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# Flood Preparedness in Urban Areas: An Analysis of the Role of Households in Disaster Risk Mitigation

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Flooding is one of the most frequent disasters in urban areas of Indonesia, including Makassar City, which experiences major floods almost every year. Households are a critical unit of analysis because they are directly affected and serve as the first line of response during flood events. This study aimed to assess household flood preparedness using the Community Preparedness Index (CPI), which consists of four components: Knowledge and Attitudes toward Preparedness (KAP), Emergency Planning (EP), Warning System (WS), and Resource Mobilization Capacity (RMC). A quantitative cross-sectional design was used with purposive sampling of 100 households in Manggala District, Makassar City. Data were collected using a standardized 17 item flood preparedness questionnaire. The results showed that 53% of respondents had low preparedness, indicated by CPI scores below 60%. Distance of the house from rivers or water channels was the most significant factor associated with flood preparedness ($p = 0.006$). 76% respondents lived within 500 meters of a river or water source and generally demonstrated higher preparedness than those living farther away, likely due to higher risk awareness. Household preparedness is influenced by both internal and external factors. Strengthening disaster education, early warning systems, evacuation planning, and resource mobilization especially for high risk households is essential. These findings support the development of evidence based, community level flood mitigation policies.

**Keywords:** Flood, Preparedness, CPI, Mitigation, Emergency

## INTRODUCTION

Flooding is one of the most frequent natural disasters in Indonesia, particularly in urban areas experiencing rapid population growth and extensive land-use change. Its impacts extend beyond material losses to include serious threats to public safety and community health. One of the key strategies in disaster risk reduction is strengthening household preparedness, as households represent the first line of response and possess significant capacity for early action during disasters. In Makassar City, South Sulawesi flooding has become a recurring annual event. In January 2023, floods affected the Manggala and Biringkanaya sub districts resulting in the evacuation of 482 residents to nine designated evacuation shelters. Then, in January 2024 heavy rain again caused flooding in Manggala Village which affected 131 people. December 2024, major floods occurred again in four sub districts with a total of 2,698 victims or 777 families displaced at 38 points. The last time it happened was in February 2025, a 70 cm high flood forced 179 people to evacuate and extreme flooding in the same month caused 2,164 Makassar City residents to be displaced.

Community preparedness in dealing with flood disasters is an important concern in disaster risk management studies. Numerous studies have demonstrated that preparedness is shaped by a range of internal and external factors, particularly knowledge and risk perception, which play a crucial role in motivating preparedness behaviors. Empirical evidence indicates that individuals with better disaster related knowledge and stronger risk awareness are more likely to undertake mitigation actions and preparedness measures prior to the occurrence of a disaster (Paton & Jhontson, 2025). In addition a framework developed by LIPI Collaboration UNESCO/ISDR makes an important contribution to measuring community-based preparedness. This

framework proposes four key indicators for assessing preparedness: Knowledge and Attitudes toward Preparedness (KAP); Emergency Planning (EP); Early Warning System (WS); and Resource Mobilization Capacity (RMC). This approach emphasizes the importance of community participation throughout the preparedness process, from information gathering and planning to training and resource organizing (Triyono et al., 2024).

Local studies in Indonesia support the importance of this approach (Nugrahani & Imamah, 2024). In Semarang City, found that the low level of community preparedness was caused by a lack of access to accurate flood information and a lack of evacuation training (Suharini et al., 2019). Reported similar findings in a study conducted in Jakarta in 2021, concluded that lack of practical knowledge and the absence of an emergency response plan are major obstacles in flood preparedness in urban communities (Husniawati & Herawati, 2023). In Makassar City, repeated floods show weakness in the early warning system and limited resource mobilization capacity. Data from various media and institutions recorded an increase in the number of victims and refugees every time a flood occurred. According to a report by the South Sulawesi Herald, floods in January 2024 have caused more than 480 people to be displaced (Media Kompas Siber, 2025).

