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Article

Predictors of Disaster Response Self-Efficacy Among Adult Residents in Selected Highly-Dense Barangays in Tondo, Manila

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ABSTRACT

The Philippines' geographical location and high population density, along with the effects of climate change, make the country vulnerable to disasters like typhoons, fires, earthquakes, and volcanic eruptions. Densely populated areas, such as Tondo, Manila, are especially at risk, necessitating stronger community disaster preparedness and response efforts. Thus, this study examined the predictors and level of disaster response self-efficacy (DRSE) among adult residents of highly dense barangays in Tondo, Manila. The study utilised a descriptive correlational research design. A total of 281 participants from three selected, highly dense barangays in Tondo, Manila, were recruited through convenience sampling. Data were collected using an adapted and validated instrument that assessed disaster response self-efficacy and its associated predictors. The reliability of the instrument was confirmed using Cronbach's alpha, and the data were analysed using multiple linear regression in IBM SPSS Version 25. Significant predictors of disaster response self-efficacy included community support ($B = 0.382$, $p < 0.000$), past disaster experience ($B = 0.196$, $p < 0.000$), perceived susceptibility ($B = 0.169$, $p = 0.006$), and monthly income ($B = -0.00000685$, $p = 0.005$). No significant associations were observed for gender, education level, duration of residence, geographical perspective, or perceived severity of the condition. Overall, participants exhibited high disaster response self-efficacy. Community support, past disaster experiences, and perceived susceptibility all enhance disaster response self-efficacy in highly dense urban populations, while income constraints appear to be a limiting factor. These findings underscore the need for targeted public health strategies to strengthen community resilience and preparedness in vulnerable areas.

KEYWORDS

Predictors; disaster response; self-efficacy; highly-dense barangays; Tondo; Manila.

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1. Introduction

Disasters, as defined by the Disaster Risk Reduction Resource Manual (2008) and the UNDRR (2024), are emergencies caused by natural or human-induced hazards that disrupt communities, particularly in high-risk areas. These disasters are often unpredictable and can strike anywhere, exposing individuals to significant harm and exacerbating vulnerabilities in areas that lack resources for timely intervention, particularly those with poor maintenance (Uhm et al., 2019).

The Philippines ranks among the most disaster-prone countries globally due to its location in the Pacific Ring of Fire (Holden et al., 2017). Frequent occurrences of typhoons, earthquakes, and volcanic eruptions put it at high risk for severe natural disasters, which are compounded by the effects of climate change (Ridulme & Garcia, 2017). Additionally, low public preparedness and insufficient knowledge of climate-related risks intensify the impact of these disasters (Bollettino, 2020).

The rapid and unregulated pace of urbanisation is a significant factor contributing to disaster risk, as cities, with their dense populations, are particularly vulnerable to both natural and artificial hazards (Parvin et al., 2015). This is especially evident in urban areas, where the risk of earthquakes is increasing due to the high concentration of housing and people. Similar trends have been observed in several Asian developing countries, including India, Indonesia, Nepal, and Pakistan, where field surveys have highlighted heightened vulnerability to such disasters (Okazaki & Pribadi, 2015).

In urban areas, such as the National Capital Region (NCR), high population density further amplifies vulnerability. With over 21,765 people per square kilometre, the NCR exceeds national urbanisation rates, driven by rural-to-urban migration and the pursuit of better opportunities (Philippine Statistics Authority, 2021a; Choi, 2021). Tondo, a district within the NCR, exemplifies this urban density, with approximately 631,000 residents as of 2024, making it one of the most densely populated places in the world (Lena, 2022). Such high-density environments pose increased risks for disasters due to congestion and limited access to resources (Donner & Rodriguez, 2011).

Recent data highlights the magnitude of Tondo's vulnerability. In 2023, more than 13.7 million Filipinos were affected by natural hazards, coinciding with the onset of a severe El Niño phenomenon expected to persist until mid-2024 (OCHA, 2024). Fire incidents are alarmingly frequent, with approximately 12,000 cases reported annually in Tondo alone, necessitating the implementation of enhanced fire prevention and management strategies (Kurata et al., 2023). Furthermore, Tondo's low-lying geography makes it susceptible to flooding, which is exacerbated by inadequate flood control measures, climate change, and the annual occurrence of 20 typhoons (Gilbuena, 2013; UNDER, 2023).

