

From Awareness to Action: Understanding Flood Risk Perception in Flood-Prone Communities of Malaysia

Muhammad Haziq Bin Norhashimi., *Siti Nurhafizah Saleeza Ramlee

Department of Management, Faculty of Defence Studies and Management , National Defence University of Malaysia, 57000 Kem Sungai Besi, Kuala Lumpur, Malaysia

*Corresponding Author

DOI: <https://doi.org/10.47772/IJRISS.2026.100300586>

Received: 27 March 2026; Accepted: 01 April 2026; Published: 21 April 2026

ABSTRACT

Malaysia is a country that frequently experiences natural disasters such as floods during the monsoon season, particularly along the east coast of Peninsular Malaysia, which has significantly affected local communities. This situation has influenced flood risk perception among communities in Terengganu, which is shaped by several variables, including knowledge, preparedness, and awareness. This study was conducted to examine the association between knowledge, preparedness, awareness, and flood risk perception among communities in Terengganu. A quantitative approach was employed in this study, involving descriptive analysis and chi-square tests on data collected through questionnaires. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 26.0. The analyses conducted included descriptive statistics and chi-square testing. The results show that all variables, knowledge, preparedness, awareness, and flood risk perception among communities in Terengganu were at a high level, with mean values ranging from 2.34 to 3.67. Furthermore, the chi-square test results reveal a strong and significant association between knowledge and flood risk perception, indicating a moderate relationship. This study highlights the importance of flood risk perception, as critical situations persist with the increasing number of flood victims in Terengganu. In conclusion, this research is expected to provide new insights and inspiration to readers and researchers in the field of flood disaster studies.

Keyword: Awareness, Flood Risk Perception, Knowledge, Preparedness

INTRODUCTION

The widespread and destructive natural disasters in the world, such as flooding, cause significant property damage, loss of life, and long-term socioeconomic impacts. Climate change escalates weather conditions and heightens the prospect of extreme weather events. The concept of awareness, knowledge, and understanding of flood hazards and their potential consequences on the part of the people is basic in this way of thinking. This, in turn, significantly influences communities' perception of these hazards and their preparedness or response to actual or imminent flood events. The relationship between the impression of flood risk and awareness is quite complex and nuanced. Awareness can be increased, leading to heightened perception of risk, but proactive preparedness behaviors are not necessarily the result. This link is influenced, to a large degree, by variables such as socioeconomic position, prior flood experiences, and access to reliable information. Additionally, the effectiveness of risk communication tactics can often be determined by the level of awareness and understanding of flood risks among the target population. In that respect, understanding the connection between awareness and flood risk perception is vital to the development of effective flood management approaches that enhance community resilience.

LITERATURE REVIEW

The past studies had discuss for meaning and relation of each variable.Knowledge is a connection of arguments and ideas, which requires a central process of getting some ideas, or called knowing, something is a difficult, unclear, optional, 9 and integrative process that unites the knower with the to-be-known (Hauke, 2019).

According to Yatnikasari et al. (2021), the flood disaster had a greater impact on the community, so knowledge is needed in dealing with flood situations to reduce the risks experienced. Preparedness can improve the community some actions that should be taken to and planning for the event of a flood. This indicates that the solution and evacuation successes when the community and residents have readiness but depend on the level of disasters (Heriaty Berutu & Manik, 2023). Preparedness can ensure the implementation of measures and policies before an event occurs to mitigate damage 2 and minimize the worst results from the event. Any activities to prevent death and morbidity are achieved by planning, thereby alleviating human suffering during and after the event. Preparedness involves measures maintained by individuals, families, communities, locales, countries, regions, institutions, and states to mitigate the effects of hazards (Andress, 2010). Given the fading of memory itself and the availability heuristic (Tversky and Kahneman, 1973), risk awareness is predicted to decline following a flood and to remain constant throughout time and space in the absence of subsequent flood incidents (Ridolfi et al., 2020). Risk perception is more process by an individual in decision-making, which involves developing results over a lifetime with many factors that come from an individual's frame of reference (Brown et al., 2014). The determination of health behavior is critical to disease risk perceptions, with associations varying based on the profile of different types of risk perceptions and their accuracy (Ferrer et al., 2015). People's perceptions of flood danger are among the crucial elements, and policymakers who are interested in flood risk management now find it to be a crucial subject (Kellens et al., 2011). The researcher has shown a case study of flood disasters in Shenzhen city, that more flood risk knowledge, education system, and flood risk attitude are strongly related to flood risk perception. this can be said that variables had an association (Huang et al., 2020). Others have pointed out a connection between rising risk perception and rising utilisation of risk mitigation strategies for natural catastrophes (Agrawal, 2018). Awareness and risk perception are closely related yet distinct constructs that both play a significant role in shaping individuals' intentions and behaviors in the face of hazards. Research indicates that while awareness refers to the knowledge or recognition of a particular risk, risk perception involves the subjective judgment about the severity and likelihood of that risk, influenced by cognitive, social, and emotional factors (Cisternas et al., 2023).