Report states that the number of victims affected by floods in Makassar in February 2025 will reach more than 2,000 people. Meanwhile, Kompas reported that the water level reached 70 cm and forced hundreds of residents to evacuate from their homes (Media Kompas Siber, 2025). The Health Ministry's Crisis Center also noted that the floods caused disruptions to health services and basic infrastructure (Ministry of Health of the Republic of Indonesia, 2024). Although the importance of household preparedness in flood disaster management has been widely recognized, many studies still focus primarily on describing preparedness levels without comprehensively examining the relative contribution of household characteristics and environmental exposure factors. Previous research has highlighted the need for more systematic and empirically grounded analyses to identify key determinants of preparedness at the household level (Husniawati & Herawati, 2023). To address this gap, the present study adopts the Community Preparedness Index (CPI) framework to assess household flood preparedness while simultaneously analyzing dominant sociodemographic and environmental factors influencing preparedness behavior.

Several studies have been conducted in other major cities in Indonesia such as Semarang and Jakarta there have been no studies that comprehensively evaluate community preparedness based on CPI indicators in areas with geographical and social characteristics such as Makassar. By adopting the CPI framework used in various previous studies, this study not only assesses the level of preparedness but also seeks to strengthen the validity of the instrument through a systematic statistical approach. Integration of quantitative preparedness data based on CPI indicators with local setting of Makassar City, which has not been explored in depth so far and strengthening the validity of measurement instruments to obtain more representative results.

In the context of disaster risk reduction, households are the smallest social unit as well as the frontline in facing the threat of flood disasters. The role of the household becomes crucial because the initial decisions related to preparedness, response, and protection of family members are mostly taken at the household level before there is any intervention from the government or disaster management agencies (Twerefou et al., 2023). The household serves as a risk management center, where the knowledge, attitudes, and actions of family members determine the extent to which the impact of a disaster can be minimized (Tang et al., 2024).

The importance of the role of households in disaster preparedness has been widely recognized, empirical evidence identifying the factors that play the most role in shaping preparedness is still limited, especially in flood prone urban areas in Indonesia. Most studies still focus on measuring the level of preparedness in general without comprehensively analyzing the relative contributions of internal household factors and environmental conditions. Therefore, research that places households as the main unit of analysis is needed to identify the dominant factors that affect preparedness in dealing with flood disasters, so that it can be the basis for the formulation of more effective, contextual, and sustainable mitigation policies.

Manggala and Biringkanaya districts are consistently the most severely affected by annual floods. Community preparedness is influenced not only by physical environmental factors, but also by internal household factors such as knowledge, attitudes, previous experience, access to information, and resource mobilization capacity. Based on the LIPI-UNESCO/ISDR framework as the Community Preparedness Index, there are four main components of preparedness that can be measured systematically, namely; *Knowledge and Attitudes toward Preparedness* (KAP), *Emergency Planning* (EP), *Early Warning System (WS)*, and *Resource Mobilization Capacity* (RMC). This research is urgent because there is still a limited study of household-based preparedness at the local level, especially in major cities in Indonesia. In addition, the results of this research can be used as a reference by local governments and disaster management agencies in formulating evidence-based policies. This research is in line with the research focus of the University of Muhammadiyah Makassar in the field of public health and the environment, and supports the achievement of SDGs number 11 (sustainable cities and settlements) and number 13 (climate change mitigation). This study aimed to assess household flood preparedness using the Community Preparedness Index (CPI) and become the basis for the formulation of more effective and participatory mitigation policies.

## METHOD

### Research Type

This study This study adopted a quantitative research approach with a cross-sectional design. The study was conducted in 2025 in flood-prone urban settings of Manggala District, Makassar City, Indonesia. A cross-sectional design was selected to enable the assessment of household flood preparedness and its associated factors at a single point in time.

