

Community Empowerment to Enhance Health Preparedness for Disasters in Flood-Prone Areas

Erin Desweni^{1*}, Awalia Gusti², & Yoanita Hijriyati³

¹Universitas Biturrahmah, Indonesia, ²Poltekkes Kemenkes Padang, Indonesia, ³Universitas Binawan, Indonesia

*Co e-mail: erindesweni@fikes.unbrah.ac.id¹

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ABSTRACT

Floods are one of the most frequent hydrometeorological disasters in Indonesia and cause various physical and psychosocial health impacts. The high health risks due to floods require strong public health preparedness through a community empowerment approach as a community-based disaster risk reduction strategy. Purpose: This study aims to analyze the relationship between community empowerment and health preparedness in facing flood disasters and identify empowerment factors that most influence public health preparedness. Method: The study used a quantitative approach with a cross-sectional observational analytical design. The study was conducted in Aia Pacah Village, Padang City, from January–March 2026 involving 420 respondents selected using a proportionate random sampling technique. Data were collected using a structured questionnaire and analyzed through univariate analysis, correlation, and multiple linear regression. Results: The results showed that the level of community empowerment and health preparedness was still dominated by the moderate category. There was a positive and significant relationship between community empowerment and health preparedness ($r=0.682$; $p<0.001$). Multivariate analysis showed that disaster education was the most dominant factor in improving health preparedness, followed by community participation, disaster preparedness cadres, and institutional support. The research model explained 54.9% of the variation in community health preparedness. Conclusion: Community empowerment plays a significant role in improving public health preparedness in flood-prone areas. Community-based health programs integrated with disaster management systems need to be prioritized to strengthen resilience to flood-related health risks.

Keywords: Community Empowerment, Health Preparedness, Flood Disaster, Public Health, Disaster Risk Reduction, Community Resilience

INTRODUCTION

Indonesia is one of the countries with the highest disaster vulnerability in the world. Its geographical location as an archipelagic nation located in the tropics makes Indonesia vulnerable to various hydrometeorological disasters, such as floods, landslides, tornadoes, and drought (Aprilana & Satria, 2023). In recent years, hydrometeorological disasters have shown an increasing trend in both frequency and impact. Global climate change, increased extreme rainfall, land conversion, watershed degradation, and uncontrolled residential growth are factors that increase the risk of flooding in various regions of Indonesia (Rusmaniah et al., 2025).

Among the various types of disasters that occur, flooding is the most frequently experienced by Indonesians and has a wide impact on social life, the economy, the environment, and public health. Floods not only cause infrastructure damage and material losses, but also disrupt community activities in the short and long term. The high vulnerability of communities to flooding indicates that disaster risk reduction cannot rely solely on physical infrastructure development but also requires strengthening community capacity as a key element in facing disaster threats (Fatmah, 2025; Rusmaniah et al., 2025).

The increase in flooding in recent years is closely related to climate change, which triggers extreme weather and high-intensity rainfall. Furthermore, unplanned urbanization, reduced water catchment areas, river sedimentation, and poor drainage systems contribute to increasing the potential for flooding. These conditions have led to many areas experiencing recurring flooding, directly impacting people's quality of life. Geographically, areas located in lowlands or near rivers are more vulnerable to flooding (Rusmaniah et al., 2025).

Floods are disasters that have serious impacts on public health, both directly and indirectly. Direct impacts include injury, drowning, and health problems due to exposure to contaminated floodwater, while indirect impacts arise through increased disease risks due to decreased sanitation quality and limited access to clean water. Various studies have shown that floods contribute to increased cases of diarrhea, skin diseases, acute respiratory infections (ARI), leptospirosis, and vector-borne diseases such as dengue fever. The humid, polluted, and unhygienic environmental conditions following floods accelerate the spread of disease, particularly leptospirosis, which is associated with exposure to water contaminated with rat urine and an increase in vector populations in prolonged standing water. In addition to impacting physical health, floods also cause psychological problems such as stress, anxiety, depression, and trauma due to loss of shelter, property damage, and economic uncertainty. These psychosocial impacts often last longer than the physical impacts and therefore need to be a crucial part of public health preparedness efforts. This situation is further exacerbated by disruptions to health services due to damaged facilities, transportation barriers, limited distribution of medicines, and reduced access of health workers to affected areas. Therefore, strengthening community capacity in preventing and early handling of health problems is an important step to reduce the risk of illness and death due to flood disasters (Yanni, 2026).

