Determinants and Moderators of Community- level Disaster Preparedness in Silang, Cavite, Philippines

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Abstract *- This study investigated the relationships between disaster risk perception levels, risk attitude, and disaster frequency as determinants of disaster preparedness among selected residents in the municipality of Silang, Cavite, Philippines. It also examined whether demographic factors, such as age, gender, educational attainment, occupation, income, marital status, and religion, moderate these relationships. Findings revealed an above average perception of disaster risks, as measured in areas of responsibility, control, acceptability, and response components. Risk attitude was generally good, as respondents valued family presence as the most important motivating factor to avoid disaster risks. Meanwhile, respondents expressed typhoons as the most frequently experienced disaster, followed by earthquakes, other calamities, and hazards. Disaster preparedness level was remarkably high, exhibited by a high score in the contingency planning component, while low in training. Inferential statistics revealed that disaster risk perception and risk attitude demonstrated moderately positive correlations with disaster preparedness. On the other hand, disaster frequency revealed a weak positive correlation. Meanwhile, no significant differences were observed in disaster preparedness when selected demographic factors were treated as determinants. Instead, they demonstrated both significant positive and negative effects when used as moderating variables (effect modifiers) on the relationships between risk perception, risk attitude, disaster frequency, and preparedness. Overall, the study findings highlight the value of the moderating role of demographic factors in disaster preparedness relationship models. Using both determinants and moderators in developing interventions to enhance disaster preparedness suggests a highly essential strategy for a healthy and disaster-resilient community.*

Keywords: disaster preparedness, disaster risk perception, disaster risk attitude, disaster frequency, demographic factors, determinants, moderators

I. INTRODUCTION

Disasters disrupt communities in several ways, damaging individual properties, infrastructure, and social systems, and can even result in loss of life. As a human community, the physical, mental, emotional, social, and spiritual well-being of its members can be severely affected during disasters. Like a sick patient with signs and symptoms, disruption in the overall functioning of the community can be reflected in the perceptions, attitudes, and behaviors of its residents.

The Philippines ranked first globally by the World Risk Index in terms of risks, vulnerability, and exposure to disasters, together with Indonesia and India (*The World Risk Report*, 2023). Natural hazards from disasters can vary, including typhoons, earthquakes, and volcanic eruptions, among others. The eruption of Taal Volcano and the emergence of the COVID-19 pandemic in 2020 had a severe impact on the provinces of Cavite, Batangas, Laguna, Rizal, and their neighboring areas, as well as the world (Merin et al., 2021; Gonzales, 2020). These highlight the urgent need for strong disaster preparedness at the community level.

Disaster preparedness covers the knowledge and capacities enabling individuals (and communities) to anticipate risks, respond to, and recover from disasters and its related risks. Anchored in the theory of planned behavior model (Najafi et al., 2017), it can be influenced by several psychosocial factors, such as disaster risk perception (including beliefs about responsibility, control, acceptability, and response), disaster risk attitude (referring to the aversion or acceptance of risks), and disaster frequency (the number of disasters experienced). All these factors interact to influence disaster preparedness.

Demographic factors, including age, gender, educational attainment, occupation, marital status, income, and religion, are previously known to affect disaster preparedness. While many studies on disaster preparedness in various community settings exist worldwide, local studies investigating the moderating roles of demographic factors in disaster preparedness remain either limited or lacking, especially in vulnerable municipalities like Silang, Cavite, in the Philippines. At the same time, research focusing on the interplay of disaster risk perceptions, risk attitudes, and preparedness is scarce. Understanding all these factors is critical to effectively address, reduce, and minimize the risks posed by such disasters, calamities, and hazards.

This study evaluates the relationships between disaster risk perception levels, risk attitude, and disaster frequency as determinants of disaster preparedness among selected residents in Silang, Cavite. Moreover, it explores the moderating role of selected demographic factors in disaster preparedness relationships.

II. LITERATURE REVIEW

Disaster preparedness is vital in reducing human and economic losses during the onset of natural hazards and other calamities (*Enhancing Disaster Preparedness for Effective Response*, 2021). It serves as the cornerstone of effective disaster risk reduction strategies.

Furthermore, disaster preparedness can be influenced by various determinants and moderators. Accordingly, the conceptual framework is illustrated in the paradigm below, which guided the researchers through the literature review and the main objectives of this study.

