (Drrm) Capacities of Residents in a Municipality in Bukidnon

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ABSTRACT

This study assessed the levels of Disaster Awareness and Disaster Risk Reduction and Management (DRRM) capacities of residents in Barangay Kisolon, Sumilao, Bukidnon. Guided by Twigg's Disaster Resilience Framework and Rogers' Protection Motivation Theory, the study evaluated four dimensions of disaster awareness—types and nature of disasters, exposure and vulnerability, disaster hazards, and emergency support systems—and four dimensions of DRRM capacities—mitigation, preparedness, response, and recovery. Using a descriptive quantitative research design, data were collected from 125 residents through a validated questionnaire. Results revealed high awareness of disaster types (M = 3.556) and hazards (M = 3.504), while awareness of exposure and vulnerability was moderately high (M = 3.324). DRRM capacities were frequently practiced, with recovery rated highest (M = 3.462), followed by preparedness (M = 3.342). Spearman's rho analysis showed significant positive correlations between disaster awareness and DRRM capacities ($p < .001$). These findings affirm that higher awareness strengthens DRRM capacities at the community level. Strengthened community-based training, broader information dissemination, and improved household-level preparedness are recommended to enhance resilience.

Keywords: Disaster Awareness, DRRM Capacities, Community Resilience, Risk Reduction Practices

INTRODUCTION

The Philippines is widely recognized as one of the most disaster-prone countries in the world due to its geographical location along the Pacific Ring of Fire and within the typhoon belt, exposing communities to recurrent earthquakes, typhoons, floods, landslides, and other hazards (UNDRR, 2019; Ritchie et al., 2020). However, disaster impacts are not determined by hazards alone but by the interaction between exposure, vulnerability, and community coping capacities (Chen, 2012; Cutter et al., 2010). At the local level, barangays remain the frontline of disaster risk reduction and management (DRRM), making household and community preparedness critical to minimizing disaster losses.

In the Philippines, Republic Act No. 10121 institutionalized a proactive and community-based DRRM framework that emphasizes disaster prevention and mitigation, preparedness, response, and recovery. Despite the existence of this policy framework, empirical evidence suggests that local DRRM implementation remains uneven, particularly in rural barangays where access to resources, information, and capacity-building activities is often limited (Dariagan et al., 2021; Jumiyate et al., 2024). Recent studies also indicate that while communities may demonstrate high levels of hazard awareness, this does not always translate into sustained preparedness and risk-reduction behaviors (Ho et al., 2022; Hu et al., 2024).

This gap between disaster awareness and actual DRRM capacities highlights the need for localized empirical assessments. While several studies have examined disaster preparedness among urban populations and students (Patel et al., 2023; Hargono et al., 2023), limited empirical work focuses on rural barangays in Bukidnon, particularly on how awareness relates to concrete DRRM capacities across the four DRRM phases. Barangay Kisolon in Sumilao, Bukidnon, is exposed to flooding, landslides, fires, and vehicular accidents, making it an appropriate site for examining community-level DRRM dynamics.

This study is grounded in Twigg's Disaster Resilience Framework and Rogers' Protection Motivation Theory

(PMT), which together explain how disaster awareness influences protective behavior and community capacities. Understanding this relationship is significant for strengthening barangay DRRM planning, improving community-based training programs, and informing local government interventions consistent with RA 10121 and the Sendai Framework for Disaster Risk Reduction.

Specifically, this study aims to: describe the demographic profile of the residents of Barangay Kisolon; determine their level of disaster awareness in terms of types and nature of disasters, exposure and vulnerability, disaster hazards, and emergency support systems; assess their DRRM capacities in terms of prevention and mitigation, preparedness, response, and recovery; and determine the relationship between disaster awareness and DRRM capacities.

This study focused on residents of Barangay Kisolon, Sumilao, Bukidnon, and examined disaster awareness and DRRM capacities using a descriptive quantitative design. The findings are intended to inform barangay-level DRRM planning and community-based interventions.

Research Questions

This study aims to evaluate the disaster awareness and DRRM capacities of the residents of Barangay Kisolon, Sumilao, Bukidnon. Specifically, this study sought to answer the following questions:

1. What is the demographic profile of the respondents in terms of the following:

1.1 age,

1.2 sex,

1.3 educational attainment, and

1.4 topography?

