



PREPAREDNESS, CHALLENGES, AND RESILIENCE IN FLOOD-PRONE AREAS OF CUARTERO

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Abstract

This survey-correlational study examined the preparedness, challenges, and resiliency of 80 household respondents affected by recurrent flooding in the Municipality of Cuartero, Capiz, Philippines. Researcher-made, Likert-scaled questionnaires measured the three constructs, and data were analyzed using frequency counts, percentages, means, standard deviations, one-way Analysis of Variance (ANOVA), and Pearson r , with alpha set at 0.05. Results showed a very high level of preparedness ($M = 4.89$, $SD = 0.26$), a moderate-to-average level of challenges ($M = 2.14$, $SD = 1.10$), and a very high level of resiliency ($M = 4.81$, $SD = 0.54$) among households. No significant differences were found across groups in preparedness, challenges, or resiliency. A significant positive relationship was found between preparedness and resiliency, while challenges were not significantly related to either preparedness or resiliency. The findings suggest that sustained information campaigns by disaster-risk-reduction agencies and lived experience with evacuation strengthen household preparedness, and that this preparedness — rather than the presence or absence of challenges — is the stronger driver of resiliency in flood-prone Cuartero.

Keywords: *disaster preparedness; flood-prone areas; resiliency; disaster risk reduction and management; household survey; Cuartero, Capiz; Philippines*

I. INTRODUCTION

The Philippines experiences an average of 20 to 25 tropical cyclones entering its area of responsibility every year, making flooding a recurring hazard for many communities, particularly those situated along river floodplains and low-lying coastal areas. Tropical Depression Agaton, for instance, caused flooding in 156 barangays across one component city and 16 municipalities of CapiZ province, displacing an initial 1,781 families (8,709 individuals) into 28 evacuation centers (Philippine News Agency, cited in the original manuscript). The Municipality of Cuartero — a 4th-class, partially urban municipality with 22 barangays and a 2007 population of 25,306 — lies within the second congressional district of CapiZ and is regularly affected when floodwaters move from Dumarao toward Cuartero, Dimalag, and Sigma.

Disaster preparedness refers to measures undertaken in advance by governments, organizations, communities, or individuals to better respond to and cope with the aftermath of a disaster. In CapiZ, government and private-sector initiatives such as the "*Pagpakigbuylog sa Pagpangaman*" project — a partnership between the Office of Civil Defense (OCD) Western Visayas and the PHAP Cares Foundation — have piloted community-level disaster-risk-reduction capacity building in Sapián and Pontevedra, in line with Republic Act 10121, the Philippine Disaster Risk Reduction and Management Act of 2010.

Locally, Cuartero's top five community concerns have been identified as garbage collection and sanitation, tricycle-fare/driver-conduct issues, traffic congestion and parking, street lighting, and sidewalk vending — alongside a reported local resiliency score of 20%, weighted on indicators such as emergency infrastructure, utilities, employed population, and sanitary systems (DTI Cities and Municipalities Competitiveness Index).

The researcher frames this inquiry around a personal, locally grounded premise — captured in the phrase "*Laging Handa sa anumang sakuna*" ("Always ready for any calamity") — reflecting how residents of Cuartero and its neighboring, similarly flood-prone barangays orient themselves toward recurring calamity.

Conceptual Framework

Preparedness and challenges served as the independent variables, while resiliency of the people of Cuartero, CapiZ served as the dependent variable, as shown below.

Independent Variables → Dependent Variable

Preparedness + Challenges → Resiliency of the People of Cuartero, CapiZ

Review of Related Literature

Preparedness in Flood-Prone Areas

Several highly urbanized areas in Metro Manila are chronically flood-affected, including Parañaque (Sucat), Manila, Cavite, Mandaluyong, Makati, Marikina, and the CaMaNaVa cluster (Caloocan, Malabon, Navotas, Valenzuela), each contending with a combination of low elevation, aging drainage infrastructure, and river-basin geography. In the Bicol Region, Camarines Sur and Sorsogon have recorded typhoon-related fatalities and mass displacement in recent years, while Agusan del Sur and Surigao del Sur in Mindanao remain similarly flood-vulnerable due to river-basin dynamics.