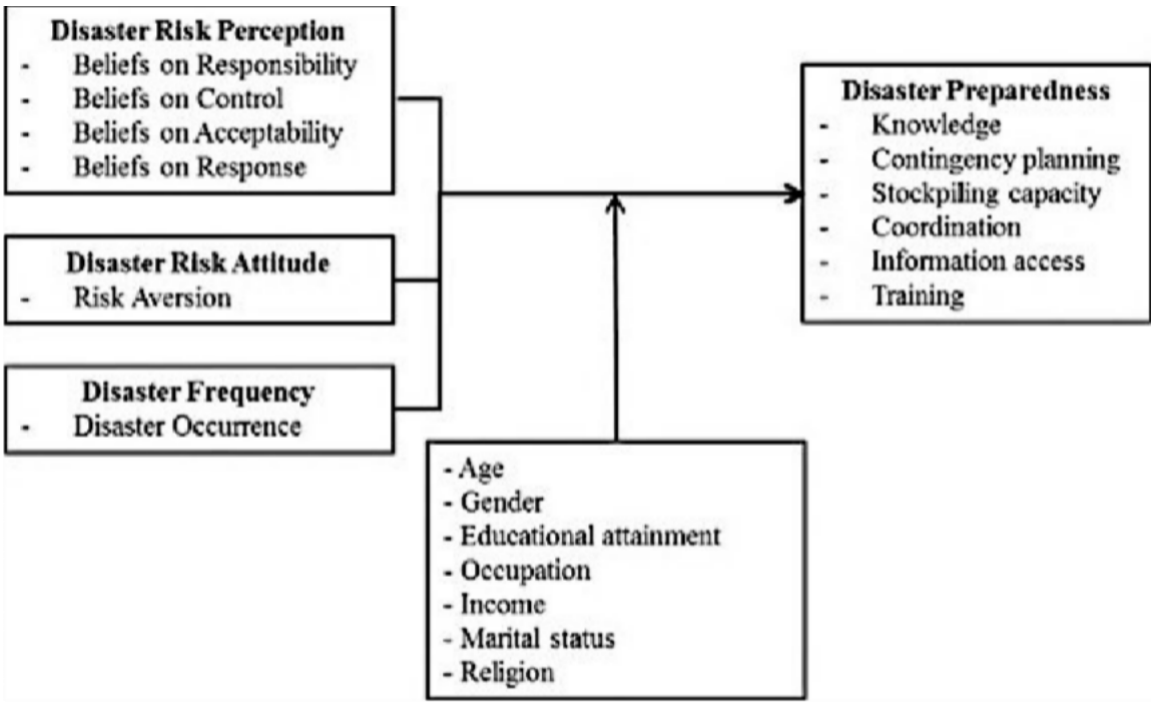

Figure 1. Relationship between Determinants and Moderators of Community-level Disaster Preparedness

Several studies, conducted at both global and local scales, have examined the various socio-demographic and psychosocial factors that influence disaster preparedness. This literature review provides a critical synthesis of related studies examining the potential links between selected demographic factors and disaster preparedness.

Age and Disaster Preparedness

The relationship between age and disaster preparedness is complex. Heterogeneity in preparedness levels was noted among older adults (Liao & Hu, 2025). It is often believed that older adults possess experiential knowledge and skills. These personal experiences may enhance their overall capacity to anticipate and respond to disasters (*Older Adults - Center for Disaster Philanthropy*, 2024), which positively supports community resilience. In contrast, recent evidence suggests that older adults may be underprepared due to a lack of resources (Adepoju et al., 2022). This raises the need for a tailored intervention across multiple age

groups and classifications. For instance, in the Philippines, the engagement of youth, as agents of change, effectively promotes advocacy for disaster preparedness (World Vision Philippines, 2024).

Gender Differences in Disaster Preparedness

Gender differences influence disaster preparedness in social roles, perceptions, and gender-linked behaviors. Several studies reveal that women have greater risks of survival and recovery in disasters (together with children) than men (Vidili, 2024). This is brought about by the caregiving responsibilities typically assigned to women, including other complex duties expected of them, which may affect their risk perception. In Serbia, the high perception of the risk of flooding is associated with household roles of women (Cvetković et al., 2018). This, in turn, supports proactive preparedness.

Inclusion of gender in addressing vulnerabilities is necessary to maximize the contributions of men and women in disaster preparedness. Using gender as a binary variable, should not neglect the underlying factors such as socioeconomic status, cultural norms, as well as resource and structural constraints that affect both men and women (World Bank Group, 2021). For this reason, association between gender and disaster preparedness should be further studied.

Educational Attainment and Disaster Preparedness

Educational attainment, or simply education, is a well-established factor in disaster preparedness. It is linked with risk awareness and actual preparedness measures. According to a study, higher educational attainment is associated with improved adoption of preparedness and response measures (Drzewiecki et al., 2020).

Educational attainment is known to drive the preferred information sources of individuals (Menard et al., 2011). Highly educated individuals may have wider access to more varied sources and platforms, including prudent use of the internet, as well as sourcing information from religious groups. Cerulli et al. (2020) highlight the positive impact of education in mitigating disaster impacts in a recent study.

Given its critical role in disaster risk reduction, researchers argue that education may also compensate for the lack of direct exposure to disasters, especially for those individuals who lack recent disaster experience. However, a clear description and explanation of this proposition requires further investigation.