### Population and Study Subjects

The target population consisted of all households residing in flood-prone areas of Manggala District, Makassar City. Based on data from the Makassar Central Statistics Agency, the total number of households in these areas was estimated to be approximately 18,500 in 2024. The sample size was determined using the Slovin formula with a margin of error of 10%, yielding a minimum sample size of 99.46 households, which was rounded to 100 households. A purposive sampling technique under a non-probability approach was applied to select eligible participants who met the predefined criteria.

Data were collected using the Community Preparedness Index (CPI) questionnaire developed by LIPI–UNESCO/ISDR and adapted from previous studies (Larasati et al., 2024). The CPI instrument aims to evaluate household preparedness for flood disasters and consists of 17 items classified into four components: Knowledge and Attitudes toward Preparedness (KAP; 5 items), Emergency Planning (EP; 4 items), Early Warning System (WS; 4 items), and Resource Mobilization Capacity (RMC; 4 items). Prior to field implementation, the instrument was subjected to validity and reliability testing. Internal consistency reliability was assessed using Cronbach's alpha, and all CPI components demonstrated coefficients exceeding 0.70, indicating satisfactory reliability.

### Research Variables

Household flood preparedness was the dependent variable in this study and was measured using the Community Preparedness Index (CPI). The overall CPI score, derived from the four components (KAP, EP, WS, and RMC), was categorized into three levels of preparedness: low (<60), moderate (60–79), and high (≥80), in accordance with established CPI classification standards.

The independent variables included selected sociodemographic and environmental factors hypothesized to influence household flood preparedness. Sociodemographic variables comprised gender, age, education level, employment status, and length of residence in the study area. Environmental and experiential variables included prior flood experience and the distance of the household from rivers or water channels. Distance from water sources was categorized into three groups: less than 500 meters, 500–1500 meters, and more than 1500 meters, representing varying levels of flood exposure risk. All variables were operationally defined and categorized prior to statistical analysis.

### Statistical Analysis

Data analysis was conducted in several stages using the Statistical Package for the Social Sciences (SPSS). Univariate analysis was performed to describe respondent characteristics as well as the distribution of independent and dependent variables using frequencies and percentages depending on the data type. Descriptive analysis was applied to present the level of household flood preparedness based on CPI categories. Bivariate analysis was conducted using the Chi-Square ($\chi^2$) test to examine the relationships between sociodemographic and environmental factors and household flood preparedness levels.

Variables that showed a statistically significant association in the bivariate analysis ($p < 0.05$) were subsequently included in a multivariate logistic regression analysis to identify the dominant factors influencing household flood preparedness. The results of the regression analysis were presented as regression coefficients (B), odds ratios (Exp(B)), and 95% confidence intervals. Statistical significance was determined at a p-value of <0.05.

### Ethics

Ethical approval for this study was obtained from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, University of Muhammadiyah Makassar (Approval No. 783/UM.PKE/VII/47/2025). All participants were provided with detailed information regarding the study objectives and procedures and gave written informed consent prior to participation. Participant confidentiality was maintained by anonymizing all data and storing them securely in password protected files accessible only to the research team.

## RESULTS AND DISCUSSION

### Respondent Characteristics

This study included 100 households residing in flood prone urban areas of Manggala District, Makassar City, who met the predefined study criteria and agreed to participate. Descriptive analysis is presented in the form of numbers and percentages as most of the variables are categorical. Age variables are presented in the form of ranges and mean values to provide an overview of respondent characteristics. The age of the respondents in this study ranged from 19 to 72 years, with an average age of 43 years. The majority are women (69%), while men amount to 31%. The majority have a high school education (52%), followed by junior high school (25%), college (10%), elementary school (7%), and uneducated (6%).