Although physical hazards pose significant threats, especially in densely populated areas like Tondo, Manila, disaster vulnerability is also shaped by underlying social conditions. Social factors, including socioeconomic status, minority background, and household composition, have been linked to lower levels of disaster preparedness (Rao et al., 2022). These social vulnerabilities, which also include limited access to education and weak community support systems, can substantially hinder individuals' ability to prepare for, respond to, and recover from disasters.

Disaster response self-efficacy—the belief in one's ability to plan and execute effective disaster response measures—plays a crucial role in reducing risks and improving disaster outcomes (Labrague et al., 2021). Factors such as community support, past disaster experiences, and social and cognitive dimensions have been identified as significant contributors to disaster preparedness (Drabek, 2005; Legesse, 2016). Similarly, risk perception has been found to shape fire preparedness in urban areas (Cvetković, 2019; Cvetković, 2024). Professional training and experience also contribute to increasing one's disaster preparedness (Cvetković & Janković, 2020). Furthermore, coordination and collaboration between organisations enhance the community's disaster response (El-Mougher, 2022).

However, existing literature on disaster response self-efficacy has primarily focused on broader populations, neglecting the unique challenges of densely populated urban areas, such as Tondo (Gumasing et al., 2022; Gumasing & Sobrevilla, 2023). Moreover, the studies often exclude artificial disasters, further limiting the understanding of disaster response self-efficacy in such contexts (Tan et al., 2024). This study seeks to address these gaps by identifying predictors of disaster response

self-efficacy among adult residents in Tondo. Specifically, it aims to assess the level of disaster response self-efficacy among residents in selected barangays. It explores the impact of sociodemographic factors, geographical perspectives, past disaster experiences, community support, and disaster attitudes on residents' ability to respond effectively during disasters.

By doing so, it provides critical insights for public health and nursing professionals to develop tailored disaster response plans and strategies. The findings of this research aim to support local government units in enhancing disaster preparedness programs while also informing disaster nursing curricula. Ultimately, this study contributes to strengthening community resilience in one of the country's most vulnerable urban areas.

2. Objectives

This study aimed to determine the level of disaster response self-efficacy among adult residents in selected highly dense barangays in Tondo, Manila. It also sought to examine whether there was a significant relationship between disaster response self-efficacy and sociodemographic factors (gender, age, educational attainment, monthly income, and duration of residence), geographical perspective, disaster attitude, perceived susceptibility, perceived severity, past disaster experience, and community support.

3. Methods

The study utilised a descriptive correlational research design. This design seeks to determine the relationship between the variables without the researchers manipulating any of these variables (Bhandari, 2021).

3.1. Sampling and Participants

This study surveyed 281 adult residents from three highly dense barangays in Tondo, Manila, focusing on those aged 18–59 who had lived in these areas for at least six months. Participants with debilitating conditions (e.g., physical disabilities, speech and language impairments, hearing or vision issues) or psychological/emotional distress (e.g., PTSD, depression, anxiety) were excluded to ensure reliable responses. A sample size calculation using the Raosoft sample size calculator was based on a population of 654,220 residents (Philippine Statistics Authority, 2021), with a 90% confidence interval and a 5% margin of error. A minimum sample size of 271 was determined, aligning with Cohen's (1988) guidelines for multiple linear regression at an effect size of 0.02, which ensures sufficient power for detecting minor effects (Selya et al., 2012). The three barangays were selected based on population density and research objectives, with 91 participants recruited per barangay through convenience sampling. This non-probability method, commonly used in disaster and prehospital research (Stratton, 2021), involved selecting participants who were available during data collection. In households with multiple eligible adults, all were invited to participate, ensuring comprehensive data from the target population.

3.2. Measures

The study adapted an instrument from Gumasing et al. (2022) on Filipinos' response efficacy during Typhoon Conson (Jolina) 2021, focusing on disaster response self-efficacy. The original tool included eight sections, but for this study, six were used: (1) Sociodemographic Data, (2) Geographical Perspective, (3) Past Disaster Experience, (4) Disaster Response Self-Efficacy, (5) Community Support, and (6) Disaster Attitude, with the latter divided into Perceived Susceptibility and Perceived Severity.