Occupation and Disaster Preparedness

Occupation can impact disaster preparedness, as it is often associated with access to resources and information, including the readiness of the organization to which the individual is affiliated (via safety plans and benefits) (Moore, 2024; Descatha et al., 2017). Individuals with higher occupational status are more likely to exhibit preparedness behavior due to the presence of well-established workplace emergency planning and contingency measures.

Employee safety during emergencies is improved with the help of employer-led initiatives that aim to maintain emergency supplies and enforce work-related protocols during disasters (Wilmot, 2024). Garingan (2021) found that occupation affects the disaster preparedness of selected community members who were particularly participants (and beneficiaries) of a conditional cash transfer program in the Philippines. An earlier study among inhabitants in Tehran, Iran showed similar findings (Najafi et al., 2015).

Based on these findings, occupation is a critical determinant of disaster preparedness among different population groups. Furthermore, additional studies are warranted to explore how differences in occupation can affect disaster preparedness, as this will reveal more of its impact at the household and community levels.

Income and Disaster Preparedness

Income is a socio-economic factor of disaster preparedness. Communities may demonstrate enhanced capacity to invest in emergency resources and disaster insurance because of high income level. As a result, it further reduces their vulnerability. In contrast, poverty increases the disaster risks (Chong et al., 2025).

Income-related inequities often result in disproportionate mortality during disasters in low-income countries (*Improving Disaster Recovery*, 2019). Weak political will and inadequate government support, as experienced in Southeast Asia (Lassa, 2020), highlight the reliance of people on personal income for out-of-pocket expenditures during disaster preparedness and response.

Nevertheless, researchers argue that not all preparedness measures are solely dependent on income, such as stockpiling capacity (for instance, of non-perishable goods). Income may influence disaster preparedness in different specific ways.

Marital Status and Disaster Preparedness

Social support and family responsibilities influence how marital status affects disaster preparedness behaviors. For instance, married individuals engage more in preventive measures (*Marriage, Cohabitation, and Men's Use of Preventive Health Care Services*, 2014; Kim et al., 2020). It increases the tendency for them to be concerned for vulnerable family members, such as children or older people. Also, single parents in Finland are considered vulnerable to natural disasters (Nikkanen et al., 2021). Altogether, it demonstrates collective preparedness at the household level.

On the other hand, a study found no association between marital status and disaster preparedness among women in Hawaii (Strid et al., 2021). This inconsistency in the relationship needs further investigation of the potential moderating role of marital status within family and community dynamics in the context of disasters.

Religious Differences in Disaster Preparedness

Religion can serve as a factor in disaster preparedness in two ways. One as a coping mechanism and the other as a community resource in the event of disasters (Sheikhi et al., 2020). Religious beliefs are often used as the basis for interpreting disaster occurrences, attributing them to divine causes (Sun et al., 2017). This, in turn, motivates how the individual prepares and responds to such disasters.

Religious communities provide social support networks necessary for community recovery and resilience (Holt et al., 2017). An Indonesian study reveals how religious ties and connections enhance the community's disaster response (Gianisa & De, 2017). In contrast, some misconceptions exist where disasters are linked with divine punishment. This may hinder a proactive approach to disaster preparedness (Root, 2021). Hence, the integration of culturally sensitive strategies (including religious cultures) becomes necessary.

Despite the availability and recency of literature and related studies about demographic and psychosocial determinants of disaster preparedness, an additional gap needs to be investigated. Single-factor relationships are more common in disaster research, leaving the focus of exploring the variables' role as moderators (effect modifiers) within specific community contexts open for investigation.

This current study addresses these gaps by specifically evaluating the determinants of disaster preparedness, moderated by selected demographic factors, in a disaster-prone municipality in the Philippines.

III. MATERIALS AND METHODS

Research Design

This study employs a cross-sectional analytic design to investigate the relationships between determinants, including disaster risk perception, risk attitude, and disaster frequency, and disaster preparedness as the outcome variable. This quantitative research utilized a survey questionnaire to collect data at a single point in time (Bayot et al., 2023). This design is applicable in public health planning and evaluation, as well as in disaster research.

Furthermore, a descriptive-correlational approach is applied in this study to quantify and explore relationships in an observational manner. Similarly, it can be classified as descriptive-evaluative, as this study measured the disaster preparedness scores of the communities in the municipality relative to the residents' perceptions, attitudes, and experiences regarding disasters.

Population and Sampling

The target population consists of the residents of the municipality of Silang, Cavite, which is composed of 64 barangays. Using Cochran's equation with a 5% margin of error and 95%

confidence level, the calculated sample size was 384 respondents distributed across the barangays based on population size.

The study employed a non-probability sampling technique via convenience sampling. This allowed data collectors to select respondents who were readily available and accessible during the house-to-house visits in each barangay.