**Table 1.**
Respondents' Demographic Data Characteristics

| Variables | Category | N | Percent |
|---|---|---|---|
| ***Gender*** | Woman | 69 | 69% |
| | Man | 31 | 31% |
| ***Education*** | There is no school | 6 | 6% |
| | Elementary school | 7 | 7% |
| | Junior high school | 25 | 25% |
| | Senior High School | 52 | 52% |
| | Bachelor | 10 | 10% |

Source: Primary Data 2025

Respondents were mostly housewives (47%), unemployed (19%), employed in other fields (22%), self-employed (6%), and civil servants (6%). Most had lived in the study area for more than 5 years (88%), and almost all had experienced flooding (97%). The distance from their homes to rivers/water sources was mostly within a radius of <500 meters (76%), while the remainder were within a radius of 500–1500 meters (20%) and >1500 meters (4%).

**Table 2.**
Respondents' Demographic Data Characteristics

| Variables | Category | N | Percent |
|---|---|---|---|
| ***Work*** | Housewife | 47 | 47% |
| | Doesn't work | 19 | 19% |
| | Etc. | 22 | 22% |
| | Self-employed | 6 | 6% |
| | government employees | 6 | 6% |
| ***Length of Stay*** | < 5 years | 12 | 12% |
| | ≥ 5 years | 88 | 88% |
| ***Flood Experience*** | Yes | 97 | 97% |
| | No. | 3 | 3% |
| ***Distance from Home*** | < 500 m | 76 | 76% |
| | 500–1500 m | 20 | 20% |
| | > 1500 m | 4 | 4% |

Source: Primary Data 2025

**Community Flood Preparedness Level**

The preparedness index is obtained from the accumulation of four main components, namely *Knowledge and Attitudes toward Preparedness* (KAP) which measures respondents' understanding of disaster and preparedness behavior, *Emergency Planning* (EP) which assesses the extent to which individuals or families have a structured plan when facing a disaster, *Early warning System* (WS) which reflects access and response to disaster warning information, and *Resource Mobilization Capacity* (RMC)

which describes the ability to leverage available resources to support emergency response. These four components combine to produce a total score that represents the overall level of preparedness of respondents.

**Table 3.**
Community Preparedness Index (CPI) Components and Domains

| Variable | Components | No. Item | Questions |
|---|---|---|---|
| ***Community Preparedness Index (CPI)*** | ***Knowledge, Attitude, and Practice (KAP)*** | 1 | Do you know what a flood disaster is? |
| | | 2 | Do you know the main causes of flooding? |
| | | 3 | Do you know the early signs of a flood coming? |
| | | 4 | Do you know the evacuation routes in your neighborhood? |
| | | 5 | Do you know of the institution or agency that handles flood disasters? |
| | ***Emergency Planning (EP)*** | 6 | Do you and your family have an evacuation plan in case of flooding? |
| | | 7 | Do you have any emergency standby bags (important documents, food, medicines, etc)? |
| | | 8 | Do you know the location of the nearest evacuation site? |
| | | 9 | Have you practiced flood evacuation before? |
| | ***Early Warning System (WS)*** | 10 | Is there a flood early warning system in your neighborhood? |
| | | 11 | Do you know the sounds or signs of flood warnings? |
| | | 12 | Have you ever received flood information from the official media (TV, Whatsapp group, or sirens)? |
| | | 13 | Do you understand what to do when you receive a flood warning? |
| | ***Resource Mobilization Capacity (RMC)*** | 14 | Do you have any emergency contacts (BPBD, BAZNAZ, etc)? |
| | | 15 | Is there a flood alert community in your neighborhood? |
| | | 16 | Do you have access to an evacuation vehicle in case of major flooding? |
| | | 17 | Do you know the location of emergency logistics storage in your neighborhood? |

Source: Primary Data 2025

The accumulation of four main components of the Community Preparedness Index (CPI), namely Knowledge and Attitudes toward Preparedness (KAP), Emergency Planning (EP), Early Warning System (EWS), and Resource Mobilization Capacity (RMC). The index score was calculated using the formula (Actual Score/Maximum Score) × 100 and was classified into three categories, low (<60), medium (60–79), and high (≥80) preparedness.

