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MORALITY BEFORE KNOWLEDGE

Community preparedness for flood disasters: The role of knowledge and attitudinal factors in disaster-prone areas

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ABSTRACT

Background: This research was conducted in Lebakharjo Village, Malang Regency. Malang Regency is prone to flooding due to high rainfall, with Lebakharjo Village being one of the affected areas. In July 2023, the village experienced another flood, damaging 119 houses and cutting off access to the village, leaving the village isolated. The purpose of this study was to assess the level of community preparedness in Lebakharjo Village for flood disasters. **Methods:** This study used a quantitative descriptive method with multiple correlation tests and multiple linear regression. Data collection was carried out by distributing questionnaires to respondents selected from flood-prone areas in Lebakharjo Village door to door. **Findings:** Data tabulation showed that 66 people, or 67.35%, were in the medium preparedness category, while 32 people, or 32.65%, were in the high preparedness category. This indicates the need for disaster preparedness training or evacuation simulations to improve community preparedness for floods. Knowledge and attitude significantly influence community preparedness in Lebakharjo Village for floods. The combined effect of Knowledge (X1) and Attitude (X2) variables on Community Preparedness (Y) is 28.5%, while the remaining 71.5% is influenced by other variables not covered in this study. **Conclusion:** This study highlights that increasing knowledge and attitudes through targeted interventions can improve flood preparedness in the Lebakharjo Village community. **Novelty/Originality of this article:** This study uniquely quantifies the impact of knowledge and attitudes on flood preparedness in the village, highlighting the need for targeted community training to improve preparedness.

KEYWORDS: attitide; disaster managemen; flood preparedness.

1. Introduction

Based on the data on the number of flood disaster events from the National Disaster Management Agency/*Badan Nasional Penanggulangan Bencana* (BNPB) in the year 2023 in East Java, it recorded the highest number of flood events with 26 occurrences, which is higher than Central Java with 17 occurrences and West Java with 2 occurrences. The factors that make East Java frequently experience flood disasters are related to topography and high rainfall with a long duration. In addition, climate change negatively impacts the community in terms of economy and health. Natural factors play a significant role; the factors influencing the occurrence of floods are high rainfall, and the difference in land surface height with sea level also becomes an influencing factor (Saputra et al., 2021).

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The Malang Regency area has the potential to be affected by floods due to high rainfall, one of which is Lebakharjo Village, Ampelgading District. In November 2022, Lebakharjo Village was affected by floods with 189 houses damaged and approximately 100 hectares of land inundated, resulting in losses of approximately IDR 2,000,000. In July 2023, this village was again affected by floods with a total of 119 houses damaged and access to the village becoming blocked, causing the village to become isolated, with losses from this flood reaching IDR 500,000,000. Therefore, it is necessary to conduct a preparedness analysis regarding disasters to obtain information related to the relationship between knowledge and community preparedness in Lebakharjo Village in facing flood disasters. According to (Yana et al., 2020), individuals respond to disasters with preparedness. To minimize the impact of disasters through the implementation of adaptation and mitigation strategies, it is important to enhance the systems that form the community (Fitriatul, 2018). In facing flood disasters, one of the strategies is to encourage community participation in the process of enhancing the ability to face flood disasters in the future. Preparedness enables the community to anticipate the possibility of disasters with the aim of preventing loss of life, property damage, and changes in the social order of the existing community (Suharinia et al., 2019).

Preparedness is a series of steps that enable governments, organizations, communities, and individuals to respond to disaster situations quickly and accurately (Fitriadi et al., 2017). The need to enhance preparedness aims to actively protect during disasters and provide short-term solutions to support long-term recovery (Opabola et al., 2023). Community preparedness in facing flood disasters greatly depends on their knowledge of the vulnerability level of the area to such disasters (Elum & Lawal, 2022; Monteil et al., 2022). If community knowledge about disasters is low but the vulnerability level is high, then the safety of the community living in that area may be threatened (Mhd Noor et al., 2022).

In Indonesia, flooding remains one of the most frequent and destructive natural disasters, with significant socioeconomic and health impacts (Escobar Carias et al., 2022; Haryanto et al., 2019). Rapid urbanization, inadequate drainage systems, and environmental degradation exacerbate flood risk, especially in densely populated areas. Previous studies have highlighted that although a national disaster management framework is in place, preparedness at the community level is often uneven, with gaps in awareness, early warning systems, and emergency response capacity (Bang, 2021; Hermans et al., 2022; Lillywhite & Wolbring, 2022). This situation highlights the need for tailored interventions that take into account local contexts and vulnerabilities in order to strengthen disaster preparedness at the grassroots level.

