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The Effect of Flood Disaster Mitigation Education on Disaster Preparedness Among Families in Kutorenon Village, Lumajang Regency

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ABSTRACT

Introduction: Floods are one of the most frequent natural disasters in Indonesia and have a significant impact on the social, economic, and health aspects of society. Low levels of public knowledge and preparedness, particularly at the household level, are among the causes of the severe impact of flood disasters. This study aims to analyze the effect of flood disaster mitigation education on disaster preparedness among families in Kutorenon, Lumajang Regency.

Method: This study employs a pre-experimental design using a one-group pre-test and post-test approach. The sample consisted of 76 families selected using simple random sampling. The instrument used was a disaster preparedness questionnaire based on indicators from LIPI-UNESCO/ISDR (2006), covering five parameters: knowledge and attitudes regarding preparedness, emergency response plans, early warning systems, policies, and resource mobilization. Data were analyzed using the Wilcoxon signed-rank test with a significance level of $\alpha = 0.05$.

Result: The average disaster preparedness score before the education program was 52.34 and increased to 70.87 after the program. The results of the Wilcoxon signed-rank test showed a p-value of 0.000 ($p < 0.05$), indicating a significant effect of disaster mitigation education on improving disaster preparedness among families.

Conclusion: Flood disaster mitigation education has proven effective in improving disaster preparedness among families in Kutorenon Village. It is recommended that disaster education programs be implemented on an ongoing basis as part of efforts to build a disaster-resilient community

Keywords: *Mitigation Education; Flood Disaster; Disaster Preparedness; Family*

Introduction

Indonesia is a country with a high risk of natural disasters. These natural disasters result in significant losses, both direct and indirect, such as loss of life, damage to

facilities and infrastructure, loss of valuables, environmental damage, and psychological trauma among disaster victims (Taryana, Mahmudi, & Bekti, 2022). One of the most common natural disasters in Indonesia is flooding. Flooding occurs when water overflows and inundates land areas that are not normally flooded. The causes of flooding can vary, and several factors that contribute to flooding include excessive rainfall, rising river water levels, regional topography, soil erosion, tidal waves, and tsunamis (Budiman & Akbar, 2023).

Flooding is one of the most frequent disasters in various regions, including Kutorenon Village, which is located in a flood-prone area and often results in significant impacts, ranging from material losses to threats to human safety. Although the potential for flooding in Kutorenon Village is quite high, public awareness particularly at the household level regarding the importance of disaster preparedness remains relatively low. Many families lack the knowledge and skills to handle flood emergencies, such as developing evacuation plans, preparing emergency supplies, and understanding early warning information. This situation has the potential to directly or indirectly exacerbate the impact of disasters on people's lives.

According to records from the International Disaster Database (EM-DAT), from 1900 to 2023, the number of disaster events rose sharply, with an average increase of 22 percent. This rise in the number of events was accompanied by a surge in the number of affected victims, which soared by more than 100 percent over the past century. Global trends aside, Indonesia has also experienced a rise in the risk of floods and landslides. Indonesia ranks as the third most flood- and landslide-prone country in the world, behind China and India.

Data from the National Disaster Management Agency (BNPB) indicates that floods are the most frequent natural disasters in Indonesia, accounting for approximately 40% of all annual disaster incidents. In the past decade, thousands of flood incidents have been recorded, causing infrastructure damage, loss of productive land, and significant social impacts, such as mass displacement and public health disruptions. In East Java Province, flooding poses a serious threat, particularly during the rainy season. This region is home to many major rivers, such as the Brantas River, which frequently overflows and causes flooding in surrounding areas.

Based on data from the Lumajang Regency Regional Disaster Management Agency (BPBD), Kutorenon Village is classified as a high-risk area for flooding, particularly during the peak rainy season from December to February. Recurring floods not only cause material damage but also impact residents' social well-being, health, and education. Although various efforts have been made, such as repairing drainage channels and planting trees along riverbanks, the impact has not been significant due to the lack of a structured and integrated approach.