The survey included 45 questions. Sociodemographic Data consisted of 5 items (gender, age, education, income, and duration of residence), while Geographical Perspective had six yes/no questions. The remaining sections used a 5-point Likert scale to measure agreement, ranging from 1 (strongly disagree) to 5 (strongly agree). Likert scales were applied to Past Disaster Experience (6 items), Disaster Response Self-Efficacy (12 items), Community Support (5 items), and Disaster Attitude (11 items across Perceived Susceptibility and Severity). Geographical Perspective scores were binary (Yes = 1, No = 0), yielding a total range of 0–6. Past Disaster Experience, Community Support, and Disaster Response Self-Efficacy were scored on a scale of 6 to 30, 6 to 30, and 12 to 60, respectively. The mean of responses in each category was used to classify disaster response self-efficacy into high, moderate, or low scores, as described by Li et al. (2017). Disaster Attitude had a range of 11–55 points, with the mean score providing a classification of high, moderate, or low attitudes.

Participants were oriented about the study and given 30 minutes to complete the questionnaire, with additional time allowed if necessary. This ensured accurate, thoughtful responses. The reliability of the tool was confirmed through a pilot test with 17 participants in Barangay 34 of Tondo, yielding a Cronbach's alpha of 0.913. The instrument's sections had the following reliability scores: Geographical Perspective (α = 0.723), Past Disaster Experience (α = 0.823), Community Support (α = 0.797), Perceived Susceptibility (α = 0.752), Perceived Severity (α = 0.785), and Disaster Response Self-Efficacy (α = 0.793).

Before field deployment, the questionnaire was translated into Filipino to ensure clarity, with validation conducted by a panel of disaster experts. Harman's Single Factor Test showed no standard method bias (CMB), confirming the tool's validity for this study.

3.3. Data collection

The study commenced following approval from the UST College of Nursing Ethics Review Committee and Research Board. After obtaining permissions from barangay chairpersons and conducting briefings in three highly dense barangays in Tondo, Manila, 281 participants were selected through convenience sampling, focusing on those aged 18–59 who had lived in Tondo for at least six months and were able to participate voluntarily. The survey was conducted in these three barangays, with a minimum of 91 participants from each. The research team was divided into two groups to distribute the Likert-scale questionnaires efficiently, and participants were given 30 minutes, with additional time allowed if necessary. If multiple participants were in the same household, they answered separately to prevent bias.

Participants were informed about the study's purpose, protocols, and the safeguards in place for their privacy. They provided informed consent, understanding their voluntary participation and the option to withdraw at any time without consequence. Data privacy was strictly ensured. Once collected, the data were analysed using multiple linear regression analysis, examining how sociodemographic factors, geographical perspective, past disaster experience, community support, and disaster attitude predicted Disaster Response Self-Efficacy.

4. Results and Discussion

Table 1 reveals the level of disaster response self-efficacy among residents in a highly dense barangay in Tondo, Manila, highlighting their confidence in handling disasters. The study found that residents of highly dense barangays in Tondo, Manila, demonstrated strong disaster response self-efficacy, reflecting high confidence in individual preparedness and self-protection.

Table 1. Level of Disaster Response Self-Efficacy of Adult Residents in a Selected Highly-Dense Barangays in Tondo, Manila

Indicators	Mean	SD	Interpretation
1. I can prepare and secure my property in the event of a disaster.	4.04	1.031	High DRSEa
2. I have a safety plan for dealing with a disaster.	4.15	0.904	High DRSEa
3. I can prepare an emergency kit ahead of a disaster.	4.22	0.974	High DRSEa
4. I can secure food and water ahead of a disaster.	4.24	0.966	High DRSEa
5. I can protect myself against a disaster.	4.23	0.894	High DRSEa
6. I can evacuate ahead of a disaster when necessary.	4.31	0.842	High DRSEa
7. Evacuating ahead of time will protect me from a disaster.	4.40	0.852	High DRSEa
8. Securing our property ahead of time will protect our assets from damage caused by disasters.	4.22	0.983	High DRSEa
9. Distribution of relief goods and rescue supplies will help me during a disaster.	4.36	0.884	High DRSEa
10. Deploying emergency teams and emergency responders will help me during the disaster.	4.40	0.897	High DRSEa
11. Broadcasting information and emergency information will help me during a disaster.	4.39	0.900	High DRSEa
12. The suspension of work and classes during a disaster will protect people from the disaster.	4.38	0.968	High DRSEa
Overall Disaster Response Self-Efficacy	4.28	0.651	High DRSEa

