

Evaluating Community Awareness and Preparedness for Flood Risks in Johor

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Abstract: *This study explores the factors influencing community awareness and flood preparedness in Johor, focusing on flood risk knowledge, the use and dissemination of flood warnings, community response to flood risks, and overall flood preparedness. The objective is to identify relationships between these factors to enhance understanding of how communities in Muar, Johor, respond to and prepare for flood risks. A quantitative research design was employed, utilizing a cross-sectional survey approach, which allows for efficient data collection and analysis across a large sample. The data were gathered through online surveys using a structured questionnaire targeting 219 residents of flood-prone areas in Muar, Johor. The results reveal a significant positive relationship between flood risk knowledge, the use and dissemination of flood warnings, community response to flood risks, and the level of flood preparedness. These findings suggest that improving flood risk knowledge and enhancing the communication and accessibility of flood warnings can strengthen community response and preparedness. The study contributes to the development of targeted public health strategies and disaster management policies aimed at increasing flood resilience in vulnerable communities. In conclusion, fostering a comprehensive understanding of flood risks and improving warning systems are essential steps in enhancing community flood preparedness, providing a foundation for future research and policy implementation in flood-prone regions.*

Keywords: community awareness, flood preparedness, flood risk, knowledge, community response

1. Introduction

The phenomenon of flood disasters in Malaysia has garnered considerable attention in recent years due to its increasing frequency and severity, primarily attributed to climate change and urbanization. A substantial body of research has emerged, examining various facets of flood disaster preparedness and response, including community resilience, social capital, and institutional frameworks. Osti and Nakasu (2016) highlight that despite structural measures in place, such as levees, their inadequacy often leads to significant infrastructure damage and loss of life, primarily due to drowning, which accounts for 44% of flood-related fatalities. This indicates a crucial gap in effective communication and community engagement, as many individuals disregarded evacuation advisories due to confusion or lack of timely information. These findings underscore the need for a comprehensive review of current flood risk management practices in Malaysia, integrating both structural and non-structural measures to enhance overall preparedness. Flooding is a common natural disaster in Malaysia that causes

significant loss and damage to the affected communities. Flooding in Malaysia causes various damages that can harm physical and mental health (Sufian et al., 2022). Floods, such as flash floods, monsoon floods, and floods caused by high tides, are the most common occurrences in Malaysia, and they cause significant and extensive damage.

Flood disasters are a recurring phenomenon in Malaysia, particularly during the monsoon season, which results in significant socio-economic impacts and disruptions to daily life. The severity of these events necessitates effective disaster preparedness and response systems to mitigate their effects. Various studies indicate that Malaysia has experienced devastating floods, with notable instances in 2014 highlighting significant weaknesses in existing flood management strategies (Leman et al., 2016; Janius et al., 2017). Flooding represents a significant natural disaster risk in Malaysia, primarily exacerbated by climate change, land use mismanagement, and urbanization. Balachanthar and Lee (2019) highlight the critical role of emergency food aid in disaster response, emphasizing that a well-prepared food aid plan tailored to the specific needs of affected populations can significantly improve recovery efforts. Ludin and Arbon (2017) evaluated the effectiveness of the Community Disaster Resilience (CDR) Scorecard in Malaysian communities, indicating that participatory approaches can enhance disaster preparedness. Their findings suggest that community engagement in self-assessment can reveal strengths and weaknesses in local disaster response frameworks, fostering a culture of resilience. Moreover, examining government agencies' roles in disaster preparedness illustrates significant areas for improvement. Sandaran and Selvaraj (2021) discuss the discourses utilized by officials in managing flood risks, pointing out that current approaches tend to favor a top-down model that may marginalize community voices. Their findings suggest that shifting towards a model encouraging shared responsibility and collaborative efforts between government and communities could enhance disaster resilience. This study aims to determine the relationship between Flood Risk Knowledge, Use and Dissemination of Flood Warnings, Community Response to Flood Risk, and Flood Preparedness.