METHODOLOGY

The study uses questionnaire forms with related previous studies to determine the relationship between the independent variables, which are knowledge, preparedness, and awareness, with the dependent variable, which is flood risk perception. The questionnaire administered to participants facilitates data collection, enabling the evaluation of the research hypotheses. The questionnaire is written in English and Malay then given to the selected participants. The questions are structured in a closed-ended format to ensure efficiency, cost-effectiveness, and ease of data entry. The questionnaire designed for this study has 47 questions. Split into five sections, ensure a systematic approach to data collection as shown in Table 1.

Table 1: Five Sections Data Collection

Section	Question	Total Question	Source
A	Demography	8	(Charalambous et al., 2018)
B	Knowledge	10	(Shah et al., 2020)
C	Preparedness	10	(Bodoque et al., 2019)
D	Awareness	10	(Kamarudin et al., 2022)
E	Flood Risk Perception	9	(Adelekan & Asiyambi, 2015)

Section A of the questionnaire is to collect information about a group of age, gender, status, and education. This section will focus on who the respondents are. The next section B, C, and D refer for question to knowledge, preparedness, and awareness as the independent variables. Section E is the questionnaire for the dependent variable, which is flood risk perception. The questions contained in the sections are for discussion related to flood risk perception among the community in Terengganu. Sections B, C, D, and E of the questionnaire had five items were included in each, based on the question framework. Surveys were distributed to participants

according to the designed sample. In this study, a five-point Likert Scale (Table 2) was employed in sections B, C, D, and E of the questionnaire.

Table 2: Likert Agreement Scaling

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Source: Bounthavong, 2019

The analysis of respondents was conducted based on their gender, age, race, highest education, status, salary, do you live in an area affected by floods, and whether they are you 47 concerned about flooding. Additionally, the table below presents the frequency and percentage distribution of the respondents' demographic characteristics: The data presented in Table 1 indicate that a larger percentage of respondents are male, 53.9% (N=160) of the total, while females count for 46.1% (N=137). That clearly shows a difference of 46.1% between the two groups, which was presented in the distribution of male and female respondents. The age distribution reveals that most participants in the study are between 46 to 59 years old. The age group makes up the largest portion, representing 35.7% (N=106) of the total respondents. The subsequent largest group consists of those aged 31 to 45 years, at 28.5% (N=85), followed by individuals between 18 to 30 years old, making up 20.5% (N=61). Those aged 60 and above represent the smallest portion at 15.2% (N=45). The race of the samples is mostly Malayu with a percentage of 85.5% (N=254), followed by other is, Bangladesh, with a percentage of 14.5% (N=43), and the respondents of Chinese and Indian are 0% (N=0). Next, the largest respondent group of the highest education level possesses a bachelor's degree, accounting for 18.2% (N=54) of the overall total. This is followed by respondents with lower secondary school at 16.5% (N=49), followed by primary school education at 15.2% (N=45), then no formal education at 14.1% (N=42), by higher 3 4 secondary school at 13.8% (N=41), next the diploma or asasi or STPM or equivalent at 10.4% (N=31), for the postgraduate has Masters at 6.1% (N=18) and PhD at 5.7% (N=17). Furthermore, the respondent's status is the highest for married at 47.5% (N=141), followed by single at 39.4% (N=117), and the status of divorce at 13.1% (N=39). The highest frequency 48 for the respondent's status was married, and the lowest frequency for the respondent's status was divorced. The next continuous large group of respondents' income possesses two similar frequencies on RM 1501 up to RM 2000 and RM 3001 up to RM 5000 has 17.2% (N=51), followed by RM 441 up to RM 750 at 16.8% (N=50), then RM 751 up to RM 1500 at 16.5% (N=49), next is RM 0 up to RM 440 at 12.1% (N=36), for RM 2001 up to RM 3000 at 10.8% (N=32), and RM 500 above at 9.4% (N=28). The income has similar highest frequencies for the two income groups, is RM 1501 up to RM 200, and RM 3001 up to RM 3001 up to RM 5000 at 17.2%, and the lowest frequencies are RM 5000 above at 9.4% by the respondents among communities in Kampung Telaga Nibong, Jerteh, Terengganu. Lastly, most respondents live in an area affected by flood, that is, say YES at 92.6% (N=275), and NO at 7.4% (N=22). The respondents are concerned about flood, the most are moderately concerned at 53.5% (N=158), then not concerned at 25.3% (N=75), and the very concerned are 21.2% (N=63).