Legend: 3.68–5.00 (High), 2.34–3.67 (Moderate), 1.00–2.33 (Low)

a

Disaster Response Self-Efficacy

Residents reported feeling capable of securing their property (M = 4.04), having safety plans (M = 4.15), preparing emergency resources (M = 4.22), and protecting themselves during disasters (M = 4.23). These results align with prior studies showing that higher perceived self-efficacy leads to greater preparedness (Mideksa, 2021; Ung et al., 2015), which involves a person thinking and organising activities to achieve a desired goal in preparation for a disaster.

Regarding evacuation preparedness, residents showed confidence in evacuating promptly (M = 4.31) and the protective benefits of timely evacuation (M = 4.40). This aligns with research indicating that high self-efficacy strengthens evacuation plans and responses (Lindell & Perry, 2011; Newnham et al., 2017), suggesting that people with higher self-efficacy may be more likely to recognise the complex barriers to evacuation and develop a plan to overcome them. In terms of asset protection, respondents displayed strong awareness of the importance of safeguarding physical assets (M = 4.22), such as homes and belongings, to mitigate disaster-related losses (Islam & Walkerden, 2022; Motsholapheko et al., 2010).

External support measures also received strong support, with participants agreeing on the value of relief distribution (M = 4.36), emergency teams (M = 4.40), and reliable communication systems (M = 4.39). This highlights the crucial role of government and community resources in disaster response (Xu et al., 2020; Houston et al., 2019), reflecting the importance of collaborative efforts in disaster management.

Overall, with a mean score of 4.28, the results indicate a high level of disaster response self-efficacy among Tondo residents, highlighting their preparedness, awareness of timely evacuation, and reliance on external support systems.

Table 2 presents the relationships between the predictors and the residents' disaster response self-efficacy among adult residents in selected highly dense barangays in Tondo, Manila. Results show that monthly income, perceived susceptibility, past disaster experience, and community support significantly influenced self-efficacy, with community support being the strongest predictor. Other variables, including gender, age, education level, duration of residence, geographical perspective, and perceived severity, did now show significance.

Table 2. Relationship of Factors to the Disaster Response Self-Efficacy of the Adult Residents in Selected Highly-Dense Barangays in Tondo, Manila

Predictor Variable	B	SE B	β	t	p	Conclusion
Gender	0.017	0.052	0.015	0.327	0.744	Not Significant
Age	-0.001	0.003	-0.030	-0.401	0.689	Not Significant
Education level	-0.009	0.011	-0.042	-0.837	0.403	Not Significant
Monthly income	-.00000685	0.000	-0.139	-2.821	0.005	Significant
Duration of residence	-0.002	0.003	-0.050	-0.667	0.505	Not Significant
Geographical perspective	-0.030	0.020	-0.073	-1.457	0.146	Not Significant
Disaster attitude: Perceived Susceptibility	0.169	0.061	0.177	2.784	0.006	Significant
Perceived severity	0.068	0.051	0.077	1.351	0.178	Not Significant
Past Disaster Experience	0.196	0.045	0.229	4.364	0.000	Significant
Community Support	0.382	0.051	0.396	7.423	0.000	Significant

Significant p-value: p <0.05

4.1. *Sociodemographic Predictors*

4.1.1. Gender

Gender (B = 0.017, p = 0.744) showed a positive but statistically insignificant relationship with disaster response self-efficacy, rejecting the hypothesis that gender significantly impacts self-efficacy. Although gender is a dichotomous variable, the results do not support the idea that adult males exhibit higher self-efficacy than females. This contradicts Bronfman et al. (2019) and Qiu et al. (2023), who suggest men are more disaster-prepared. However, the study aligns with Cuesta et al. (2022), noting that women tend to have higher risk perceptions, which could contribute to greater preparedness and self-efficacy. The findings suggest that varying perceptions, awareness, and involvement in disaster preparedness contribute to gender differences in self-efficacy.