2. Problem Statement

Floods are among the most frequent and devastating natural disasters worldwide, causing significant loss of life, property damage, and livelihood disruptions (Smith & Ward, 2018). In recent years, the frequency and severity of floods have escalated due to climate change and rapid urbanization, highlighting the critical need for effective flood preparedness measures. However, community awareness and preparedness levels remain inadequate in many vulnerable regions, exacerbating the impacts of these disasters (Kellens et al., 2013). Despite numerous initiatives to improve flood risk communication and enhance community engagement, gaps persist in understanding the social, cultural, and economic factors that influence individuals' and communities' ability to prepare for and respond to flood events (Paton, 2019). These gaps hinder the development of targeted strategies to build community resilience against floods. Various factors shape community awareness and preparedness, including socio-demographic characteristics, access to information, past flood experiences, and trust in authorities (Zia & Wagner, 2015). For instance, individuals with higher levels of education and income often demonstrate greater preparedness due to better access to resources and information (Bubeck et al., 2012). Conversely, marginalized populations, such as low-income households and rural communities, may face barriers to preparedness, including limited access to early warning systems, inadequate infrastructure, and lower levels of risk perception (Lindell & Perry, 2012). Furthermore, cultural beliefs and social norms can influence

perceptions of flood risk and willingness to engage in preparedness behaviors, underscoring the importance of understanding local contexts in flood risk management (Terpstra, 2011).

Effective community flood preparedness also depends on disseminating accurate, timely, and accessible information through trusted communication channels (Morss et al., 2015). However, challenges such as misinformation, language barriers, and limited access to technology can undermine the effectiveness of risk communication efforts (Paton & Johnston, 2006). Additionally, a lack of coordination among stakeholders, including government agencies, non-governmental organizations, and local communities, can impede efforts to build awareness and preparedness (UNISDR, 2015). Addressing these challenges requires a comprehensive approach integrating scientific knowledge, local insights, and participatory strategies to enhance community awareness and foster proactive preparedness behaviors. This underscores the need for research to identify and address the multifaceted factors influencing community awareness and flood preparedness.

3. Methodology

This study employs a quantitative research design, utilizing a cross-sectional survey approach. Cross-sectional studies are cost-effective and time-efficient and allow for the inclusion of large sample sizes, making them an ideal choice for studies exploring relationships between variables. For this study, this design is specifically applied to understand factors influencing flood preparedness among victims in Muar, Johor, focusing on flood risk knowledge, the dissemination and use of warnings, and community responses to flood risks. These insights serve as a foundation for identifying patterns and informing future research and public health strategies.

The data collection process involves conducting online surveys using a structured questionnaire adapted from prior research by Nurul Aini (2019). Online surveys are advantageous due to their cost efficiency, ease of distribution, and ability to reach a broad audience. Moreover, online methods offer time and resource savings, and potential limitations such as lower perceived anonymity than printed surveys are acknowledged. The study employs a purposive sampling method to select participants who meet specific criteria, ensuring they have relevant knowledge or experience concerning flood preparedness. Based on Krejcie and Morgan's (1970) sample size determination formula, a sample size of 226 respondents from the 547 flood victims in Muar is required. Participants are drawn from high-risk areas such as Bukit Kepong and Lenga along Sungai Muar, where flood levels have been recorded at the danger threshold. This purposeful and structured sampling approach ensures that the data gathered is representative and focused on addressing the study's objectives.

4. Results

Table 1: Respondents Demographic Profile

Characteristic		Frequency	Percentage
Gender	Male	91	41.6
	Female	128	58.4
	Total	219	100.0
Race	Malay	205	93.6
	Indian	8	3.7
	Chinese	6	2.7
	Total	219	100.0
Age Group	18-25	143	65.3
	26 – 35	34	15.5
	36 – 45	18	8.2
	46 – 55	12	5.5
	56 & above	12	5.5
	Total	219	100.0
Education Level	PMR	80	36.5
	SPM	43	19.6
	STPM	29	13.2
	Diploma	27	12.3
	Degree	40	18.3
	Total	219	100.0
Ownership Status	Private House	130	59.4
	Rented House	89	40.6
	Total	219	100.0

The demographic profile of the respondents revealed that 58.4% were female, while 41.6% were male, with a total of 219 respondents. The majority of respondents were Malay (93.6%), followed by Indian (3.7%) and Chinese (2.7%). Most respondents were in the 18-25 age group (65.3%), with smaller proportions in the 26-35 (15.5%), 36-45 (8.2%), 46-55 (5.5%), and 56 and above (5.5%) age groups. In terms of education, 36.5% had completed PMR, 19.6% had completed SPM, 13.2% had completed STPM, 12.3% had a Diploma, and 18.3% had a degree. Regarding housing, 59.4% of respondents owned private houses, while 40.6% lived in rented houses.