In Lumajang, particularly in Sukodono Subdistrict, Kutorenon Village frequently experiences flooding when the rainy season arrives because it is flanked by two major rivers: the Bondoyudo River and the Menjangan River. According to disaster incident data from the East Java Provincial Disaster Management Agency (BPBD) in 2021, the most severe flooding occurred when the floodwaters submerged more than 70% of the village's area, with an average water level reaching 2 meters, centered in Biting Hamlet, Kutorenon Village. This is further supported by various news sources from digital media, one of which is "Kim Kutorenon," which states that every rainy season, the village of Kutorenon frequently experiences flooding due to the narrowing of the rivers caused by sedimentation, while the discharge flows in one direction—the Bondoyudo River. The main factors triggering the flooding include heavy rainfall, river sedimentation, deforestation in the upstream areas, and the lack of adequate mitigation systems.

Based on the results of a preliminary study in two hamlets Krajan II and Biting I it was found that some homes were severely affected, while others were moderately or lightly affected. Regarding disaster mitigation, observations revealed that despite frequent flooding in the area, residents have not yet been able to minimize the impact of these floods; for example, electronic devices have not been placed on higher ground. In some two-story homes, the ground floor was still filled with electronic devices. Most families in Kutorenon Village lack adequate knowledge about the steps they should take to prepare for flood disasters. They are not yet familiar with developing evacuation plans, preparing emergency supplies, or understanding information related to early warnings. This situation has the potential to increase risks and adverse impacts when flooding occurs, both in terms of material losses and threats to human safety.

Disaster management is one of the steps to anticipate and address the impacts of disasters, spanning the pre-disaster, during-disaster, and post-disaster phases. There are three phases: the pre-disaster phase, the during-disaster phase, and the post-disaster phase. These three stages form a cycle in disaster management, and the pre-disaster stage is a critical one that is often overlooked by the public, as people sometimes pay little attention to the hazards that threaten their surroundings. This pre-disaster phase consists of three parts: prevention, mitigation, and preparedness. Prevention can be described as an effort to avoid high-risk areas; when we know a certain area has the potential for a disaster, we will prefer to avoid it as a residential area.

Flood disaster mitigation education can be implemented to instill preparedness and response capabilities in families when facing disaster risks. Mitigation involves a series of efforts to reduce disaster risks, both through physical infrastructure development and by raising awareness and enhancing the ability to cope with disaster threats. Flood disaster mitigation programs are also beneficial for fostering good habits in environmental stewardship and educating families to understand the initial steps for self-rescue should a flood disaster occur (Kurniawati, 2020).

Introducing flood disaster mitigation can minimize psychological impacts if prepared for early on. The introduction to flood disaster mitigation will provide children with the knowledge to be vigilant and demonstrate appropriate responses should a flood occur. Natural disaster mitigation taught from an early age will enhance children's ability to be vigilant before a natural disaster, engage in self-rescue, and know what actions are permitted and prohibited after a disaster (Qurrotaini & Nuryanto, 2020).

According to Turniningtyas Ayu Rahmawati (2019), efforts to reduce disaster risk can also be carried out through structural or non-structural mitigation. Non-structural mitigation measures can be implemented through: public awareness campaigns on disaster preparedness to ensure prompt and appropriate actions are taken in emergency situations, as well as community-based prevention efforts.

Based on research conducted by Ismawati (2022) on the impact of disaster mitigation education on community preparedness in Mahawu Village, Manado City, the results indicate that disaster mitigation education influences preparedness; thus, education can enhance community knowledge.

The results of a study conducted by Rahmawatie et al. (2021) on flood disaster preparedness among residents of Kenongo Hamlet indicated that residents' knowledge regarding flood preparedness in Kenongo Hamlet is good, emergency response plans are in place, an effective early warning system is operational, and the majority demonstrate high levels of preparedness. To optimize the role of residents in flood preparedness, it is necessary to maintain constant coordination across relevant sectors and to strengthen the existing communication systems.