Furthermore, improving preparedness is not only a matter of upgrading infrastructure, but also of fostering a culture of risk awareness and proactive action within the community. Empowering local leaders, schools, and civil society organizations to disseminate knowledge about flood hazards can significantly increase risk perception and encourage behavioral change (Intramuean et al., 2025; Vasileiou et al., 2022). Collaborative programs between government agencies and non-governmental organizations (NGOs) have been shown to improve preparedness at the household level, such as through the development of evacuation plans, first aid training, and the establishment of community-based early warning mechanisms (Lese et al., 2022; Shah et al., 2023). Such initiatives can bridge the gap between policy and practice, ensuring that preparedness efforts are inclusive and sustainable.

Finally, integrating disaster preparedness into broader climate development and adaptation plans can strengthen their long-term impact. As climate change increases rainfall variability and flood frequency, resilience-building efforts must adopt a holistic approach that combines structural measures, such as improving flood control infrastructure, with non-structural measures, such as education, land use planning, and environmental conservation. By integrating preparedness into ongoing development programs, governments and communities can create more adaptive systems that not only mitigate disaster risk but also support sustainable development goals. This multidimensional

approach is aligned with international frameworks such as the Sendai Framework for Disaster Risk Reduction, which emphasizes the importance of local action in reducing disaster risk and increasing resilience.

In the research (Hardian, 2017) regarding disaster management in Malang Regency, the steps taken by the Malang Regency BPBD in creating resilient village activities can assist the community. However, based on observations, the Malang Regency BPBD has conducted outreach to village communities, but it was not carried out periodically. Through the implementation of a flood disaster preparedness survey, the following research objective is to determine how the relationship between knowledge and attitudes of the community living in Lebakharjo Village, located in Ampelgading District, Malang Regency, in facing flood disaster events.

2. Methods

The research method used in this study is a descriptive research method with a quantitative approach, which describes the level of flood disaster preparedness knowledge of the community in Lebakharjo Village, Ampelgading District, Malang Regency, and collects data from respondents using a questionnaire with a Likert scale and has scores for each statement item.

The respondents for this research were selected from a community with a history of flood impact. A total of 100 individuals with such a history were identified. After applying Slovin's formula to determine the sample size, the final number of respondents was established at 50. Sample collection was conducted using cluster random sampling. The cluster random sampling technique was carried out by taking samples in several hamlets or villages affected by flooding in the village of Lebakharjo, Malang Regency.

$$n = \frac{N}{1 + N\,(e)^2}$$
$$n = \frac{100}{1 + 100\,(0{,}1)^2}$$
$$= 50 \qquad \text{(Eq. 1)}$$

3. Results and Discussion

This section contains a description of the research findings, specifically addressing the justification or answers to the research questions. The presentation of research results can be supported with the use of tables, images, diagrams, and histograms. The characteristics of respondents in this study based on gender can be seen in Table 1.

Table 1. Characteristics of respondents

No.	Gender	Total	Percentage (%)
1.	Men	43	86%
2.	Women	7	14%
Total		50	100%

The validity test was conducted through Pearson correlation, with the provision that the questionnaire is declared valid if the Corrected Item Total Correlation value is higher than the r table and the significance value is less than 0.05 (5%), then the question item can be declared valid.

Table 2. Validity test

Variable	R Count	Sig.	Information
X1 Knowledge	0.378	<0.001	VALID
	0.339	<0.001	VALID
	0.557	<0.001	VALID
	0.372	<0.001	VALID
	0.560	<0.001	VALID

X2 Attitude	0.804	<0.001	VALID
	0.790	<0.001	VALID
	0.678	<0.001	VALID
	0.618	<0.001	VALID
Y	0.579	<0.001	VALID
community preparedness	0.563	<0.001	VALID
	0.537	<0.001	VALID
	0.438	<0.001	VALID
	0.408	<0.001	VALID
	0.505	<0.001	VALID

According to the findings from the validity assessment, variable X1 (knowledge) has a significance value of 0.001, which is less than the 0.05 benchmark. In the same manner, variable X2 (attitude) shows a significance value of 0.001, and variable Y (community preparedness) also has a significance value of 0.001. As a result, all questionnaire items related to these variables are validated and can be employed in the research. To assess the reliability of a measuring instrument, the researcher used the SPSS program by calculating the Cronbach's Alpha reliability coefficient. If the Cronbach's Alpha value is above 0.6, then the measuring instrument can be considered reliable.