Table 2: Correlations between Flood Risk Knowledge (X₁), Use and Dissemination of Flood Warnings (X₂), Community Response to Flood Risk (X₃) and Flood Preparedness (Y)

Variables			Y	X ₁	X ₂	X ₃
Y	Flood preparedness	Pearson Correlation	1	.720**	.789**	.884**
		Sig. (2-tailed)		.000	.000	.0000
X₁	Flood risk knowledge	Pearson Correlation	.720**	1		
		Sig. (2-tailed)	.000			
X₂	Use and dissemination of flood warnings	Pearson Correlation	.789**		1	
		Sig. (2-tailed)	.000			
X₃	Community response to flood risk	Pearson Correlation	.884**			1
		Sig. (2-tailed)	.000			

** . Correlation is significant at the 0.01 level; Bonferroni adjusted alpha ($\alpha_{adjusted}$) = 0.0167 (0.05/3).

5. Discussion

The findings of this study reveal a positive relationship between flood risk knowledge and flood preparedness, supporting the first objective of the research. This outcome aligns with previous studies, such as that of Mohamad Yusoff et al. (2018), which explored flood disaster management and emphasized the importance of educating the community to improve flood awareness. By raising awareness of preparing and reacting during a flood, communities are better equipped to reduce flood-related risks. Additionally, Mondino et al. (2020) explored the influence of experience and knowledge sources on flood risk awareness. They found that discrepancies in the impact of experience could be due to varying definitions of the experience variable. This suggests that the strength of the relationship between flood risk knowledge and preparedness may also depend on individual interpretations and prior experiences with floods. Similarly, in a study by Fuchs et al. (2019), it was found that increased knowledge about flood risks significantly improves community preparedness, further validating the findings of this study.

The second objective, focusing on the relationship between the use and dissemination of flood warnings and flood preparedness, shows a positive association between these two factors. The results echo the findings of Alias et al. (2019), which highlighted the significance of effective flood warning systems in improving preparedness. Their study underscores the importance of well-distributed and accurate warnings, as these can prompt communities to take necessary precautions ahead of a flood event. Similarly, research by M. Kuller et al. (2021) reinforces this notion, asserting that early warning systems are crucial for reducing the adverse impacts of floods. The research by Blong (2021) also contributes to this discussion by pointing out that while flood warning systems are important, their effectiveness is often hindered by poor communication and accessibility, especially in rural areas. This highlights the need for more efficient and inclusive warning dissemination to ensure that all population segments are adequately prepared.

Finally, the third objective investigates the relationship between community response to flood risk and flood preparedness, with the results indicating a positive correlation. This supports the hypothesis that a proactive community response is integral to better preparedness. The study aligns with the work of Desphande (2013), who explored the importance of ergonomics and stress management, highlighting that adequate response times and task adjustments are necessary for optimal outcomes. Cvetković et al. (2018) also contribute to this understanding by emphasizing that community engagement and trust in local authorities can influence preparedness levels. Their study indicates that communities with high trust in local authorities tend to demonstrate greater willingness to adopt protective measures, thus enhancing overall flood preparedness. In line with this, Freeman et al. (2020) further underscore that community trust and social capital significantly contribute to collective action in flood preparedness, with stronger community ties often resulting in more effective disaster response. This research corroborates the idea that fostering trust and collaboration within communities is essential for improving flood resilience.

6. Conclusion

The study highlights a significant link between flood risk knowledge and preparedness, emphasizing that communities with better awareness of flood risks are more likely to take necessary precautions. It suggests that effective flood management requires community education, as prior experiences and definitions of risk can influence individuals' preparedness.

The research also shows that disseminating flood warnings is crucial in preparedness, with well-distributed and accurate warnings prompting communities to act. However, challenges in communication and accessibility, particularly in rural areas, suggest the need for more inclusive warning systems. Additionally, the study stated the importance of community response, revealing that proactive engagement and trust in local authorities are key factors in enhancing preparedness. Communities with strong social ties and trust in authorities are more likely to adopt protective measures, improving overall flood resilience.

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