Based on the background described above, mitigation plays a significant role in fostering disaster preparedness. Previously conducted studies appear to support the researcher's hypothesis that disaster mitigation is linked to disaster preparedness among the residents of Kutorenon Village; therefore, the author was motivated to conduct a study titled "The Effect of Flood Disaster Mitigation Education on Disaster Preparedness Among Families in Kutorenon Village, Lumajang Regency."

Method

This study used a one-group pre-post test design with simple random sampling. The study population consisted of flood survivors living in RW 09, Biting Subdistrict, Kutorenon Village, Lumajang, and the study was conducted in February 2025. There were 94 households living in that area. The study population consisted of 94 individuals; after the population was entered into Slovin's formula, the result was 76.1 respondents, which was then rounded to 76 respondents.

Results

The research data is presented in two sections: general data and specific data. The general data describes the respondents' characteristics, such as age, gender, education level, and occupation. The specific data, meanwhile, presents a comparison of pre-test and post-test results, illustrating the level of flood disaster preparedness before and after the mitigation education was provided.

1. General Data

a. Respondent Characteristics by Age

Table 1.1 Frequency Distribution of Flood Survivors by Age in Kutorenon Village, Lumajang Regency

Age	Frequency (f)	Percentage (%)
20-30 years old	21	27,6
31-40 years old	28	36,8
41-50 years old	12	15,8
51-60 years old	15	19,7
Total	76	100,0

Source: Primary Research Data from May 2025

According to Table 1.1, there were a total of 76 respondents, with the largest age group being 31–40 years old (28 respondents, or 36.8%) and the smallest being 41–50 years old (12 respondents, or 15.8%).

b. Characteristics of Respondents By Gender

Table 1.2 Frequency Distribution of Respondents by Gender: Flood Survivors in Kutorenon Village, Lumajang Regency

Gender	Frequency (f)	Percentage (%)
Male	45	59,2
Female	31	40,8
Total	76	100,0

Source: Primary Research Data from May 2025

According to Table 1.2, there were a total of 76 respondents, with the largest group consisting of 45 male respondents (59.2%) and the smallest group consisting of 31 female respondents (40.8%).

c. Characteristics of Respondents by Level of Education

Table 1.3 Frequency Distribution of Respondents by Level of Education: Flood Survivors in Kutorenon Village, Lumajang Regency

Level of Education	Frequency (f)	Percentage (%)
Didn't Attend Elementary School	8	10,5
Elementary School	41	53,9
Junior High School	22	28,9
Senior Haigh School	4	5,3
Diploma/Bachelor's Degree	1	1,3
Total	76	100,0

Source: Primary Research Data from May 2025

Based on Table 1.3, there were a total of 76 respondents, with the largest group having an elementary school education (41 respondents, or 53.9%) and the smallest group having an associate's or bachelor's degree (1 respondent, or 1.3%).

d. Characteristics of Respondents by Occupation

Table 1.4 Frequency Distribution of Respondents by Occupation: Flood Survivors in Kutorenon Village, Lumajang Regency

Occupation	Frequency (f)	Percentage (%)
Self-Employed Worker	16	21,1
Farmer	22	28,9
Housewife	6	7,9
Driver	9	11,8
Etc.	23	30,3
Total	76	100,0

Source: Primary Research Data from May 2025

According to Table 1.4, there were a total of 76 respondents, with the largest group consisting of 23 respondents (30.3%) who worked in other occupations, and the smallest group consisting of 6 respondents (7.9%) who were homemakers.