The inclusion criteria were as follows: being a Filipino citizen, residing in Silang, Cavite, for at least one year, being at least 18 years old at the time of the survey, and residing in a physical shelter within the municipality. The survey also allowed multiple respondents from the same household, as applicable. Informal settlers, however, were not allowed to participate in the study. The purpose is to control other extraneous variables that may affect the relationship between selected determinants and disaster preparedness specific to Silang, Cavite, as a municipality.

The data collection yielded 386 participants. Among these, 339 (88%) completed all survey items and were considered the final analytical sample, comprising 130 (38%) males and 209 females (62%). The analytical sample was valid and acceptable for subsequent data analyses, which were necessary to answer the study objectives.

Instrumentation

A structured questionnaire composed of three sections: (1) demographic data, (2) disaster risk perception, risk attitude, and disaster frequency, and (3) disaster preparedness was used to collect data. The demographic data of respondents included age, gender, educational attainment, occupation, income, marital status, and religion.

Disaster risk perception is comprised of components (or dimensions) of responsibility, control, acceptability, and response. Risk attitude was measured by assessing risk aversion in disaster situations. Meanwhile, disaster frequency data were collected based on the respondents' reported experiences with disasters, including typhoons, earthquakes, floods, landslides, droughts, and other disasters, calamities, and hazards.

Disaster preparedness scores were obtained by assessing several key components: knowledge, contingency planning, stockpiling capacity, coordination, access to information, and training.

Content validity was employed using expert review by several professionals in disaster management, research, and academia. Pilot testing was conducted before the actual implementation. Items on the survey questionnaire underwent several revisions based on feedback. Cronbach's alpha demonstrated acceptable internal consistency ($\alpha = 0.71$ to 0.90) across all sections and subscales, showing reliability of the survey tool. These checks for validity and reliability ensured that the survey questionnaire was culturally and contextually appropriate to the target population. Both informed consent and the survey questionnaire were translated into Filipino by a certified translator.

Measurement Scales

Responses from the survey were measured using the Likert scale. Weighted mean intervals with corresponding degrees of intensity ranged from 1.00-1.49 (strongly disagree/not willing at all/rare) to 4.50-5.00 (strongly agree/extremely willing/almost always). Scale interpretation in each variable is described in Table 1 below:

Table 1. Five-point scale interpretation for study variables

Variables	**1**	**2**	**3**	**4**	**5**
Risk Perception	Very Low	Below Average	Average	Above Average	Very High
Risk Attitude	Very Poor	Poor	Fair	Good	Very Good
Disaster Frequency	Rare	Seldom	Sometimes	Often	Almost Always
Disaster Preparedness	Very Poor	Poor	Fair	Good	Very Good

Higher scores indicated a greater perceived risk, more favorable attitudes towards disaster-related events, more frequent disaster occurrences experienced, and higher levels of preparedness. These scale interpretations guided the researchers in both interpreting the descriptive statistics and the subsequent inferential analyses performed in this study.

Ethical Considerations

Researchers sought ethical clearance and approval from the Ethics Review Board of the Adventist University of the Philippines. Participation in the survey was entirely voluntary. Informed consent was obtained before data collection. The purpose of the study, potential sensitive questions, and the right to withdraw from the survey at any time were discussed to the respondents.

Participants were assured of privacy and confidentiality. Codes were assigned as unique identifiers to restrict data access to data collectors and/or researchers only. Upon the study's completion, all survey questionnaires were eventually shredded.

Data Collection Procedure

The data collectors made house-to-house visits after undergoing training and orientation to the data collection strategy. The survey questionnaire was administered either by self-completion or via interview, especially when literacy or other barriers became a concern. Respondents took approximately 15 to 20 minutes to completely answer the survey. Researchers were always available for clarification should the need arise during the data collection process.

Two editing stages were employed: one for field editing to ensure completeness at the data collection site and the second for central editing done at the Adventist University of the Philippines - College of Medicine (AUP-COM). As token of appreciation, all respondents were offered light refreshments for their participation in the study. No other forms of compensation were provided.

Data Analysis

Descriptive statistics were used to demonstrate the levels of disaster risk perception, risk attitude, disaster frequency, and disaster preparedness. The relationship of continuous variables was examined using bivariate (Pearson) correlation.

Differences in disaster preparedness were analyzed using demographic factors, including age, educational attainment, occupation, income, marital status, and religion, with inferential statistics applied: one-way ANOVA and Kruskal-Wallis tests. An independent samples t-test was applied to detect gender differences. IBM SPSS Statistics (IBM Corp.) was used to perform the above descriptive and inferential statistics.

To assess the moderating role of demographic factors, structural equation modeling (SEM) using SmartPLS (Ringle et al., 2023) was employed to estimate the complex interrelationships of disaster preparedness as influenced by the moderators involved in this study.

IV. RESULTS AND DISCUSSION

1) Determinants of Disaster Preparedness

The analytical sample consisted of 339 respondents, comprising 130 males (38%) and 209 females (62%). The survey yielded the following descriptive statistics for each scale of the questionnaire.