**Table 4.**
Levels of Community Flood Preparedness Based on CPI Scores

| CPI Categories | Respondents | Percent |
|---|---|---|
| Low (<60) | 53 | 53% |
| Medium (60–79) | 39 | 39% |
| High (≥80) | 8 | 8% |
| Total | 100 | 100 |

Source: Primary Data 2025

The results of the analysis showed that the majority of respondents were in the low preparedness category (53%), followed by the moderate category (39%), and only a small percentage were in the high preparedness category (8%). These findings show that most respondents do not have optimal abilities in dealing with potential disasters, both in terms of knowledge, attitudes, and skills. This condition emphasizes the importance of capacity-building efforts through structured education, training, and disaster simulation, so that more individuals can achieve moderate to high levels of preparedness, thereby minimizing the risk of vulnerability to disaster impacts.

**Factors Associated with Household Flood Preparedness**

The results of the analysis using the chi-square test showed that there were three variables that were significantly related to the level of preparedness, namely gender (p = 0.013), flood experience (p = 0.022), and distance of the house from the river or channel/water (p = 0.016). Meanwhile, the variables of education, employment status, and length of stay in the study area did not show a significant relationship with flood preparedness.

**Table 5.**
The Relationship between Respondent Characteristics and CPI Preparedness Index Using the Chi-Square Test

| Variables | $\chi^2$ (Pearson) | Df | *P-Value* | Conclusion |
|---|---|---|---|---|
| **Gender** | 6.133 | 1 | 0.013 | Significant |
| **Education** | 1.784 | 4 | 0.775 | Not significant |
| **Work** | 3.114 | 4 | 0.539 | Not significant |
| **Length of Stay** | 0.127 | 1 | 0.721 | Not significant |
| **Flood Experience** | 5.266 | 1 | 0.022 | Significant |
| **Distance of House from River/Water Channel** | 8.318 | 2 | 0.016 | Significant |

Source: Primary Data 2025

Regression analysis was conducted to identify the dominant factors that affect the level of flood preparedness. The results showed that of the three significant variables, only two remained statistically influential in the multivariate model, namely gender and distance of the house from the water source.

**Table 6.**
Dominant Factors Affecting the Level of Flood Preparednes

| Variable | B | Sig. | Exp(B) | 95% CI for EXP(B) | |
|---|---|---|---|---|---|
| | | | | Lower | Up |
| **Gender** | -1.219 | 0.011 | 0.295 | 0.115 | 0.760 |
| **Distance of House from River/Water Channel** | -1.177 | 0.006 | 0.308 | 0.132 | 0.718 |

Source: Primary Data 2025

The results of the analysis showed that the distance of houses from rivers or waterways was the most significant factor affecting the level of flood preparedness (p = 0.006). This variable had a coefficient value of B of −1.177 with an Exp(B) value of 0.308 (95% CI: 0.132–0.718), indicating that respondents living in a certain distance category had a lower chance of preparedness compared to the reference category. These findings confirm that the proximity of residential locations to potential flood sources plays an important role in shaping community preparedness for flood disasters.

Based on the results of the analysis with the category of preparedness level, distance from home (p = 0.006) had the most significant relationship. The majority of respondents are known to live at a distance < 500 meters from rivers or waterways, which is 76%, while 20% of respondents live at a distance of 500–1500 meters and only 4% live at a distance of >1500 meters.