2. What is the level of awareness of the residents of Barangay Kisolon in terms of;

2.1 types and nature of disaster,

2.2 exposure and vulnerability,

2.3 disaster hazards, and

2.4 emergency support system?

3. What is the level of DRRM capacities of the residents of Barangay Kisolon during and after the disaster in terms of;

3.1 prevention and mitigation,

3.2 preparedness

3.3 response, and

3.4 recovery and rehabilitation?

4. What is the significant relationship between disaster awareness and DRRM capacities of the residents of Barangay Kisolon?

5. Based on the findings, what can be drawn to improve the DRRM capacities of the residents in Barangay Kisolon?

LITERATURE REVIEW

Disaster Risk Reduction Theory

Disaster Risk Reduction Theory, as articulated by Twigg (2015), emphasizes that disaster resilience is built through strengthened governance, risk assessment, knowledge and education, preparedness, and social capacities at the community level. The theory emphasizes that awareness is a fundamental component of resilience, as informed individuals and households are more likely to engage in risk-reduction behaviors, such as preparedness planning, participation in drills, and adoption of mitigation measures. In the context of this study, Twigg's framework explains how residents' awareness of disaster types, hazards, exposure, and emergency support systems can translate into concrete DRRM capacities in prevention and mitigation, preparedness, response, and recovery. Communities with stronger awareness and social capital are more likely to demonstrate adaptive capacities across the DRRM cycle (Shaw & Rahib, 2020; Mei et al., 2020).

Protection Motivation Theory

Protection Motivation Theory (PMT) developed by Rogers (1975) explains how individuals adopt protective behaviors based on four cognitive appraisals: perceived severity, perceived vulnerability, response efficacy, and self-efficacy. In disaster contexts, individuals who perceive disasters as severe and recognize their personal vulnerability are more motivated to prepare, evacuate, seek information, and comply with safety measures (Hu et al., 2024; Ho et al., 2022). The concepts of response efficacy and self-efficacy explain why individuals engage in preparedness actions such as preparing emergency kits, participating in drills, and assisting others during emergencies. In this study, PMT provides a behavioral explanation for why higher disaster awareness is expected to lead to stronger DRRM capacities across mitigation, preparedness, response, and recovery phases.

Together, Twigg's Disaster Resilience Framework and PMT provide complementary explanations for the relationship between disaster awareness and DRRM capacities. Twigg's framework situates awareness within broader community resilience structures, while PMT explains how awareness is cognitively processed into protective behavior at the individual and household levels. These theoretical lenses directly support the study's objective of examining whether higher disaster awareness is significantly associated with stronger DRRM capacities among barangay residents.

RESEARCH METHODOLOGY

Research Design

This study employed a descriptive quantitative research design, which is appropriate for determining the existing levels of disaster awareness and DRRM capacities and examining relationships between variables in a natural community setting (Yoro et al., 2023). Unlike experimental or qualitative designs, this approach allows for systematic measurement of community-wide patterns and statistical analysis of relationships between awareness and DRRM capacities without manipulating variables.

Respondents/Participants

A total of 125 residents of Barangay Kisolon participated in the study and were selected using purposive sampling. This technique was employed to ensure that participants were long-term residents who had prior exposure to disasters and participation in community DRRM activities, making them information-rich cases (Jumiyate et al., 2024). While purposive sampling limits the generalizability of findings to other barangays, it enhances the contextual relevance and depth of community-level DRRM assessment.

Instrument of the Study

The questionnaire was adapted from validated DRRM tools (Talplacido et al., 2022) and consisted of sections on demographic profile, disaster awareness, and DRRM capacities. The instrument underwent content validation by experts in DRRM and public administration. Pilot testing yielded acceptable internal consistency, with reliability coefficients (Cronbach's alpha) exceeding the minimum acceptable threshold of 0.70 for all subscales, indicating satisfactory reliability.

Procedure

Data collection followed a systematic sequence. First, permission was secured from institutional authorities and the Punong Barangay. Second, the questionnaire underwent expert validation and pilot testing. Third, informed consent was obtained from all participants prior to survey administration. Finally, accomplished questionnaires were retrieved, coded, and prepared for statistical analysis.