Table 2 presents the means, standard deviations, scaled responses, and verbal interpretations of selected determinants and disaster preparedness levels among the respondents.

Table 2. Determinants of Disaster Preparedness

Determinants	Mean	Std. Dev	Scaled Response	Verbal Interpretation
Disaster Risk Perception	4.23	0.49	Agree	Above average
Disaster Risk Attitude	4.06	0.96	Very willing	Good
Disaster Frequency	2.17	0.63	Seldom	Seldom
Disaster Preparedness	4.14	0.54	Agree	Good

Generally, on average, respondents agreed with the statements related to disaster risk perception (M = 4.23), interpreted as "Above Average". Residents recognize potential hazards

and their severity, measured in areas of their perceived responsibility (component with the highest rating from respondents), control, acceptability, and response. In addition, a high level of risk perception may serve as a cognitive foundation or motivation to prepare for any disaster. Research indicates that higher risk perception is often correlated with a greater intention to engage in resilience or safety measures in disasters (Odiase et al., 2020; Cisternas et al., 2023).

For risk attitude, the mean score of 4.06, interpreted as "Very Willing", indicates that respondents generally have a positive attitude and predisposition to act against the threats posed by disasters. Similar findings for disaster risk attitude are also observed among respondents from different cohorts, such as secondary school students (Alkalash et al., 2023) and resident doctors at a tertiary care teaching hospital (Sharma et al., 2023). Overall, the disaster risk attitude fosters the confidence and motivation of people.

Furthermore, in this current study, respondents are willing to address issues and concerns related to preparation and response to disasters if they are with their families. Thus, family presence is the most important motivator of their attitude.

Disaster frequency was rated by the respondents as low (M = 2.17, verbally interpreted as "Seldom"). This suggests that many residents had not experienced disasters as common as possible. A perceived lack of exposure and experience to such disasters can lead to complacency and apathy, negatively affecting preparedness behaviors (*Complacency, Apathy Lead People to Ignore Disaster Warnings, Researchers Say*, 2013). In contrast, accumulating disaster experiences improves levels of preparation (Zhang et al., 2021). Despite less frequent occurrences, respondents regarded typhoons as the most frequently experienced disaster, then earthquakes, other calamities, and hazards.

On the other hand, respondents had interestingly shown a "Good" level of disaster preparedness (M = 4.14). This implies that their preparedness behavior may be driven by disaster risk perception and risk attitude more than their direct experience. Damages or losses during a disaster can prompt people to prepare for and anticipate future disasters, rather than merely experiencing them (Bian et al., 2022; *The Effect of Experiencing Disaster Losses on Risk Perceptions and Preparedness Behaviors*, n.d.). Respondents score high in the contingency planning component of disaster preparedness, while low in training, specifying the need for more and updated capacity building initiatives.

Despite the respondents' lack of disaster experience, they still demonstrated good disaster preparedness. Aside from disaster experience, other factors could also play a role in disaster preparedness. Hence, the crude descriptive data were further investigated in the next objective of this study.

2) Relationship between Determinants and Disaster Preparedness

A Pearson correlation analysis determined if there is an association between selected determinants (disaster risk perception [DRP], risk attitude [DRA], risk frequency [DF]) and disaster preparedness (DP) levels. Table 3 shows the findings from the bivariate correlations:

Table 3. Relationship between Determinants and Disaster Preparedness

Variables	*Correlation coefficient, r*	Direction of Correlation	Strength of Correlation
DRP and DP	0.49*	Positive	Moderate
DRA and DP	0.31*	Positive	Moderate
DF and DP	0.15*	Positive	Low

[1]DRP – Disaster Risk Perception, DRA – Disaster Risk Attitude, DF – Disaster Frequency, DP – Disaster Preparedness; *significant at $p<0.05$

All three selected determinants were able to establish statistically significant positive correlations with the respondents' level of disaster preparedness.

DRP and DRA showed a moderate positive correlation with DP. This indicates that individuals who have a greater awareness and understanding (perception) of disaster risks tend to engage actively in disaster preparedness measures. On the other hand, this aligns with the previous notion that willingness and disposition to act (attitude) contribute to the actual preparedness behaviors. The greater the perception and more proactive attitude toward disaster risks one has, the more prepared one becomes, at least to a moderate extent.

DF, however, demonstrated a low positive correlation with DP ($r = 0.15$, $p > .05$). This means that more frequent experiences of disasters would tend to slightly increase their preparedness levels due to the accumulation of exposures or increased alertness among the residents over time.

Meanwhile, it also implies that disaster experience or exposure alone does not drive preparedness without the contribution of other factors. Tuquero et al. (2025) studied factors affecting disaster preparedness among nursing students and also found a significant association between disaster experience, but not disaster attitude. In addition, Ng (2022) found no correlation between attitude and intention to prepare among survey respondents in Hong Kong.