2. **Specific Data**

a. Disaster Preparedness Before Mitigation Education

Table 2.1 Frequency Distribution of Respondents Before Mitigation Education Was Conducted for Flood Survivors in Kutorenon Village, Lumajang Regency

Disaster Preparedness	Frequency (f)	Percentage (%)
Unprepared	42	55,3
Lack of Readiness	22	28,9
Almost Ready	12	15,8
Total	76	100,0

Source: Primary Research Data from May 2025

Based on Table 2.1, there were a total of 76 respondents, with the largest group 42 respondents (55.3%) reporting that they were not prepared for disasters, and the smallest group 12 respondents (15.8%) reporting that they were almost prepared.

b. Disaster Preparedness after Mitigation Education

Table 2.2 Frequency Distribution of Respondents following mitigation education provided to flood survivors in Kutorenon Village, Lumajang Regency

Disaster Preparedness	Frequency (f)	Percentage (%)
Partially Prepared	10	13,2
Prepared	31	40,8
Fully Prepared	35	46,1
Total	76	100,0

Source: Primary Research Data from May 2025

According to Table 2.2, there were a total of 76 respondents, with the highest level of disaster preparedness being "very prepared" (35 respondents, or 46.1%) and the lowest level being "almost prepared" (10 respondents, or 13.2%).

c. Cross-Tabulation of the Analysis of the Effect of Mitigation Education on Disaster Preparedness

Table 2.3 Cross-Tabulation of the Effect of Mitigation Education on Family Disaster Preparedness Among Flood Survivors in Kutorenon Village, Lumajang Regency

Pre Test	*Post Test*						**Total**	
	Almost Ready		Prepared		Fully Prepared			
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**
Unprepared	6	7,9	17	22,4	19	25	**42**	**55,3**
Partially Prepared	2	2,6	10	13,2	10	13,2	**22**	**28,9**
Almost Ready	2	2,6	4	5,3	6	7,9	**12**	**15,8**
Total	**10**	**13,2**	**31**	**40,8**	**35**	**46,1**	**76**	**100**

Source: Primary Research Data from May 2025

Based on Table 2.3, there were 76 respondents. Before receiving disaster mitigation education, the majority 42 respondents (55.3%) showed an improvement after receiving education, becoming very prepared (19 respondents, 25%), and among those with the lowest level of disaster preparedness before receiving mitigation education those who were almost prepared (12 respondents, 15.8%) 6 respondents (7.9%) showed an improvement after receiving education

d. Statistical Analysis Table: The Effect of Mitigation Education on Disaster Preparedness

Table 2.4 Statistical Analysis Table: The Effect of Mitigation Education on Family Disaster Preparedness in Kutorenon Village, Lumajang Regency

Test Statistics	
	POST TEST - PRE TEST
Z	-7,561[b]
Asymp. Sig. (2-tailed)	,000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Source: SPSS Statistical Analysis

Based on Table 2.4, the results of the Wilcoxon Signed Ranks Test show that the Z-value is -7.561 with a significance level (Asymp. Sig. (2-tailed)) of 0.000. Since this significance value is less than $\alpha = 0.05$, it can be concluded that there is a significant effect of disaster mitigation education on improving family disaster preparedness.

Discussion

Disaster Preparedness Among Families Before Receiving Flood Mitigation Education in Kutorenon Village, Lumajang Regency, indicates that the majority of respondents 42 people (55.3%) fall into the “unprepared” category when it comes to facing flood disasters. Additionally, 28.9% (22 people) were in the “partially prepared” category, and only 15.8% (12 people) were classified as “fully prepared.” These data indicate that, in general, community preparedness prior to the educational intervention remains relatively low.

The low level of community preparedness for flood disasters prior to educational intervention aligns with findings in a study by Furqon et al. (2023), which states that communities with limited knowledge regarding disaster risks and mitigation efforts tend to lack both physical and mental preparedness to face disasters. Knowledge is a key factor in preparedness because it influences the ability of individuals or families to recognize risks, make plans, and take preventive actions.

Research by Zakina et al. (2024) indicates that low levels of preparedness prior to educational interventions are generally attributed to limited access to disaster-related

information, a lack of evacuation simulation training, and the absence of community-based early warning systems. The lack of community involvement in disaster risk reduction programs also contributes to the community's unpreparedness in facing emergency situations such as floods.