Data Analysis

Descriptive statistics (mean and standard deviation) were used to determine levels of disaster awareness and DRRM capacities. Spearman's rho was employed to examine relationships between variables because the data were ordinal and did not meet the assumptions of normality required for parametric correlation tests (Diakakis et al., 2020).

Ethical Considerations

Ethical principles of voluntary participation, informed consent, confidentiality, and anonymity were strictly observed. The study protocol was reviewed and approved by the institutional research committee prior to data collection, ensuring compliance with ethical research standards (Hoffmann et al., 2020).

RESULTS

This section presents the findings according to the study's research questions.

This part is composed of the table for the demographic profile of the respondents in the study. Table 4 presents essential information on the respondents' age, sex, educational attainment, and topography to describe their demographic characteristics.

Table 4 Demographic Characteristics of Respondents

	Frequency	Percentage
Age Group		
1. Youth (15-29)	44	35.2
2. Adulthood (30-59)	71	56.8
3. Elderly (>59)	10	8.0
Total	125	100.0
Sex		
1. Male	45	36.0
2. Female	80	64.0
Total	125	100.0
Educational Attainment		
1. Post Graduate	4	3.2
2. College Graduate	11	8.8
3. College Level	19	15.2
4. High School Graduate	42	33.6
5. High School Level	35	28.0
6. Elementary Graduate	6	4.8
7. Elementary Level	8	6.4
Total	125	100.0
Topography		
1. Creek Side	10	8.0
2. Riverside	12	9.6

3. Flat Land	103	82.4
Total	125	100.0

This part is composed of the table for the level of awareness on the types and nature of disasters of the respondents. Table 5 provides essential information describing the respondents' understanding of various natural and man-made disasters.

Table 5 Descriptive Statistics for the level of awareness on the types and nature of disasters

Types and Nature of Disaster	N	Mean	SD	Description
1. I am aware that natural disasters are events that have the potential to cause loss of life or property.	125	3.712	.4721	Strongly agree
2. I am aware that man-made disasters occur intentionally through negligence or a failure of machinery, which causes suffering for humans and harm to the environment.	125	3.536	.5469	Strongly agree
3. I am aware that earthquakes happen in a short duration and usually affect regions near fault lines.	125	3.632	.5164	Strongly agree
4. I am aware that drought develops slowly and affects large regions.	125	3.392	.5220	Agree
5. I am aware that landslides occur when soil and rocks are loosened by heavy rain and earthquakes.	125	3.568	.5727	Strongly agree
6. I am aware that floods are an overflow of water usually caused by heavy rainfall or tropical cyclones.	125	3.568	.5133	Strongly agree
7. I am aware that tornadoes develop from heavy thunderstorms, especially when warm air collides with cold air.	125	3.632	.5318	Strongly agree
8. I am aware that fires occur when fuel, heat, and oxygen combine.	125	3.504	.5626	Strongly agree
9. I am aware that vehicular accidents occur due to speeding, getting distracted, being intoxicated, and/or ignoring traffic signals.	125	3.560	.5448	Strongly agree
10. I am aware that disease outbreaks may develop because of disease transmission from animals to humans.	125	3.456	.5889	Strongly agree
Overall Mean	125	3.5560	.35250	Strongly agree

This part is composed of the table for the level of awareness on exposure and vulnerability of the respondents. Table 6 presents essential information describing the respondents' awareness of factors influencing disaster exposure and vulnerability.

Table 6 Descriptive Statistics for the level of awareness on exposure and vulnerability

Exposure and Vulnerability	N	Mean	SD	Description
1. I am aware that my locality is prone to one or more natural or manmade hazards/disasters.	125	3.344	.7736	Agree
2. I am aware that the area of my community may have an impact on our exposure to disasters.	125	3.216	.7469	Agree
3. I am aware that children and the elderly are more vulnerable to disasters.	125	3.240	.6648	Agree
4. I am aware that poverty increases vulnerability to disaster.	125	3.320	.6299	Agree
5. I am aware that education can lessen the	125	3.448	.6151	Agree

exposure and vulnerability to disaster				
6. I am aware that my house is well-designed and will withstand a disaster event (such as an earthquake, tornado, etc.).	125	3.376	.6558	Agree
Overall Mean	125	3.3240	.47862	Agree

This part is composed of the table for the level of awareness on disaster hazards of the respondents. Table 7 contains essential information describing the respondents' awareness of hazards that may cause damage to life, property, and health.