Table 3: Respondents' Demographic Details

Variables	Frequency (n=297)	Percentage (%)
Gender		
Men	160	53.9
Female	137	46.1
Age		
18 – 30 years	61	20.5
31 – 45 years	85	28.5
46 – 59 years	106	35.7
60 years above	45	15.2

Race		
Melayu	254	85.5
Cina	0	0
India	0	0
Lain- lain (Bangladesh)	43	14.5
Highest Education		
No Formal Education	42	14.1
Primary Education	45	15.2
Lower Secondary School/PMR	49	16.5
High Secondary School/SPM	41	13.8
Diploma/Asasi/STPM	31	10.4
Bachelor's Degree	54	18.2
Masters's	18	6.1
PhD	17	5.7
Status		
Single	117	39.4
Marriage	141	47.5
Divorce	39	13.1
Income		
RM0 – RM440	36	12.1
RM441 – RM 750	50	16.8
RM751 – RM1500	49	16.5
RM1501 – RM2000	51	17.2
RM2001 – RM3000	32	10.8
RM3001 – RM5000	51	17.2
RM5000 above	28	9.4
Do you live in an area affected by floods?		
YES	275	92.6
NO	22	7.4
Are you concerned about flooding?		
Not Concerned	75	25.3
Concerned Moderate	158	53.5
Very Concerned	63	21.2

RESULTS

A descriptive analysis approach was used among communities in Terengganu to address the first research objective outlined in the first chapter, which aimed to assess the level of knowledge, preparedness, awareness, and flood risk perception. The analysis of each variable was carried out by categorizing various statistical measures, including the mean, median, standard deviation, minimum, maximum, range, interquartile range, skewness, and percentiles. In addition, the descriptive statistics for the independent variables (X1, X2, X3) and the dependent variables (Y) in this study are summarized in Table 2. Flood risk perception ratings among respondents in Terengganu's communities varied from a minimum of 1.56 to a maximum of 5.00, resulting in a range of 3.44. The median commitment score was 3.00, with a standard deviation of 0.50. The average score was 2.98, reflecting generally moderate organizational commitment among communities. The skewness value was 0.50, indicating a slight positive skew in the flood risk perception among communities. However, since the skewness remains within the ± 2.0 threshold recommended by Kim (2013), the distribution can be considered nearly normal. Based on the given ratings, scores below 2.33 indicate low agreement, scores between 2.34 and 3.67 indicate moderate agreement, and scores between 3.68 and 5.00 indicate high agreement. Next, the knowledge ratings among respondents in Terengganu's communities varied from a minimum of 1.80 to a maximum of 5.00, resulting in a range of 3.20. The median commitment score was 3.10, with a standard deviation of 0.68. The average score was 3.24, reflecting a generally high level of knowledge among the community. The skewness value was 1.26, indicating a slight positive skew and normality in the knowledge among Terengganu's community. The preparedness ratings among respondents in Terengganu's community varied from a minimum of 1.90 to a maximum of 5.00, resulting in a range of 3.10. The median commitment score was 3.10, with a standard deviation of 0.60. The average score was 3.20, reflecting generally high preparedness among the community. The skewness value was 1.18, indicating a slight positive skew and normality in the preparedness among Terengganu's community. Lastly, awareness ratings among respondents in Terengganu's community varied from a minimum of 1.90 to a maximum of 5.00, resulting in a range of 3.10. The median commitment score was 3.10, with a standard deviation of 0.51. The average score was 3.15, reflecting a generally high awareness among the community. The skewness value was 0.94, indicating a slight positive skew in the awareness among Terengganu's community.