4.1.2. Age

Age (B = -0.001, p = 0.689) displayed a negative, statistically insignificant relationship with disaster response self-efficacy, rejecting the hypothesis of a positive link between age and self-efficacy. Although older adults typically exhibit lower preparedness due to health and vulnerability (Olawuni et al., 2020; Bronfman et al., 2019), the current study found no significant age-based differences. This contrasts with findings from Hua Yao (2019), who also reported no significant association between age and disaster preparedness confidence.

4.1.3. Educational Level

Educational level (B = -0.009, p = 0.403) did not significantly influence disaster response self-efficacy. This finding aligns with Peng et al. (2020), who highlighted that disaster-specific knowledge, rather than formal education, is crucial for enhancing self-efficacy in disaster response. While higher education may contribute to disaster readiness (Çiriş Yildiz & Yildirim, 2022), the current study

suggests that exposure to targeted disaster education programs or practical experience may be more influential in building self-efficacy. Accordingly, disaster preparedness may depend on specialised knowledge and community support rather than general education alone.

4.1.4. Monthly Income

Monthly income showed a significant negative relationship with disaster response self-efficacy (B = −0.139, p = 0.005), indicating that higher income is associated with lower self-efficacy. This counterintuitive result may stem from wealthier individuals relying on private protection systems and external resources, such as insurance or professional rescuers, which reduces the need to develop personal disaster response skills. Yu et al. (2022) highlighted that socioeconomic status, including income, influences preparedness and self-efficacy. Lower-income groups, often with limited external support, tend to be more resourceful, increasing their disaster response self-efficacy. Rivera (2022) also found higher self-efficacy among economically disadvantaged populations, attributing this to their reliance on personal coping strategies. These results suggest that higher-income groups may feel less inclined to engage in community-level preparedness due to their financial resources, underscoring the relationship between income, readiness, and self-confidence.

4.1.5. Duration of Residence

Duration of residence (B = −0.002, p = 0.505) revealed a negative but statistically insignificant relationship with disaster response self-efficacy, rejecting the hypothesis that longer residence predicts higher self-efficacy. This finding contrasts with Adeola's (2009) study, which found that the duration of residence was significant in predicting evacuation outcomes during Hurricane Katrina. However, the results align with Bollettino et al. (2020), who noted that long-term residents in the Philippines often exhibit complacency and lower disaster preparedness. Participants in this study reported that their barangays are rarely affected by severe disasters, leading to a reduced sense of urgency for preparedness. Prolonged exposure to disasters may diminish perceived risks, as noted by Mirzan and Turan (2022), with long-term residents displaying less inclination to prepare due to increased attachment to their community and environment.

4.1.6. Geographical Perspective

The geographical perspective (p = 0.146) was not significantly related to disaster response self-efficacy (DRSE), suggesting that geographical awareness alone does not enhance disaster preparedness. This aligns with Qiu et al. (2023), who noted that while geographic knowledge can inform risk understanding, it must be coupled with proper disaster preparedness and training to address disaster risk and emergency response (DRSE) effectively. Gammon et al. (2023) further emphasised the importance of community engagement and trust in disaster response systems. The negative regression coefficient (B = −0.030) indicates that respondents in perceived low-risk areas may underestimate potential threats, leading to complacency and reduced preparedness. A majority of respondents did not perceive their area as vulnerable to certain disasters, such as typhoons (59.07%) or flooding (76.16%), which may reduce their sense of urgency in responding to disasters. This highlights the need to integrate geographic education with practical disaster training to enhance preparedness.

4.1.7. Disaster Attitude

4.1.7.1. Perceived Susceptibility

Perceived susceptibility was positively related to DRSE (B = 0.177, p = 0.006), indicating that higher vulnerability perceptions were associated with increased disaster preparedness. This is consistent with Kurata et al. (2022) and Bempah & Øyhus (2017), who found that recognising vulnerability drives proactive measures. The positive regression coefficient (0.69) suggests that as residents' perceived susceptibility increases, their confidence in disaster response also grows. This supports the findings by Hudson et al. (2020), who linked risk perceptions to higher self-efficacy. However, Qiu et al. (2023) argued that the relationship can vary depending on household circumstances. In this

study, over half of the respondents (56.94%) lived in homes that might heighten their vulnerability to damage during disasters, which likely influenced their perception and preparedness.