Table 7 Descriptive Statistics for the level of awareness on disaster hazards

Disaster Hazards	N	Mean	SD	Description
1. I am aware that floods, storm surges, and tornadoes may damage and destroy power supplies and agricultural land.	125	3.544	.5313	Strongly agree
2. I am aware that factory explosions or chemical spills can cause loss of life and environmental damage.	125	3.400	.5536	Agree
3. I am aware that smoking, overloaded electrical wires, overheated electrical appliances, unattended lighted candles, cooking, and sparks can create fire.	125	3.576	.5574	Strongly agree
4. I am aware that over speeding, distractions, intoxication, and/or ignoring traffic signals can cause vehicular accidents.	125	3.560	.5298	Strongly agree
5. I am aware that bacteria, viruses, and unhealthy lifestyles can pose a threat to human health.	125	3.400	.6350	Agree
Overall Mean	125	3.5040	.34029	Strongly agree

This part is composed of the table for the level of awareness of emergency support systems of the respondents. Table 8 presents essential information describing the respondents' awareness of evacuation centers, emergency resources, and community support mechanisms.

Table 8 Descriptive Statistics for the level of awareness of the emergency support systems

Emergency Support System	N	Mean	SD	Description
1. I am aware of my community's evacuation center	125	3.544	.5159	Strongly agree
2. I am aware that emergency kits are important during disasters. (i.e., Water supply, Food supply, Two-way radio, flashlights or light sources, Vehicles for evacuation, First-aid kits, hygiene and sanitation products, Hand tools, Cell phones with long-lasting batteries, and power banks, medicines).	125	3.584	.5563	Strongly agree
3. I am aware of which government office/officer needs to be contacted after a disaster.	125	3.392	.5665	Agree
4. I am aware of the list of emergency hotlines to contact during a disaster.	125	3.440	.5594	Agree

5. I am aware that there are rescue teams in our community.	125	3.568	.4973	Strongly agree
6. I am aware that preparing an evacuation plan with my family is important.	125	3.472	.6167	Agree
7. am aware that teaching family members what to do before, during, and after a disaster is important.	125	3.560	.4984	Strongly agree
8. I am aware that there are community activities like Oplan Dalus, earthquake drills, fire drills, and seminars in my community.	125	3.416	.6861	Agree
Overall Mean	125	3.422	0.1033	Agree

This part is composed of the table for the level of Disaster Risk Reduction and Management (DRRM) capacities in terms of prevention and mitigation. Table 9 provides essential information describing the respondents' practices related to reducing disaster risks before hazards occur.

Table 9. Descriptive Statistics for Level of DRRM Capacities-Prevention and Mitigation

Emergency Support System	N	Mean	SD	Description
1. I am aware of my community's evacuation center	125	3.544	.5159	Strongly agree
2. I am aware that emergency kits are important during disasters. (i.e., Water supply, Food supply, Two-way radio, flashlights or light sources, Vehicles for evacuation, First-aid kits, hygiene and sanitation products, Hand tools, Cell phones with long-lasting batteries, and power banks, medicines).	125	3.584	.5563	Strongly agree
3. I am aware of which government office/officer needs to be contacted after a disaster.	125	3.392	.5665	Agree
4. I am aware of the list of emergency hotlines to contact during a disaster.	125	3.440	.5594	Agree
5. I am aware that there are rescue teams in our community.	125	3.568	.4973	Strongly agree
6. I am aware that preparing an evacuation plan with my family is important.	125	3.472	.6167	Agree
7. I am aware that teaching family members what to do before, during, and after a disaster is important.	125	3.560	.4984	Strongly agree
8. I am aware that there are community activities like oplan dalus, earthquake drills, fire drills, and seminars in my community.	125	3.416	.6861	Agree
Overall Mean	125	3.422	0.1033	Agree

This part is composed of the table for the level of Disaster Risk Reduction and Management (DRRM) capacities in terms of preparedness. Table 10 presents essential information describing the respondents' readiness and planning activities prior to disaster events.