Table 3. Reability test

Variabel	Cronbach's Alpha	Criteria
X1 Knowledge	0.641	Reliable
X2 Attitude	0.692	Reliable
Y community preparedness	0.605	Reliable

The results of the reliability test show that the results from variable X1 (knowledge) have a Cronbach's Alpha value of 0.641 > 0.6, variable X2 (attitude) has a value of 0.692 > 0.6, and variable Y has a value of 0.603 > 0.6. All question items from all variables are declared reliable and can be used in the research. The normality test was conducted using the Kolmogorov-Smirnov method, with the decision rule based on the following criteria; (1) if the Sig. (2-tailed) value > 0.05, the data is considered normally distributed, and (2) if the Sig. (2-tailed) value < 0.05, the data is considered not normally distributed. Based on the Kolmogorov-Smirnov normality test results from a total of 98 respondents, the significance value obtained was 0.051, which is 5.1% > 5%. This indicates that the data in this study is normally distributed.

The multiple correlation test may be performed when there are a minimum of two independent variables present. The criterion for this test is determined by the significance value of the F change. The results of the multiple correlation analysis revealed a significance F change value of 0.001, which is below of 0.05. This indicates that the variables of knowledge (X1), attitude (X2), and community preparedness (Y) are correlated and allows for progression to the next step, which is multiple linear regression.

Multiple linear regression analysis can only be performed when there is more than one independent variable. In this study, multiple linear regression analysis was used to examine the effects of the independent variables, knowledge (X1) and attitude (X2), on the dependent variable, community preparedness (Y). The results of the multiple linear regression test yielded a significance value for the variables of knowledge and attitude of 0.000, which is less than 0.05, indicating statistical significance. Additionally, the constant value was found to be 15.303, with the regression coefficient for the variable knowledge (X1) being 0.139, and the regression coefficient for the variable attitude (X2) being 0.253. Thus, the multiple linear regression equation can be expressed as follows in Equation 2

$$Y=15.303+0.139\ X1-0.253\ X2+e \quad \text{(Eq. 2)}$$

Based on the regression analysis results, the dependent variable used is community preparedness (Y) with two independent variables, namely knowledge (X1) and attitude (X2). The constant value (α) obtained is 15.303, indicating that when the knowledge and

attitude values are considered zero, the level of community preparedness is at that number. The regression coefficient for knowledge (β1) is 0.139 and the regression coefficient for attitude (β2) is 0.253, indicating that every one-unit increase in the knowledge and attitude variables will increase community preparedness by the value of each variable's coefficient. Meanwhile, e indicates the standard error in the regression model used.

The model can be interpreted as follows; (1) α = 15.303 means that if Knowledge and Attitude are both zero, the Community Preparedness will be 15.303, (2) β1 = 0.139 means that assuming an increase in the Knowledge variable, it would result in an increase in Community Preparedness by 0.139 units of variance with a significance of 0.000, (3) β2 = 0.253 means that assuming an increase in the Attitude variable, it would result in an increase in Community Preparedness by 0.253 units of variance with a significance of 0.000.

Based on the results of the tabulation of questionnaire data filled out by respondents, the category of community preparedness level was obtained. The level categories are classified into three, namely low preparedness, moderate preparedness, and high preparedness.

Table 4. Individual Preparedness Level

Index	Category
80-100	High Preparedness
60-79	Moderate Preparedness
<60	Less Preparedness

(Triyono et al., 2011)

Referring to Table 4, the category of the total respondents after filling out the questionnaire was obtained. The following Table 5 is the tabulation for the level of community preparedness in Lebakharjo Village.