Health preparedness is a key component of disaster management, aimed at improving the capacity of individuals, families, and communities to respond to health threats during disasters. Health preparedness encompasses knowledge of flood-related health risks, the ability to provide first aid, preparedness for health emergencies, the availability of family health supplies, and an understanding of health communication and referral systems. Communities with a high level of



health preparedness tend to be better able to protect themselves and their families when a disaster occurs (Yahya & Syahputra, 2025).

Strengthening public health preparedness aligns with the new paradigm of disaster management, which positions communities as the primary actors in disaster risk reduction. The approach, which previously focused on post-disaster response, has now shifted to a preventive, participatory, and community-based approach. In this approach, communities are no longer positioned as objects receiving aid, but as subjects with the capacity to recognize risks, plan preventative measures, and implement mitigation efforts independently (Junaidi, 2025).

One strategy considered effective in improving health preparedness is through community empowerment. Community empowerment is the process of increasing the ability of individuals and groups to identify problems, make decisions, and manage existing resources to achieve better conditions. In the context of disasters, community empowerment can be carried out through disaster health education, preparedness training, evacuation simulations, the formation of disaster preparedness cadres, and strengthening social networks and institutions at the community level (Rusmaniah et al., 2025).

Various studies have shown that empowerment approaches can improve community knowledge, attitudes, and skills in responding to flood threats. Community-based training programs that involve active community participation have been shown to increase preparedness capacity and strengthen community resilience in the face of disasters. Furthermore, the involvement of community leaders and local cadres also plays a crucial role in maintaining the sustainability of health preparedness programs (Fatmah, 2025).

Despite this, various challenges remain in efforts to improve public health preparedness in flood-prone areas. Disaster health literacy among some communities remains relatively low. Disaster training and simulations have not been implemented sustainably, while the number of health cadres and disaster volunteers at the community level remains limited. Furthermore, community participation in disaster risk reduction programs is often suboptimal due to a lack of institutional support and coordination between stakeholders (Junaidi, 2025).

The success of health preparedness programs is also greatly influenced by collaboration between communities, local governments, health care facilities, educational institutions, and community organizations. A multisectoral approach is necessary because the health risks caused by flooding are complex and cannot be resolved by one party alone. Strengthening community capacity through sustainable partnerships is believed to increase community resilience in facing disasters more effectively (Fatmah, 2025; Yanni, 2026).

Based on a recent literature review, most flood-related research still focuses on structural mitigation aspects, such as embankment construction, drainage systems, and watershed management. Meanwhile, research specifically examining public health preparedness through a community empowerment approach is still relatively limited. Several studies have demonstrated a relationship between community knowledge, attitudes, and disaster preparedness, but empirical evidence regarding the effectiveness of community empowerment programs in improving health preparedness in flood-prone areas still requires further strengthening (Yahya & Syahputra, 2025).

This research gap highlights the need for a more in-depth study of the role of community empowerment in improving health preparedness in communities living in flood-prone areas. This research is crucial because health preparedness is a long-term investment in disaster risk reduction

efforts. Through sustainable empowerment, communities are expected to become more independent, resilient, and responsive in facing the threat of flooding, thereby minimizing the resulting health impacts (Rusmaniah et al., 2025).

Therefore, research on community empowerment to improve health preparedness in flood-prone areas is necessary to analyze the level of community health preparedness, identify the role of community empowerment, evaluate the effectiveness of implemented programs, and formulate an empowerment model that can be applied sustainably. The research results are expected to provide a scientific basis for the development of community-based health programs and support government policies to strengthen community resilience to flood disasters.