Table 10. Descriptive Statistics for Level of DRRM Capacities-Preparedness

Preparedness (Before)	N	Mean	SD	Description
1. My family had experienced a natural disaster.	125	3.112	.9177	Often

2. Another family member can carry out the emergency plan in my absence	125	3.248	.6679	Often
3. I and/or a family member have training on First Aid or BLS-CPR.	125	3.112	.7643	Often
4. There is a disaster or emergency plan, laws, and policies in place for the community.	125	3.224	.6459	Often
5. I have a phone number for disasters outside our province.	125	3.168	.7904	Often
6. I would want to receive disaster management information or emergencies through effective channels like Newspapers, Public Meetings, Television, and Radio.	125	3.512	.6172	Often
7. I would want to receive disaster management information or emergency through effective channels like Family/ Friends, cell phones, E-mails, and Internet/ Social Media.	125	3.568	.5585	Always
8. Below are assisted by the community in developing a disaster plan. • National Government	125	3.536	.5756	Always
• Local Government Unit	125	3.536	.5895	Often
9. Local Disaster Risk Reduction and Management Office.	125	3.456	.6660	Often
10. Non-governmental organization or voluntary organization.	125	3.296	.8134	Often
Overall Mean	125	3.3425	.41742	Often

This part is composed of the table for the level of Disaster Risk Reduction and Management (DRRM) capacities in terms of response. Table 11 contains essential information describing the respondents' ability to act and provide assistance during disaster situations.

Table 11 Descriptive Statistics for Level of DRRM Capacities-Response

Response (During)	N	Mean	SD	Description
1. I am willing to accommodate displaced people who need shelter.	125	3.352	.5855	Often
2. I can provide food and water to my neighbor during a disaster.	125	3.224	.6204	Often
3. I can provide basic first aid.	125	3.352	.6125	Often
4. I can volunteer to help with the search and rescue team if they are in need.	125	3.352	.6869	Often
5. I can contact an elected official in cases of emergency.	125	3.416	.5845	Often
6. I can help with the evacuation of my neighbor.	125	3.288	.6198	Often
Overall Mean	125	3.3307	.42227	Often

This part is composed of the table for the level of Disaster Risk Reduction and Management (DRRM) capacities in terms of recovery and rehabilitation. Table 12 presents essential information describing the respondents' post-disaster coping, recovery, and rehabilitation practices.

Table 12 Descriptive Statistics for Level of DRRM Capabilities-Recovery and Rehabilitation

Recovery (After)	N	Mean	SD	Description

1. I make sure that all my family members are safe and present.	125	3.584	.5982	Often
2. I have funds for temporary repair for the post-disaster phase.	125	3.288	.6935	Often
3. I need assistance with repairs in our house.	125	3.424	.6870	Often
4. I listen to the radio or television after the disaster for emergency information.	125	3.520	.5902	Always
5. I make sure to identify hazards after a disaster.	125	3.496	.5768	Often
Overall Mean	125	3.4624	.43878	Often

This part is composed of the table for the significant relationship between disaster awareness and DRRM capacities. Table 13 provides essential information describing the correlation between the levels of disaster awareness and the respondents' DRRM capacities.

Table 13 Spearman's rho test of the significant relationship between the level of awareness of disaster and the level of DRRM capacities.

Level Of Awareness in Disaster	Level of DRRM Capacities	P-value	Interpretation
1. Types and nature of disaster	.360**	<.001	Significant
2. Exposure and vulnerability	.424**	<.001	Significant
3. Disaster hazards	.357**	<.001	Significant
4. Emergency support system	.378**	<.001	Significant

*Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

The discussion of respondents' profiles and disaster awareness from tables 4 to 8 indicates that the barangay possesses a generally strong cognitive foundation for disaster risk reduction and management (DRRM). Table 4 shows that most respondents were adults and high school graduates, a demographic group typically responsible for household decision-making, which supports existing literature linking age and education to disaster perception and preparedness (Cutter et al., 2010). The predominance of residents in flatland areas further explains heightened exposure to hazards such as flooding, consistent with UNDRR (2019). High levels of disaster awareness are evident in Tables 5 and 7, where respondents demonstrated strong recognition of both natural and human-induced hazards (M = 3.556 and M = 3.504), reflecting effective information dissemination and the influence of repeated hazard exposure (Mei et al., 2020; Bhowmik et al., 2017). Meanwhile, Table 6 shows moderately high awareness of social vulnerability factors (M = 3.324), though comparatively lower awareness of structural vulnerabilities points to technical knowledge gaps common in community settings (Leal Filho et al., 2018). Table 8 further reveals strong awareness of evacuation centers and emergency kits (M = 3.422), affirming RA 10121's emphasis on community-based preparedness, while limited knowledge of emergency hotlines highlights persistent communication gaps (Kalogiannidis et al., 2022).

Across the DRRM capacity phases of mitigation, preparedness, and response from tables 9 to 11, the barangay demonstrates functional but uneven capacity development. Table 9 shows that mitigation practices (M = 3.206) are largely focused on low-cost, household-level actions such as securing breakables and clearing hazardous vegetation, aligning with findings by Mei et al. (2020), while structural mitigation remains limited due to socioeconomic constraints (Cutter et al., 2010). Preparedness capacities in Table 10 (M = 3.342) are reflected in active information-seeking behaviors through multiple channels, consistent with RA 10121's risk communication framework. However, limited first-aid training underscores a recurring gap in technical preparedness skills noted by Jumiyate et al. (2024). Table 11 highlights relatively strong response capacities (M = 3.331), particularly in residents' willingness to help neighbors, coordinate with officials, and perform basic

response actions—an indicator of strong social capital and community cohesion (Cui, 2016; Shaw & Rahib, 2020). Despite these strengths, deficiencies in institutional communication remain a constraint to optimal response effectiveness (Kalogiannidis et al., 2022).

Recovery and the integrative relationship between awareness and capacity are particularly notable in Tables 12 and 13. Table 12 shows that recovery capacity (M = 3.462) is the strongest among the DRRM phases, underscoring the role of family-centered coping mechanisms and communal support systems characteristic of Filipino communities (Matamanda et al., 2017). Nonetheless, financial limitations affecting post-disaster repair reveal persistent socioeconomic vulnerabilities consistent with Cutter et al. (2010), while reliance on radio and television affirms the continued importance of traditional media during recovery periods (Hu et al., 2024). Finally, Table 13 demonstrates significant correlations between disaster awareness and DRRM capacities, empirically validating theoretical frameworks that link knowledge, attitudes, and adaptive behavior, including Protection Motivation Theory (Rogers, 1997) and the Theory of Planned Behavior (Ajzen, 1991). These findings strongly support Twigg's (2009) resilience framework, confirming that disaster awareness is a critical driver of community resilience and effective DRRM capacity at the barangay level.

CONCLUSION

Residents of Barangay Kisolon exhibit consistently high levels of disaster awareness, particularly regarding hazard characteristics, community vulnerabilities, and emergency support mechanisms, which aligns with evidence that hazard-exposed communities tend to internalize risk information (Mei et al., 2020; Hu et al., 2024). These awareness patterns translate into frequent DRRM practices across mitigation, preparedness, response, and recovery—reflecting the influence of risk perception on protective behavior (Rogers, 1997; Ajzen, 1991). The study therefore confirms that heightened awareness serves as a foundational factor driving adaptive and proactive DRRM actions, consistent with Twigg's (2009) resilience framework.

The significant positive correlations between disaster awareness dimensions and DRRM capacities affirm theoretical claims that information, perception, and self-efficacy collectively enhance disaster readiness (Chen, 2012; Shaw & Rahib, 2020). These findings highlight the need for sustained risk communication, community-based DRRM training, and household-level planning to strengthen local resilience, which is also recommended in national policy frameworks such as RA 10121 (2010). Addressing gaps in structural mitigation knowledge, emergency hotline awareness, and first-aid competency can further elevate preparedness and accelerate community recovery following hazard impacts (Cutter et al., 2010; Kalogiannidis et al., 2022).

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