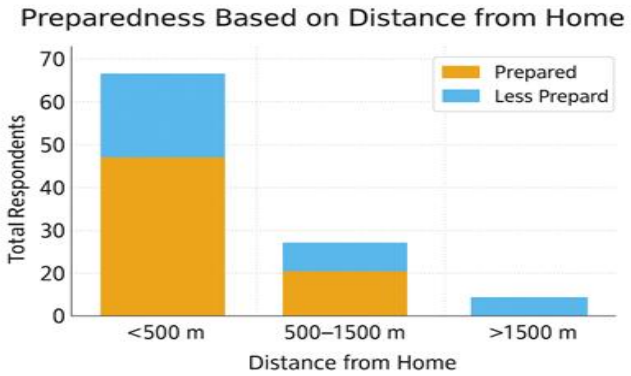


**Figure 1.** Level of Preparedness Based on Distance from Home

76% of respondents who lived less than 500 meters from a river or water source, most were better prepared than those who lived farther away. This shows the high potential risk of flooding in the region. Respondents who live closer tend to be better prepared than those who live farther away. The distance of houses from the river was shown to have the most significant relationship with flood preparedness levels (p = 0.006).

The results of this study show that most of the respondents are in the productive age group to older, with the dominance of women and the majority have a high school education. This reflects the social structure of the local community, where the role of households, especially housewives, is the largest group in the sample. Further analysis showed that gender was one of the variables that stood out from several other factors, that women showed a higher level of preparedness than men. Several factors may explain this pattern (Budhiana, 2024). First, women, especially housewives, are often directly involved in managing household needs such as managing logistics, ensuring child safety, and preparing emergency supplies, which naturally makes them more sensitive to potential disaster risks. Second, in many social contexts, women tend to have greater awareness of the health, safety, and protection of their families, so they are more proactive in seeking information, attending community education sessions, or participating in disaster preparedness activities. Third, these findings may also be influenced by reporting bias, as women are more likely to report preparedness-related actions or attitudes in more detail than men (Kurniawan, 2024).

However, this interpretation needs to be further investigated, given that the number of female respondents in this study is much higher than that of men. Imbalances in these samples can affect the overall distribution of the level of preparedness. Further, similar findings may not appear in other studies because preparedness may vary based on social, economic, cultural, and gender role differences. For example, in some communities, men may be more involved in outdoor activities or physical disaster response, leading to higher preparedness scores among them (Putri et al., 2024). Variations in occupation, previous disaster experiences, access to information, and family responsibilities may contribute to different patterns across various studies. Overall, community preparedness for floods is still relatively low (53%) less than 60 of the CPI index score, with more than half of the respondents categorized as having a low preparedness index. This is in line with previous research that states that sociodemographic factors affect disaster preparedness, especially education, experience, and distance of homes from hazard sources (Hidayaht et al., 2024).

The analysis showed that 76% of respondents who lived less than 500 meters from rivers or water sources, were mostly better prepared than those who lived farther away (Tang et al., 2024). From the aspect of KAP (Knowledge, Attitudes, and Practices), although the public's knowledge about floods is quite good, real practices such as preparing emergency bags, emergency rescue training, and evacuation simulations are still limited (Wandira et al., 2024). This results in a low preparedness index, even though public attitudes seem positive. When it comes to Emergency planning (EP), most people don't have a clear contingency plan, such as evacuation routes, safe gathering points, and protection for vulnerable groups (Rizky et al., 2025). This lack of planning contributes to the high number of unprepared groups. Similarly, in the Early Warning System (WS) aspect, limited access to and utilization of early warning systems means that some communities still rely on natural signs or informal information, which tend to be late and increase the risk of flooding (Nuliana et al., 2024).

The last aspect, namely RMC (Resource Mobilization Capacity), also shows weaknesses, where the mobilization of physical, financial, and trained volunteers is still limited (Sakawuna et al., 2025). This situation slows down the ability of communities to respond quickly to disasters. Therefore, although there are a small number of respondents with high preparedness, significant improvements are still needed through strengthening KAP practices (*Knowledge and Attitudes toward Preparedness*), community based emergency response planning, early warning system optimization, and local resource capacity

building to reduce overall community vulnerability (Yustisia et al., 2024).