Overall, these results suggest that perceptions and attitudes towards disaster risks, as well as the frequency of disasters, collectively represent the cognitive, affective, and experiential dimensions that affect disaster preparedness levels. Findings regarding their relationships can vary depending on the context-dependent populations under study. Moreover, researchers recommend and emphasize the need to focus on and strengthen all possible domains that influence disaster preparedness, regardless of the existing degree of positive correlation between them.

3) Demographic Differences in Disaster Preparedness

Various inferential statistics were applied to investigate the relationships between selected demographic factors, including age, gender, educational attainment, occupation, income, marital status, religion, and disaster preparedness.

For age groups and educational attainment levels, the one-way ANOVA was used. An independent samples t-test was used to compare the genders (male and female). In contrast, the Kruskal-Wallis test was used for the remaining variables, including occupation, income, marital status, and religion. Table 4 illustrates the summary findings:

Table 4. Demographic Differences in Disaster Preparedness

Variable	Statistical Parameter	*p-value*	Interpretation
Age (group)[1]	0.794	0.498	Not significant
Gender[2]	0.763	0.446	Not significant
Educational Attainment[1]	1.040	0.399	Not significant
Occupation[3]	30.327	0.065	Not significant
Income[3]	4.157	0.527	Not significant
Marital status[3]	0.368	0.832	Not significant
Religion[3]	8.222	0.412	Not significant

[1] Variables are analyzed using the statistical test (superscript): 1=ANOVA, 2=Independent T-test, 3=Kruskal-Wallis

Interestingly, no statistically significant differences were obtained in disaster preparedness with respect to the selected demographic factors.

The age groups and educational attainment levels demonstrated no significant variation or differences in disaster preparedness. This finding is consistent with the results of a local study by Epal et al. (2024) among intermediate level students. AlGahtani et al. (2022), though, found significant variation in disaster preparedness among these demographic factors, as reported by respondents in selected regions of Saudi Arabia.

The independent samples t-test, applied to gender ($t = 0.763$, $p = 0.446$), revealed no significant difference in disaster preparedness levels between male and female respondents. Similar findings were obtained among pre-service teachers in India (Sari & Ridhwan, 2022) and the South African community in Auckland, New Zealand (Odiase et al., 2020), as well as among health professionals in Myanmar (Aung & Xu, 2025). These results from related studies, along with this current study, suggest that interventions or strategies to improve or enhance disaster preparedness among people should be similar for both males and females. A practical example would be a gender-neutral training program in the community.

This current finding, however, is not aligned with the previous principle that women should be more integrated into disaster policies for preparedness and response (Cvetković et al., 2018).

Moreover, in 2023, the United Nations emphasized that women have lower levels of disaster resilience and recovery compared to men (*Accelerating Action for Gender Responsive Disaster Risk Reduction | UN Women – Headquarters*, 2023).

Given the mixed and seemingly contrasting findings and principles on gender roles in disaster preparedness, the researchers argue that a targeted and integrated approach would be more effective than relying solely on gender differences.

The shifting roles of males and females in disaster preparedness may be more complex than initially understood. Therefore, when developing disaster preparedness strategies, researchers recommend concurrently considering both gender and role-based contexts in terms of personal circumstances and individual resources.

In other words, males who may lack other resources must be assisted equitably with females who may be more equipped to prepare for disasters, as applicable, and vice versa. Meanwhile, all people, regardless of gender, should have equitable access to information sources regarding disaster preparedness in their respective communities.

Through the Kruskal-Wallis test, no significant differences in disaster preparedness were observed among the occupations of respondents ($\chi^2 = 30.327$, $p = 0.065$). The same finding holds for the respondents' income ($\chi^2 = 4.157$, $p = 0.527$), marital status ($\chi^2 = 0.368$, $p = 0.832$), and religion ($\chi^2 = 8.222$, $p = 0.412$).

Studies outside the Philippines found contrasting results. In China, Yong et al. (2020) found the general public and professionals exhibited no differences in disaster preparedness. On the other hand, in Finland, Nikkanen et al. (2021) revealed that low income is associated with a lower predisposition to disaster preparedness.

Locally, household respondents from a study in Negros Occidental, Philippines reported that the most significant challenge they encountered is the preparation of kit (and food) supplies for disasters due to low household income (Lopez et al., 2022).

Cvetkovic (2016) has exhaustively studied the significant role of marital status in disaster (specifically for flooding) preparedness (measured as supplies and plans) in Serbia. While there is limited research on the direct link between religion and disaster preparedness, findings from a more recent survey in Serbia revealed that women are more likely to believe that religious beliefs influence their attitude and perception of risks than men (Cvetković et al., 2023).

In this study, although no statistical difference was found in these demographic factors when treated as determinants (exposure variables), researchers argue that they still have a more complex yet practical influence on the behavior of respondents in terms of disaster preparedness. This is further explored in the next objective when these demographic factors are treated as moderating variables.