METHODS

This study used a quantitative approach with a cross-sectional observational analytical design to analyze the relationship between community empowerment and public health preparedness for flooding. The cross-sectional design was chosen because it allows for the simultaneous measurement of independent and dependent variables, thus providing a snapshot of the state of public health preparedness and its influencing factors at the time of the study.

The study was conducted in Aia Pacah Village, Padang City, West Sumatra, which is one of the areas with potential flood vulnerability due to topographic conditions, high rainfall, and the development of residential areas. Data collection was carried out during the period of January to March 2026. The study population was all residents domiciled in Aia Pacah Village and aged at least 18 years. Considering the relatively large number of adults in the area, the sample size was determined using the Lemeshow formula for survey research with unknown proportions, so that the sample requirement was obtained, to anticipate the possibility of data loss or non-response of 10%, the number of samples used in the study was 420 respondents. The sampling technique used proportionate random sampling based on the neighborhood association (RW) area so that each member of the population had an equal opportunity to be selected as a respondent.

The independent variable in this study is community empowerment, while the dependent variable is public health preparedness in facing flood disasters. Community empowerment is defined as the process of increasing community capacity through involvement in disaster education activities, training, community participation, the presence of disaster preparedness cadres, and community institutional support. Health preparedness is defined as the ability of individuals and families to anticipate, respond to, and reduce health risks due to floods, which includes disaster health knowledge, family health equipment readiness, first aid skills, emergency preparedness, and utilization of health services during disasters.

Primary data were collected using a structured questionnaire based on community empowerment and health preparedness indicators developed from the literature and previous research. All questions were measured using a five-point Likert scale, ranging from strongly disagree to strongly agree. Before being used in the main study, the instrument was tested for validity and reliability on at least 30 respondents with similar characteristics to the study population. Validity testing was performed using the Pearson Product Moment correlation with the criterion of a calculated r value greater than the table r value, while instrument reliability was assessed using the Cronbach's Alpha coefficient with a minimum value of 0.70.



The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) software. Univariate analysis was performed to describe the characteristics of respondents and the distribution of each research variable in the form of frequency, percentage, mean value, and standard deviation. Furthermore, bivariate analysis was conducted to examine the relationship between community empowerment and health preparedness using Pearson or Spearman correlation tests according to the results of the data normality test. To identify the factors most influential on community health preparedness, multivariate analysis was performed using multiple linear regression with a 95% significance level ($p < 0.05$).

This research adhered to ethical research principles, including respect for respondent rights, data confidentiality, research benefits, and fairness. Prior to data collection, each respondent was given an explanation of the research objectives and asked to provide written informed consent. All information obtained was kept confidential and used solely for research purposes.

RESULTS

1. Respondent Characteristics

Table 1. Characteristics of Research Respondents (n = 420)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Man	178	42.4
Woman	242	57.6
Age		
18–35 years	143	34.0
36–55 years	192	45.7
>55 years	85	20.3
Last education		
Elementary/Middle School	101	24.0
Senior High School	214	51.0
College	105	25.0
Ever experienced a flood?		
Yes	362	86.2
No	58	13.8

Respondent characteristics indicate that the productive age group dominated the study. Most respondents had experience dealing with flooding, thus having direct exposure to the various health risks it poses. This provides a strong basis for assessing the level of public health preparedness, as most respondents had interacted with real-life disaster situations.

2. Level of Community Empowerment

Table 2. Univariate Analysis of Community Empowerment and Public Health Preparedness (n = 420)

Variable	Mean $\pm$ SD	Median (Min–Max)	Category
Community Empowerment	72.84 $\pm$ 10.51	73 (42–95)	Moderate
Public Health Preparedness	74.96 $\pm$ 11.23	75 (45–98)	Moderate

Table Distribution of Community Empowerment Levels

Category	Frequency (n)	Percentage (%)
Low	68	16.2
Currently	213	50.7
High	139	33.1
Total	420	100

The findings indicate that community empowerment is still dominated by the moderate category. This indicates that various disaster education programs, health training, and community involvement in disaster risk reduction activities have been implemented, but have not yet fully developed optimal community capacity. The existence of community groups with low levels of empowerment indicates continued limitations in access to information, participation, and institutional support for disaster preparedness activities.