Table 5. Community preparedness level

Index	Category	Total Respondents	Percentage
80-100	High Preparedness	16	32%
60-79	Moderate Preparedness	34	68%
<60	Less Preparedness	0	0%

Based on Table 3, it states that the community included in the high preparedness category has a lower number, which is 16 respondents, while the community with a moderate level of preparedness is 34 respondents. With this, it can be interpreted that efforts are still needed to improve the level of community preparedness in Lebakharjo Village. From the results of the regression test, the constant value and the coefficient of the variable were also obtained, where the coefficient value indicates a positive influence, meaning that if it is assumed that the independent variable increases, then the dependent variable will also increase. Good knowledge and attitude towards flood disasters are important for the community, especially for those living in areas prone to flood disasters. If having knowledge and good attitudes then the community can make mitigation efforts to reduce losses or impacts due to flood disasters. From the data tabulation, it was found that the community with a moderate preparedness category amounted to 34 people or 68% and the community in the high preparedness category amounted to 16 people or 32%. This indicates the need for counseling or disaster evacuation simulations to improve community preparedness in facing floods.

Several previous studies reinforce the findings of this study. For example, Sari et al. (2022) found that community knowledge and awareness significantly influenced household preparedness in flood-prone areas in Central Java, where communities that received regular disaster education showed higher levels of preparedness. Similarly, Nakano & Yamori (2021) showed that positive attitudes toward disaster risk reduction correlate with proactive mitigation behaviors, such as preparing emergency supplies, family evacuation plans, and participation in simulation activities. These studies show that preparedness is

not only a function of physical infrastructure, but also social capital, education, and sustained engagement.

Research by Okay et al. (2015) also highlights that socioeconomic factors, such as income level and educational attainment, influence the extent to which communities can implement mitigation measures. Communities with higher levels of education tend to have better access to information, early warning systems, and disaster training programs, thereby increasing their capacity to respond effectively (Ma et al., 2021; Šakić Trogrlić et al., 2022). These findings are in line with the regression results of this study, which show that increased knowledge (independent variable) has a positive effect on preparedness (dependent variable). Thus, strategies to improve preparedness must address gaps in access to information and resources to ensure inclusiveness and equity.

Other studies emphasize the role of participatory approaches in improving preparedness. For example, Rahman et al. (2017) show that Community-Based Disaster Risk Management (CBDRM) programs in flood-prone areas in Bangladesh significantly improve household preparedness by encouraging local ownership and collective action. These programs included mapping hazard-prone areas, conducting community drills, and forming environmental emergency response teams. The success of these interventions underscores the importance of integrating local knowledge and leadership into disaster preparedness planning, which can also be applied in the Indonesian context to improve outcomes (Karnoto et al., 2025; Nurhasna et al., 2025).

Furthermore, recent research on disaster simulation and evacuation drills shows their effectiveness in strengthening community preparedness. Kurniawan et al. (2022) reported that regular simulations improve the speed and coordination of evacuation processes during floods, thereby reducing casualties and property damage. These findings support the recommendation of this study that counseling and evacuation simulations should be prioritized to improve preparedness. By combining educational efforts, participatory planning, and practical exercises, communities can develop a stronger culture of preparedness that mitigates the adverse effects of flooding.

Finally, integrating these interventions into the national disaster management framework is essential for sustainability. The community-level preparedness must be supported by policies, funding, and technical assistance from government agencies (Kusumastuti et al., 2022). This multi-level coordination ensures that local initiatives are not isolated efforts, but rather part of a broader disaster risk reduction strategy that is aligned with the Sendai Framework. Therefore, the findings of this study not only add to the evidence on the importance of knowledge and attitudes in disaster preparedness, but also highlight actionable pathways to improve community resilience through policy, education, and practice.

4. Conclusions

Knowledge and attitudes have a significant effect on community preparedness in Lebakharjo Village, Malang Regency in facing flood disasters. This can be interpreted that if the level of knowledge and attitudes increases, then community preparedness will also experience an increase. The influence of the Knowledge variable (X1) and Attitude (X2) simultaneously on the Community Preparedness variable (Y) is 9%, while the remaining 81% is influenced by other variables not included in this study.

The level of community preparedness in the hamlet affected by floods with a moderate preparedness category dominates this study, with a moderate preparedness percentage of 68% of the total respondents, while the high preparedness level has a percentage of 32% of the total respondents. This indicates that community preparedness is in the middle range of preparedness, and with this, there is a need for efforts to improve preparedness against flood disasters to reduce losses or other impacts caused by flood disasters.

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