4) The Moderating Role of Demographic Factors

Moderation effects were revealed through the comprehensive stratified analysis of the partial least squares–structural equation modeling (PLS-SEM) algorithm applied to all study variables, as shown in Table 5. This statistical approach comprehensively and thoroughly examines the disaster preparedness relationships among the determinants, moderators, and outcome variables.

Table 5. Moderating Role of Demographic Factors in Disaster Preparedness Relationships

Variable	DRP and DP	DRA and DP	DF and DP
Age (group)	Yes (-)	Yes (+)	Yes (-)
Gender	Yes (+)	No	No
Educational Attainment	Yes (+)	Yes (+)	No
Occupation	Yes (+, -)	Yes (+, -)	Yes (+, -)
Income	Yes (+)	Yes (+)	No
Marital status	Yes (+)	No	Yes (+)
Religion	Yes (+)	Yes (-)	Yes (+, -)

[1]Positive sign means the variable positively moderated (improved/enhanced) the relationship, while a negative sign means negatively moderated (weakening effects). Both signs (+, -) indicate that the variable provided moderating effects in both directions, depending on a particular stratum.

Overall, demographic factors such as age, gender, educational attainment, occupation, income, marital status, and religion have significant moderating effects on the relationships between DRP, DRA, DF, and DP ($p < 0.05$).

The analysis demonstrated that all demographic variables exhibited at least one significant moderating role ($p < 0.05$) in the relationship pathways between the selected determinants (DRP, DRA, DF) and disaster preparedness. Moreover, it suggests that disaster preparedness is not only determined by a single factor (either DRP, DRA, or DF) but is also influenced (either positively, negatively, or both) by demographic factors.

Age groups moderated the three relationships. While it weakens the DRP and DP, as well as the DF and DP relationships, it was observed to enhance the relationship between DRA and DP. As residents age, their perceptions and experiences can be altered, decreasing their readiness during disasters. This can be attributed not only to age as a single number (and a non-modifiable variable) but also to the generational differences to which the resident belongs.

Millennials may interpret and react to disaster risks differently than residents classified as baby boomers. For instance, in terms of access to information and communication practices, the newer (younger) generation is considered to be digital natives, with real-time access to information, compared to the older generation (*How Access to Information Has Shaped Generational Differences | LinkedIn*, 2024; Choudhary et al., 2024).

Gender (encompassing both males and females) positively moderated only one relationship: between DRP and DP. While being male moderates the relationship between DRP and DP better than females (interaction term of 0.616, higher than 0.459), estimates for males and females are not statistically different, based on a post hoc analysis of the difference in slopes test. This aligns with the previous argument that roles associated with gender may be more complex than merely classified as male and female and must be interpreted in conjunction with other factors.

Related to gender complexities, it has been observed that several communities have made attempts to incorporate LGBTQIA+ (lesbian, gay, bisexual, transgender, queer/questioning, intersex, asexual, and other gender-diverse) individuals into their official disaster preparedness policies (*LGBTQIA+ Communities and Disasters - Center for Disaster Philanthropy*, 2023) in countries such as Australia, Canada, Ecuador, Fiji, Poland, and Sweden. However, this warrants further and careful investigation, mainly since the use of 'gender' in many other studies usually refers to biological classification, rather than individual preference.

Educational attainment was illustrated to have positive interaction effects as a moderating variable on both DRP and DP, as well as DRA and DP relationships. Wei et al. (2025) highlighted that education level supports a positive relationship between perception and behavioral response, which aligns with the findings of this study. There is limited study on the role of education in DRA and DP; however, researchers argue that risk attitude can still be influenced by risk perception, implying contributory effects in enhancing overall disaster preparedness.

Moreover, no interaction effect was observed between DF and DP, suggesting that further studies on education as a moderating variable are needed to modify the effect of disaster experience.

Occupation both positively and negatively moderated all three relationships. The significant variation in disaster perceptions, attitudes, and experiences among residents is influenced by their occupation. For example, in fields such as engineering, architecture, farming, fishing, forestry, the arts, and community service, a higher perception of disaster risk leads to stronger preparedness. These occupations consider disaster as a critical factor at work: an engineer, an architect, and a farmer would ensure that any natural or man-made disaster would not affect their work settings, thus, they would implement higher measures of preparation.

Another example is that office and administrative support occupations negatively interact with disaster preparedness. This could imply that in this group, perceptions, attitudes, and experiences toward disasters do not necessarily translate to actual readiness behaviors, which

now becomes a basis for subsequent future studies. Meanwhile, no respondent has claimed an occupation related to healthcare, public safety, or other disaster-related jobs. These particular occupations can also be a focus of future research, particularly in how they moderate the above relationships.

Interaction effects of income strata illustrated a positive moderating role in the relationships between DRP and DP, as well as between DRA and DP. However, they did not show any moderating role between DF and DP. Furthermore, while the lower income strata (e.g., no and low income) rely on risk perception to influence disaster preparedness, the higher income strata (e.g., middle and upper income) also rely on risk attitude, aside from disaster perception alone. This suggests that individuals with higher income levels tend to be more risk-averse, allowing them to manage their finances more efficiently in times of disaster.