Univariate analysis showed that the mean score of community empowerment was 72.84 ± 10.51 , indicating that respondents generally demonstrated a moderate level of empowerment in disaster-related health activities. Likewise, the mean score of public health preparedness was 74.96 ± 11.23 , suggesting that the overall preparedness of the community remained at a moderate level. The relatively moderate average scores for both variables indicate that although disaster preparedness programs have been implemented, substantial opportunities remain to strengthen community capacity through continuous education, active participation, institutional support, and the development of disaster preparedness cadres.

3. Public Health Preparedness Level

Table 3. Distribution of Health Preparedness Levels

Category	Frequency (n)	Percentage (%)
Low	74	17.6
Currently	201	47.9
High	145	34.5
Total	420	100

The majority of respondents ranked their health preparedness as moderate. These results indicate that the community has a basic understanding of what to do in the event of a flood, but preparedness in terms of first aid, providing family health supplies, and utilizing emergency health services still requires strengthening. These findings indicate the need for ongoing interventions to improve community preparedness toward a high level.

The univariate findings indicate that respondents obtained an average health preparedness score of 74.96 ± 11.23 , reflecting a moderate level of preparedness. Although most participants demonstrated adequate knowledge regarding flood-related health risks, variability in preparedness scores suggests that practical competencies, including emergency response skills, family health emergency planning, and utilization of health services during disasters, remain inconsistent across the study population. These findings highlight the need for sustained community-based preparedness interventions to improve both knowledge and practical readiness.



4. The Relationship between Community Empowerment and Health Preparedness

Table 4. Results of the Correlation Test between Community Empowerment and Health Preparedness

Variables	r	p-value
Community Empowerment – Health Preparedness	0.682	<0.001

Correlation analysis shows a strong positive relationship between community empowerment and health preparedness. These results indicate that increasing community capacity through disaster education, training, community engagement, and institutional support contributes to improving community capacity to address health risks during floods. The better the empowerment process received by the community, the higher their level of health preparedness.

5. Multiple Linear Regression Analysis

Table 5. Factors Influencing Public Health Preparedness

Independent Variables	B	β	t	p-value
Disaster Education	0.312	0.341	6,884	<0.001
Community Participation	0.286	0.298	5,917	<0.001
The Existence of Standby Cadres	0.251	0.243	4,876	<0.001
Institutional Support	0.174	0.187	3,925	<0.001

Model Summary:

R	R ²	Adjusted R ²	F	p-value
0.741	0.549	0.544	126,872	<0.001

The results of the multivariate analysis showed that the research model was able to explain more than half of the variation in community health preparedness. This finding indicates that the community empowerment component plays a substantial role in shaping health preparedness in flood-prone areas.

Among all the variables analyzed, disaster education emerged as the most influential factor. This indicates that increasing public knowledge about health risks, disease prevention measures, and emergency response procedures is a key foundation for building community health preparedness.

Furthermore, active community participation in community activities, the presence of disaster preparedness cadres, and institutional support have also been shown to play a significant role in strengthening health preparedness. These findings confirm that health preparedness is influenced not only by individual factors but also by the social and institutional capacities developed within the community.

Summary of Key Findings

1. The level of community empowerment and health preparedness is still dominated by the moderate category.
2. There is a positive and significant relationship between community empowerment and public health preparedness in flood-prone areas.
3. Disaster education is the most influential factor in increasing health preparedness.
4. Community participation, the presence of disaster preparedness cadres, and institutional support contribute significantly to strengthening community preparedness.