Case accounts from Typhoon Vamco (2020) in Kasiglahan Village, Montalban, Rizal, and in Biñan, Laguna (near Laguna de Bay) illustrate how resettlement communities and lakeside communities experience repeated, worsening flood events — Vamco's flood coverage in Kasiglahan Village was roughly double that of Ondoy (2009). Ondoy (Ketsana) and Pepeng (Parma) in 2009 affected over 9.3 million people, caused nearly 1,000 deaths, and caused damage equivalent to about 2.7% of GDP in the affected regions (World Bank Post-Disaster Needs Assessment, cited in the original manuscript). In response, the Philippine government, supported by the World Bank, adopted the Metro Manila Flood Management Master Plan (approved by the NEDA Board on September 4, 2012), which combines structural measures (dams, river improvements, floodways) with non-structural measures (land-use regulation, watershed conservation, reforestation) and early-warning system upgrades.

At the national policy level, the Philippine Disaster Risk Reduction and Management Act of 2010 (RA 10121) organizes DRRM around four priority areas — prevention and mitigation, preparedness, response, and rehabilitation/recovery. Between 1997 and 2007, 84 tropical cyclones entered the Philippine Area of Responsibility, resulting in 13,155 casualties and over 51 million affected families, with economic losses estimated at P158.242 billion (Department of the Interior and Local Government, cited in the original manuscript). Globally, disaster risk reduction is recognized by the World Meteorological Organization and UNESCO as integral to sustainable development and to Education for Disaster Risk Reduction (ESD-DRR), consistent with the Hyogo Framework for Action 2005–2015.

At the local level, the OCD–PHAP Cares partnership in Sapián, Pontevedra, and Sigma (Capiz) illustrates how national policy translates into community-level capacity building — improving health service access, raising climate change awareness, and sustaining preparedness efforts among the most disaster-vulnerable Municipal DRRM Councils in the region.

Challenges in Flood-Prone Areas

Flooding damages roads, bridges, and paths, impeding evacuation and access to safe areas; it destroys crops and farms, contributing to food shortages, and renders houses and buildings uninhabitable. Beyond material loss, floods carry significant social and psychological costs — displacement, loss of property and livelihood, and disruption of business and social life generate sustained stress, which can produce lasting psychological impacts, particularly on children. Immediate impacts include loss of life, property damage, crop and livestock losses, and an elevated risk of waterborne disease, compounded by long-term disruption to essential public services.

In Capiz specifically, Typhoon Quinta (December 2020) triggered a province-wide state of calamity after 151 barangays and 14,577 families (54,962 persons) were affected; 9 of the affected barangays were in Cuartero. The typhoon claimed two lives, damaged over 16,000 hectares of rice land (an estimated ₱16.53 million in losses), and caused further losses to corn, vegetable, and fisheries production.

Resiliency in Flood-Prone Areas

Recommended flood-resilient measures for households include elevating utilities (furnace, water heater, air conditioning units), installing check valves in sewer traps, constructing interior barriers against low-level floodwater, and waterproofing basement walls. At the community/town level, resilience-building strategies include drainage-system design, vegetation planting, construction of detention basins, and sustained public education.



Statement of the Problem

This study sought to determine the preparedness, challenges, and resiliency of households in flood-prone areas of Cuartero, Capiz. Specifically, it answered the following questions:

1. What is the level of preparedness in flood-prone areas of Cuartero?
2. What is the level of challenges in flood-prone areas of Cuartero?
3. What is the level of resiliency in flood-prone areas of Cuartero?
4. Is there a significant difference in the level of preparedness across flood-prone areas of Cuartero?
5. Is there a significant difference in the level of challenges across flood-prone areas of Cuartero?
6. Is there a significant relationship among preparedness, challenges, and resiliency in flood-prone areas of Cuartero?

Hypotheses

H1o: There is no significant difference in the level of preparedness across flood-prone areas of Cuartero.

H2o: There is no significant difference in the level of challenges across flood-prone areas of Cuartero.

H3o: There is no significant relationship among preparedness, challenges, and resiliency in flood-prone areas of Cuartero.

Significance of the Study

The findings of this study are intended to benefit: the general public, by raising awareness and improving readiness for calamities; the academe, by contributing to the body of knowledge on disaster preparedness education; the Local Government Unit, by informing collaborative planning with disaster-focused agencies; the Disaster Risk Reduction and Management Council (DRRMC), by highlighting community needs during calamities; and future researchers, who may replicate this study in other flood-prone areas.