A related study conducted among university students in Arlington, USA, revealed that students from low- and high-income families demonstrate varying levels of disaster preparedness (*Impact of Family Income on Public's Disaster Preparedness and Adoption of DRR Courses*, n.d.). Family income, aside from the respondent's income, can also be investigated for its moderating role in the relationship.

Marital status had a positive moderating effect on the relationship between the DRP and DP, as well as between the DF and DP. This suggests that in both single and married statuses, a higher risk perception is associated with higher disaster preparedness.

Single respondents may want more control and accountability for their safety during disasters. Likewise, married respondents share in the responsibility and thus may dilute or spread the perception of disaster risks between the couple. While marital status was found to be a significant predictor (or determinant) of disaster preparedness behavior, along with income and other factors, it did not investigate its interaction effects (Tohan et al., 2023).

Religion as a moderator of disaster preparedness showed varied findings from PLS-SEM. It positively moderated the relationship between DRP and DP in most religious groups. This means the respondents' faith influences how they perceive disaster risks (in terms of responsibility, control, acceptability, and response) and how they eventually prepare for such disasters. Additionally, Protestant respondents exhibit a negative interaction effect between DRA and DP, suggesting that a higher risk attitude may decrease preparedness levels.

Furthermore, residents from both Seventh-Day Adventist (SDA) and Protestant churches display contrasting moderation findings in the DF and DP relationship: a negative effect for SDA, whereas a positive effect for Protestants. An SDA respondent who experiences more disasters does not positively influence one's readiness, unlike how it enhances the preparedness behavior of a Protestant respondent. This significant moderation finding highlights a unique religious view on the role of disaster frequency (experience). On this note, researchers still argue that, apart from the prevalence of disaster exposure, the quality of experiences in terms of damage or loss caused by disasters can provide more insight into this relationship, especially in its moderating effects.

Findings from this study collectively highlight that demographic factors may not only determine disaster preparedness but also facilitate how people may understand and interpret the risk (perception), accept or avoid the inherent risks (attitude), and act accordingly (preparedness) during disasters. A culturally sensitive, equitable, and appropriate risk management and reduction strategy tailored to both the individual and community would be highly essential.

V. CONCLUSION

This study investigated the determinants and moderators of disaster preparedness among selected residents in Silang, Cavite, Philippines. The community's disaster risk perception was above average, and its risk attitude and actual preparedness assessments were good, despite the respondents' infrequent experience with disasters. All three determinants were positively correlated with disaster preparedness scores.

Meanwhile, disaster preparedness did not differ among categories of selected demographic factors, such as age, gender, educational attainment, occupation, income, marital status, and religion. Generally, the findings from this study align with the theory of planned behavior model, illustrating that perceptions and attitudes contribute to an individual's behavior.

The moderating role of demographic factors was significant in the established relationships (correlations), as they can both negatively and positively influence disaster preparedness. Findings from this study distinctively fill the gap in disaster preparedness for community residents in the Philippine context. This can also serve as a guide for future research on both determinants and moderators of disaster preparedness, especially in risk reduction management efforts.

Limitations include the study design's cross-sectional nature. This limits the inferences into associations between variables, rather than causal links. Findings from the municipality of Silang, Cavite, may not reflect the perceptions, attitudes, and behaviors of other municipalities and communities in the Philippines. Therefore, caution is necessary when generalizing the results to other disaster-prone areas. Also, this article highlights the most pertinent general findings from this comprehensive study. More detailed information related to the complete list of significant predictors and moderators of disaster preparedness is available elsewhere and can be obtained through official correspondence.

Despite these limitations, the study serves as an essential and reliable reference for developing and improving disaster efforts at the local (community) level within the municipality of Silang, Cavite. This can be applied in the form of developing training plans and programs, implementing risk communication strategies, and enhancing existing policies in place, shifting to a more individual, family, and community-centered approach to disaster services, similar to how patient-centered care is underscored in healthcare delivery. Specific recommendations for future studies were previously specified in the discussion section of the article.

AUTHORS' CONTRIBUTIONS

Marlon L. Bayot served as the research team leader primarily responsible for the study's conceptualization, design, analysis, and implementation. He is also the principal author of the report. Danielle Vince D. Capuno, Hazel Faye A. Acupan, Nizza Leign R. Nuestro, and Yesha T. Ilagan, served as co-authors, primarily assisting in the study implementation, which involved preliminary work (pilot testing), data collection, data processing, and contributing to the drafting of the report. Also, Demuel Dee L. Berto and Edwin A. Balila served as co-authors, with a specific focus on manuscript review, providing input from the protocol development phase through to the initial results presentation and the finalization of the report. All aforementioned authors contributed to the work and approved the final manuscript.

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