Previous research supports these findings, which report that high levels of knowledge do not always align with preparedness practices, making communities vulnerable when faced with disasters (Islami et al., 2024). Other related research also found that weak community emergency response planning was a major factor in low flood preparedness (Marta & Fersari, 2025). The effectiveness of early warning systems plays an important role in improving the rapid response of the community. Meanwhile, limited local resources, both logistical and volunteer, contribute significantly to the low preparedness of the community (Parameswari & Warsono, 2024). This reinforces the need to improve comprehensive preparedness through education, emergency planning, strengthening early warning systems, and building community resource capacity (D. A. A. Sari et al., 2025).

The results of statistical tests showed a significant correlation between gender and preparedness. Females tend to be more prepared than males. This can be influenced by the role of women in households, where they are more involved in daily preparedness activities, such as storing basic necessities, caring for children, and preparing for evacuations (Sriyono et al., 2024). Distance from home is the most significant factor affecting preparedness. Most respondents who lived closer to the river/stream source reported better levels of preparedness. This can be explained by their greater exposure to flood risk and, therefore, their greater motivation to prepare (Nugrahani & Imamah, 2024).

Overall, the results of this study show that community preparedness is influenced by a combination of individual and environmental factors. Gender factors shape social roles in household preparedness, while distance from risk sources strengthens people's adaptive motivation in dealing with floods. These findings emphasize the importance of disaster risk reduction strategies that consider the gender roles and geographic conditions of communities (N. M. Sari & Susanti, 2025). The designed interventions not only need to improve the skills and practical knowledge of the community, but also pay attention to the distribution of risks based on the location of residence so that efforts to improve preparedness become more targeted (Budhiana, 2024). Despite low preparedness index scores, first-hand experience with flooding and geographical factors such as proximity to rivers encourage communities to be more vigilant and practically prepared. In other words, community preparedness is more influenced by environmental conditions than by knowledge, formal planning, or available resources (D. A. A. Sari et al., 2025).

The level of preparedness places more emphasis on external factors experienced in real life (distance from the source of the threat). Strategies to improve community preparedness should be implemented in a balanced manner, strengthening internal aspects through education, planning, and resource provision, while addressing external factors by providing specific interventions for geographically at-risk groups and less experienced in disaster management (Budhiana, 2024). Community knowledge does not always correlate with preparedness, as disaster experiences have a greater influence on actual actions. Location of residences in flood-prone areas increases family preparedness to develop evacuation strategies (Marta & Fersari, 2025). Although limitations in formal planning and weak early warning systems have resulted in low index-based preparedness, the proximity of residences to flood sources forces communities (households) to adapt more quickly. Therefore, internal and external factors need to be considered so that preparedness-enhancing interventions can be more effective.

## CONCLUSIONS

This study shows that the level of household preparedness for flood disasters in urban areas is still relatively low, with more than half of the respondents in the low preparedness index category based on the Community Preparedness Index (CPI). The results of the analysis identified that gender, flood experience, and distance of homes from rivers or waterways were significantly related to flood preparedness. However, the results of the multivariate analysis showed that only gender and distance of the house from the water source played a dominant role in determining the level of preparedness.

These findings indicate that physical (external) environmental factors, especially the distance of residential locations to potential flood sources, have a stronger influence on preparedness than other sociodemographic factors. In addition, differences in preparedness by gender (internal) show that there are variations in roles and responses in the context of household preparedness. Overall, the results of this study confirm that flood preparedness at the household level is influenced by a combination of individual (internal) and environmental (external) factors, with the dominant contribution of geographical factor.

## SUGGESTION

The study shows that longer experience does not automatically lead to higher preparedness, suggesting that experience must be supported by practical application, continuous education, and access to accurate information. This gap highlights that experience alone is insufficient without reinforcement through structured learning and evidence-based training. Therefore, future research is recommended to develop more comprehensive educational intervention models, explore psychosocial and organizational factors that influence preparedness behaviors, and employ longitudinal or mixed-methods designs to better understand the dynamics of preparedness over time.

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