Scope and Delimitation

This survey-correlational study was delimited to the relationship between preparedness, challenges, and resiliency in flood-prone areas of the Municipality of Cuartero, Capiz. Using purposive sampling, 80 households affected by flooding across eight barangay clusters (Poblacion Ilawod, Poblacion Takas, Malagab-i, Nagba, Angub, Bito-on Ilawod, Poblacion Ilaya, and Bito-on Ilaya) served as respondents. A 30-item researcher-made survey questionnaire (covering preparedness and resiliency, with a parallel instrument for challenges) was pilot-tested on 10 households in Barangay Tuburan, Pototan, Iloilo — a comparable flood-prone community not included among the study's actual participants — and subjected to face and content validation by a panel of experts prior to reliability testing.



II. METHODS

Research Design

This study employed a survey-correlational research design. Descriptive (survey) research describes what exists and helps surface new facts and meanings by observing, describing, and documenting a situation as it naturally occurs (Francisco et al., 2016, cited in the original manuscript). Correlational research, in turn, determines the extent of a relationship between two or more variables using statistical data. Together, the survey-correlational design was deemed appropriate because the study both described the levels of preparedness, challenges, and resiliency among respondents and examined the relationships among these variables. Preparedness and challenges were the independent variables; resiliency was the dependent variable.

Participants

Participants were 80 household respondents affected by flooding in the Municipality of Cuartero, Capiz, selected through purposive sampling across eight barangay clusters, as summarized in Table 1.

Table 1. Distribution of Household Respondents

Location	Household Number Range
Poblacion Ilawod	1–11
Poblacion Takas	12–21
Malagab-i	22–33
Nagba	34–46
Angub	47–54
Bito-on Ilawod	55–63
Poblacion Ilaya	64–73
Bito-on Ilaya	74–83

Instrumentation

A 30-item researcher-developed survey measured preparedness, challenges, and resilience on a 5-point Likert scale (5 = Strongly Agree, 4 = Somewhat Agree, 3 = Disagree, 2 = Somewhat Disagree, 1 = Strongly Disagree). The instrument underwent face and content validation by a panel of subject-matter experts and a question-construction specialist to screen for leading, confusing, or double-barreled items. It was then pilot-tested on 10 respondents from Barangay Tuburan, Pototan, Iloilo — a comparable flood-prone community excluded from the actual study sample — after which internal consistency was assessed using Cronbach's alpha, yielding a reliability coefficient of 0.872, considered adequate per Garret (1972, cited in the original manuscript).



Data Gathering Procedure

Following instrument validation and pilot testing, the researcher obtained permission from the Office of the Dean of the Graduate School to conduct the study. After obtaining respondent consent, the researcher personally distributed and administered the questionnaire to the 80 household respondents, allowing sufficient time for reflection before submission. Responses were consolidated, tallied, and analyzed using the Statistical Package for the Social Sciences (SPSS), version 17.0.

Statistical Treatment

Frequency counts and percentages, means, and standard deviations were used for descriptive analysis. One-way Analysis of Variance (ANOVA) was used to test for significant differences in preparedness and challenges, and Pearson r was used to test for significant relationships among preparedness, challenges, and resiliency. All inferential tests were set at an alpha level of 0.05.

III. RESULTS

Level of Preparedness

Table 2. Mean and Standard Deviation of Preparedness on Flood-Prone Areas of Cuartero

Variable	Mean	Description	SD
Preparedness	4.89	Very High	0.26

Households in Cuartero reported a Very High overall level of preparedness ($M = 4.89$, $SD = 0.26$).

Level of Challenges

Table 3. Mean and Standard Deviation of Challenges in Flood-Prone Areas of Cuartero

Variable	Mean	Description	SD
Challenges	2.14	Average	1.10

Overall, households reported an Average (moderate) level of challenges ($M = 2.14$, $SD = 1.10$).

Level of Resiliency

Table 4. Mean and Standard Deviation of Resiliency on Flood-Prone Areas of Cuartero

Variable	Mean	Description	SD
Resiliency	4.81	Very High	0.54

Households reported a Very High overall level of resiliency ($M = 4.81$, $SD = 0.54$).