Table 4: Selected Descriptive Statistics for Level of X1, X2, X3, and Y of the Research

Selected Descriptive Statistics	Variables			
	(Y)	(X ₁)	(X ₂)	(X ₃)
Mean	2.98	3.24	3.20	3.15
Median	3.00	3.10	3.10	3.10
Standard Deviation	0.50	0.68	0.60	0.51
Minimum	1.56	1.80	1.90	1.90
Maximum	5.00	5.00	5.00	5.00
Range	3.44	3.20	3.10	3.10
Interquartile Range (IQR)	0.61	0.60	0.60	0.60
Skewness	0.50	1.26	1.18	0.94
Level				
Low	2 (0.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Moderate	221 (74.4%)	209 (70.4%)	212 (71.4%)	213 (71.7%)
High	74 (24.9%)	88 (29.6%)	85 (28.6%)	84 (28.3%)
Total	297 (100.0%)	297 (100.0%)	297 (100.0%)	297 (100.0%)

The purpose of the study is to analyze whether there is any association between a set of independent variables as knowledge (X1), preparedness (X2), and awareness (X3), and the dependent variable is flood risk perception (Y). The researcher used the Chi Square Test to determine the association between variables. This analytical approach to the Terengganu community addresses the research objective outlined in Chapter One, which seeks to identify then understand how knowledge, preparedness, and awareness are connected to flood risk perception. Survey data were analysed using cross-tabulation to determine the association. The Chi-Square The chi-square test analysis reveals a significant association between the independent variables and the flood risk perception. The variables of knowledge, preparedness, and awareness all have a strong association. The p-value for knowledge, preparedness, and awareness is $p = 0.0001$, confirming there is a strong association.

Table 5: Chi-Square Test Output

	df	Asymptotic Significance (2-sided)
Chi-Square of X ₁ *Y	9	0.0001
Chi-Square of X ₂ *Y	9	0.0001
Chi-Square of X ₃ *Y	9	0.0001

DISCUSSION

The level of flood risk perception showed a result is moderate, and the results of knowledge, preparedness, and awareness are high level. The community in Terengganu experienced flooding, which influenced their knowledge of flood disasters through information. As a result, the community frequently prepared for floods, thereby increasing their preparedness. Those affected by floods influence awareness when they have suffered loss and damage their property. According to Yesil et al. (2011), knowledge about hazards and preparedness varies significantly across different demographics and regions. For instance, high school students in New Zealand who participated in hazard education programs demonstrated better knowledge of safety behaviors. These findings have similar means that the knowledge comes from experience and participation. Education plays a crucial role in enhancing awareness. In Turkey, children who participated in earthquake education programs had higher awareness and preparedness levels (Yildiz et al., 2020).

Based on the findings that the knowledge associated with flood risk perception, but needs to clear understanding of what that knowledge means, can improve their perception of flood, and it decreases the efficiency to prepare or save the property. Despite the importance of knowledge, there are significant gaps and misconceptions among the public. Many individuals lack a comprehensive understanding of flood risks, leading to inadequate preparedness (Sales & Rescia, 2024). For example, residents in areas unprotected by dikes often underestimate their flood risk, highlighting the need for targeted education and communication strategies (Botzen et al., 2009). Some members of the community in unexperienced floods have expectations that floods will not affect them, but it will be flooding, and unexpected events happen, such as land landslide, which can cause the level of water to increase quickly. Additionally, the way risk information is presented can influence perception, with longer-term probabilities perceived as more likely to occur (Lin & Opdyke, 2024).