Based on the researchers' assumptions, the findings of this study reinforce the importance of educational interventions to improve community preparedness. Appropriate and sustainable mitigation education is expected to enhance the community's understanding and skills in dealing with flood threats, thereby minimizing the risk of loss of life and material damage in the future.

This study also shows that disaster preparedness among families in Kutorenon Village, Lumajang Regency, following the provision of flood disaster mitigation education, saw a significant increase in disaster preparedness levels. Furthermore, Padmasari et al. (2024) also found that the application of active learning-based disaster mitigation education methods (such as role-playing and simulations) can enhance knowledge and disaster preparedness starting from elementary school age. This supports the findings of your study, where after receiving mitigation education, the majority of respondents demonstrated the ability to handle floods independently. Of the total 76 respondents, 43 people (56.6%) fell into the "Prepared" category, 19 people (25%) were "Almost Ready," and only 14 people (18.4%) remained in the "Unprepared" category. This indicates an increase in public understanding and awareness of the risks and actions that need to be taken during a flood disaster.

This finding aligns with the results of the study by Fuedsi et al. (2024), which states that disaster mitigation education particularly when delivered visually and interactively can significantly improve flood disaster preparedness. In their study, an educational approach combining digital media with conventional outreach effectively increased students' preparedness scores from the pre-test to the post-test.

Based on the researchers' assumptions, these findings confirm that flood disaster mitigation education is an effective intervention for improving family preparedness against flood risks. It is hoped that these educational activities can be conducted regularly and in a structured manner, involving cross-sectoral stakeholders such as the Regional Disaster Management Agency (BPBD), Community Health

Centers (Puskesmas), and community leaders to ensure the sustainability and effectiveness of the program.

The results of the Wilcoxon Signed Ranks Test presented in Table 2.4 show a Z-value of -7.561 with a significance level of Asymp. Sig. (2-tailed) = 0.000. This significance value is smaller than the significance level of 0.05 ($p < 0.05$), so it can be concluded that there is a significant effect of disaster mitigation education on improving family disaster preparedness. This indicates that after receiving mitigation education, there was a significant increase in family preparedness to face flood disasters. Before receiving the education, the respondents' preparedness was mostly in the "not prepared" and "less prepared" categories. However, after the educational intervention, the majority of respondents moved to the "prepared" and "very prepared" categories.

These results align with the findings of Fuedsi et al. (2024), who stated that educational mitigation interventions using educational media can significantly enhance both individual and family knowledge and preparedness in facing flood disasters. In their study, preparedness scores increased significantly following the implementation of visual and interactive educational interventions.

Additionally, Nugroho et al. (2023) state in their journal article that household-based disaster mitigation outreach programs are effective in improving risk understanding, developing family evacuation plans, and utilizing early disaster detection tools. This demonstrates that disaster mitigation education not only enhances cognitive aspects but also improves family preparedness in terms of attitudes and practices.

Thus, based on the researchers' assumptions, the results of this study indicate that disaster mitigation education is a strategic effort to improve family preparedness, particularly in flood-prone areas such as Kutorenon Village. This intervention is crucial to be implemented continuously and sustainably across sectors, particularly by local governments, Community Health Centers (Puskesmas), and the Regional Disaster Management Agency (BPBD), as a form of community-based disaster risk reduction.

Conclusion

Flood disaster mitigation education is an effective intervention for improving family preparedness against flood risks, particularly in flood-prone areas such as Kutorenon Village. It is important that this intervention be implemented on an ongoing basis by various sectors specifically local governments, community health centers (Puskesmas), and the Regional Disaster Management Agency (BPBD) as part of community-based disaster risk reduction efforts. It is hoped that these educational activities can be conducted periodically and in a structured manner to ensure the sustainability and effectiveness of the program.

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