Differences in Preparedness, Challenges, and Resiliency

Table 5. Analysis of Variance on the Levels of Preparedness Across Groups ($p > .05$ = Not Significant)

Source of Variation	SS	df	MS	F	Sig.
Between Groups	60.653	7	8.665	1.330	0.248
Within Groups	488.576	75	6.514		
Total	549.229	82			

No significant difference was found in the level of preparedness across the barangay groups, $F(7, 75) = 1.330$, $p = 0.248$ ($p > .05$); H_{01} was therefore not rejected.

Table 6. Analysis of Variance of Challenges Across Groups ($p > .05$ = Not Significant)

Source of Variation	SS	df	MS	F	Sig.
Between Groups	162.772	7	23.253	.165	0.991
Within Groups	10546.854	75	140.611		
Total	10709.627	82			

No significant difference was found in the level of challenges across the barangay groups, $F(7, 75) = .165$, $p = 0.991$ ($p > .05$); H_{02} was therefore not rejected.

Relationship Among Preparedness, Challenges, and Resiliency

Table 7. Pearson r Correlation Coefficients Among Preparedness, Challenges, and Resiliency (*significant at $p < .05$)

Variables	r	Sig.
Preparedness	1.0	0.000*
Challenges	.090	0.419
Resiliency	.245	0.026*

A significant positive relationship was found between preparedness and resiliency ($r = .245$, $p = 0.026$, $p < .05$): higher preparedness was associated with higher resiliency. Challenges were not significantly related to either preparedness or resiliency ($r = .090$, $p = 0.419$, $p > .05$).

IV. DISCUSSION

The Very High level of preparedness observed among Cuartero households ($M = 4.89$, $SD = 0.26$) is consistent with sustained information campaigns conducted by the National/Local Disaster Risk Reduction and Management Councils (NDRRMC/LDRRMC) and with residents' repeated lived experience of evacuation-



center stays during past calamities, which appear to translate into stronger household-level readiness. This finding aligns with Kurata et al.'s study on flood disaster preparedness and mitigation in the Philippines, which integrated Protection Motivation Theory and the Theory of Planned Behavior via Structural Equation Modeling, and with Barquet and Cumiskey (2018), who found that effective risk communication builds the risk awareness that motivates preparedness action. It is further consistent with a household survey in Tabasco, Mexico, where accessible flood-risk maps, shared flood experience within families, early-warning systems, and available shelters all increased the likelihood of household preparedness actions.

The Average (moderate) level of challenges ($M = 2.14$, $SD = 1.10$) suggests that although households in Cuartero contend with real hardships during flood events, they are buffered by government support services, family, and community support systems, which sustain their optimism and determination to persevere. This pattern echoes Petrucci's systematic review of flood-fatality research (2010–2020), which underscores that risk factors and their interrelationships — not the mere presence of a hazard — determine whether a flood event turns fatal, reinforcing the value of the support systems that households in Cuartero report drawing on.

The Very High level of resiliency ($M = 4.81$, $SD = 0.54$) reflects a generally positive household outlook and a clear sense of what to do and whom to approach in the face of calamity. Taken together with the ANOVA results, the absence of significant differences in preparedness and challenges across barangay groups indicates that readiness for flood safety is prioritized comparably across Cuartero's flood-prone areas, rather than concentrated in a few localities.

The significant positive relationship between preparedness and resiliency, together with the non-significant relationship between challenges and either preparedness or resiliency, suggests that it is what households do in advance — not the severity of the challenges they subsequently face — that most strongly shapes their capacity to adapt and recover.

Conclusions

Households in flood-prone Cuartero are highly prepared for flooding, an outcome attributable to sustained information campaigns by disaster-risk agencies and prior lived experience of evacuation. They report only moderate/average challenges, buffered by government, family, and community support that sustains their determination to persevere. They exhibit very high resiliency, reflecting a positive outlook and clarity about what to do during calamities. No significant differences in preparedness, challenges, or resiliency were found across barangay groups, indicating comparable attention to flood safety across Cuartero. Preparedness and resiliency are significantly and positively related to each other, while challenges are not significantly related to either.

Recommendations

1. Sustain and regularly repeat information-dissemination campaigns among flood-affected households to keep residents fully aware of appropriate actions during calamities.
2. Conduct a thorough identification of the specific challenges experienced by households, together with proposed remedies for each.



3. Maintain and enhance household resiliency in Cuartero's flood-prone areas through extension programs and activities addressing the challenges encountered during flood events, including the introduction of floating/flotation devices for the safety of lives and property.



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