The association between preparedness and flood risk perception was significant, with the positive by collected data that showed the increase, or most respondents chose to accept the association between the variables, where most agreed and neutral. As such, some suggest that those who have a low-risk perception are less willing to disaster preparedness and respond to warnings (Hung et al., 2007). The risk perception presented the connection. Several studies highlight that flood risk perception does not always translate into preparedness actions. For instance, a study in Nanjing found that while participants had moderate perceptions of flood risk, their levels of preparedness were higher, indicating an unbalanced relationship (Li & Wang, 2025). The findings of the previous study supported the association between preparedness and flood risk perception.

Awareness and risk perception are closely related yet distinct constructs that both play a significant role in shaping individuals' intentions and behaviors in the face of hazards. Research indicates that while awareness refers to the knowledge or recognition of a particular risk, risk perception involves the subjective judgment about the severity and likelihood of that risk, influenced by cognitive, social, and emotional factors (Cisternas et al., 2023). The study found a moderate association between awareness and flood risk perception. This implies that a community with a lot of experience faced floods, they will have less of a flood risk perception. The significance of the variables is associated when the answers of the respondent mostly chose the neutral and agree. The findings represent that the association between awareness and flood risk perception does not directly link cause of the community's own perception based on their experience will differs. Awareness of flood risks is essential for effective flood risk management. Studies show that awareness can significantly influence risk perception and preparedness behaviors. For example, individuals who are aware of their flood zone designation are more likely to perceive higher risks and take protective measures (Huang & Lubell, 2022). Based on the findings of the association between awareness and flood risk perception among the community in Terengganu, having a situation where they have moderate strength that already increases the flood risk perception to high strength that from the platform was shares clear information can change some of the variables that increase the risk perception. According to Sales & Rescia (2024), accessibility to accurate and comprehensive flood risk information is crucial for enhancing public awareness and risk perception. In areas with rapid urban expansion, inadequate information can hinder effective risk mitigation. Providing rigorous scientific information and specific technical recommendations can bridge the gap between awareness and preventive measures. Digital tools like interactive flood hazard maps have been shown to improve spatial awareness and reduce nonspatial dread, thereby enhancing overall risk perception (Houston et al., 2017). Effective communication strategies that leverage these tools can significantly improve public understanding and preparedness. The community group had the highest awareness about nature and supported sustainability programs that can mitigate disasters from happening, but with the highest perception that can hold the statement, which can be a positive movement. The relationship between awareness and risk perception is generally positive, meaning that as individuals become more aware or knowledgeable about a risk, their perception of that risk tends to increase (Cohen et al., 2017). According to Yusoff 2018 in the study mentioned that awareness and readiness in facing the flood disaster are indispensable so that the negative impacts resulted from the disasters can be minimised. Therefore, the community should be educated to improve their awareness regarding flood management especially on how and what to prepare for flood as well as how to react during the flood.

CONCLUSION

This study demonstrates reliable findings and confirms a significant association between knowledge, preparedness, awareness, and flood risk perception among the community in Terengganu, with all variables recorded at a high level. The results highlight that higher levels of knowledge, preparedness, and awareness contribute positively to stronger flood risk perception, which is essential for improving community readiness during flood events. These findings provide useful insights for the Terengganu government and disaster management agencies, particularly in Kampung Telaga Nibong, Jerneh, to design effective strategies, awareness campaigns, and preparedness programmes to maintain and enhance community resilience. The study also supports existing theories, showing that factors such as awareness, preparedness, and prior experience influence how individuals perceive flood risks. However, the research is limited to one location and cannot be generalised to other contexts. Future studies are recommended to include additional variables such as worry, direct experience, and education, and to expand the research to different communities or sectors to provide a more comprehensive understanding of flood risk perception.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to National Defence University of Malaysia for providing the necessary resources and support throughout the course of this research. Special appreciation is extended to colleagues and peers who contributed valuable insights and constructive feedback, which greatly enhanced the quality of this paper.

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