4.1.7.2. Perceived Severity

Perceived severity was not significantly associated with DRSE (B = 0.068, p = 0.178). This aligns with Jackson (1981) and Rüstemli & Karanci (1999), who found no correlation between perceived disaster severity and preparedness. While some studies, such as those by Ong et al. (2022) and Gumasing et al. (2023), have reported that higher perceived severity leads to greater preparedness, the current findings suggest that long-term residency may reduce perceptions of disaster severity. Respondents who have lived in their areas for many years (mean = 29.85 years) may perceive minimal future risks, especially if prior disasters caused little harm, which can lead to complacency.

4.1.8. Past Disaster Experience

Past disaster experience (B = 0.196, p < 0.000) was a significant positive predictor of disaster response self-efficacy (DRSE). Previous exposure to disasters enhances preparedness, knowledge, and confidence, fostering resilience for future challenges. Kato (2021) and Bollettino et al. (2020) emphasised that firsthand experience not only improves readiness but also equips individuals with essential skills to manage future disasters effectively. However, Demuth et al. (2016) found that traumatic experiences in hurricane-prone areas could lower self-efficacy.

The present findings support the idea that past disaster experiences positively influence DRSE, even if they involve trauma, as these events build competence and practical skills. Repeated exposures help residents develop effective strategies to handle future disasters. Despite the potential negative impacts of trauma, as noted by Panighari and Suar (2021), such experiences encourage knowledge sharing within communities, further improving disaster preparedness. Given the vulnerability of Tondo's densely populated areas to frequent disasters, respondents have developed coping strategies and heightened disaster risk reduction and emergency response (DRSE) capabilities, often due to repeated exposure and desensitisation. These experiences contribute to increased resilience and improved disaster readiness.

4.1.9. Community Support

Community support (B = 0.382, p < 0.000) showed a significant positive relationship with DRSE, underscoring the importance of local resources in disaster preparedness. Access to training programs, resource distribution, and disaster response systems greatly enhances residents' confidence and readiness. This finding aligns with those of Gundran et al. (2022) and Sofyana et al. (2024), which highlight the effectiveness of community-based disaster programs.

Research indicates that such programs lead to significant improvements in knowledge, skills, and engagement in disaster response activities, directly boosting DRSE. In Tondo, where resources are limited and the population is highly vulnerable, community-based approaches, such as disaster training and the distribution of first aid kits, can enhance both individual and collective preparedness. The study suggests that strengthening community support can significantly improve disaster response efforts, particularly in communities with established disaster management committees.

Table 3 presents the summary of the multiple linear regression model. The results show a strong positive relationship (R = 0.671) between disaster response self-efficacy and its predictors, including community support, duration of residence, gender, education level, monthly income, geographical perspective, past disaster experience, perceived severity, perceived susceptibility, and age.

Table 3. Multiple Linear Regression R Model Summary

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.671[a]	0.450	0.429	0.41166	1.949

[a] Predictors: (Constant), Community Support, Duration of residence, Gender, Education level, Monthly income, Geographical Perspective, Past Disaster Experience, Perceived Severity, Perceived Susceptibility, Age

[b] Dependent Variable: Disaster Response Self-Efficacy

The R Square value of 0.450 indicates that these predictors explain 45% of the variability in DRSE. The adjusted R-squared value of 0.429 accounts for the number of predictors and sample size, providing a more accurate estimate of the model's goodness of fit. The standard error of the estimate (0.41166) suggests the model's predictions are reasonably close to the observed data, further validating its accuracy. The Durbin-Watson statistic (1.949) indicates no significant autocorrelation in the residuals, confirming the independence of residuals and reinforcing the model's reliability.

5. Conclusions

In conclusion, adult residents of the selected highly dense barangays in Tondo, Manila, demonstrate a high level of disaster response self-efficacy, reflecting strong confidence in their ability to respond to disasters. The study identified key predictors of disaster response self-efficacy, including monthly income, perceived susceptibility, past disaster experience, and community support. These factors highlight the importance of financial resources and community engagement in enhancing individuals' confidence in disaster response. Additionally, perceived susceptibility and past disaster experience can be leveraged to strengthen disaster response self-efficacy further.

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Conflicts of Interest: The authors declare that there are no conflicts of interest related to this research.

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