5. Community empowerment has proven to be an important strategy in increasing public health resilience in the face of flood disasters.

DISCUSSION

1. Level of Community Empowerment and its Implications for Health Preparedness

Research findings indicate that the level of community empowerment in Aia Pacah Village is still dominated by the moderate category (50.7%), while the low category was recorded at 16.2% and the high category was only 33.1%. These results indicate that although disaster education and health training programs have been implemented, community capacity has not reached the optimal level expected. This finding is in line with the results of research by Fatmah (2025) which stated that empowering health cadres and community leaders to become disaster preparedness cadres still requires significant improvement (Fatmah et al., 2024). The moderate level of empowerment reflects a gap between community potential and the realization of their capacity, caused by limited access to information, low community participation, and weak institutional support in disaster preparedness activities.

Researchers assume that the current category dominance occurs because existing empowerment programs have not been designed in a participatory and sustainable manner. Disaster training and simulation programs are often incidental and not yet integrated with the local public health system. This is reinforced by Yanni's (2026) study, which shows that community empowerment for integrated health services in disaster-prone areas still faces challenges such as short-term funding, exclusion of marginalized groups, and limited institutional support (Yanni, 2026). The implication of these findings is the need to strengthen empowerment strategies oriented towards sustainability, starting with increasing the capacity of local cadres, strengthening social networks, and integrating preparedness programs into the primary health care system.

Furthermore, the finding that the proportion of people with low levels of empowerment, reaching 16.2%, deserves serious attention. This group likely comprises those living in areas with limited access to disaster information, having low levels of education, or being less involved in community activities. Research conducted in West Pentadio Village, Gorontalo, showed that a participatory action research (PAR) approach effectively increased community knowledge by up to 85%, particularly on the topics of leptospirosis and dengue fever (Tandiabang & Paramata, 2026). These findings indicate that a participatory approach that actively involves the community in the learning process can be a solution to address low empowerment in certain groups.

2. Level of Public Health Preparedness and Determinants Influencing It

The study revealed that the level of public health preparedness in flood-prone areas was dominated by the moderate category (47.9%), with only 34.5% in the high category and 17.6% in the low category. This finding indicates that the community has a basic understanding of the actions that need to be taken during a flood, but there are still weaknesses in aspects of first aid, provision of family health supplies, and utilization of emergency health services. This condition is in line with the results of research by Sakti et al. (2026) which showed that integrated post-disaster health interventions in Aceh Tamiang faced challenges in the form of a dominance of cases of ARI, diarrhea, and skin diseases, indicating that community preparedness in preventing environmental-based diseases is not optimal (Sakti et al., 2026).



Researchers assume that the moderate level of health preparedness is caused by structural and cultural factors. Structurally, limited access to health facilities, disruptions in drug distribution, and a reduced number of health workers able to reach affected areas mean that communities lack direct experience in emergency health care. Culturally, low disaster health literacy and a lack of awareness of the importance of independent preparation hinder increased preparedness. Research by Collein et al. (2026) shows that integrated disaster training involving active community participation can increase knowledge from 58% to 86%. These findings confirm that structured and sustainable educational interventions can significantly improve community preparedness capacity (Collein et al., 2026).

Another important aspect revealed is that health preparedness is not only related to knowledge of health risks, but also encompasses practical skills such as Basic Life Support (BLS), drowning evacuation, and emergency management. A community service program in Gorontalo reported that the majority of participants were able to perform chest compressions with the correct depth and speed after participating in simulation-based training (Tandiabang & Paramata, 2026). Consequently, health preparedness improvement programs should be designed not only as a transfer of theoretical knowledge but also as practical skills training that can be directly applied in emergency situations. This type of training aligns with the ILATGANA-PHN model developed by researchers in Indonesia, which has been proven effective in increasing community capacity in disaster management through a community-based approach (Sofyana et al., 2024).

3. Positive and Significant Relationship between Community Empowerment and Health Preparedness

The results of the correlation test indicate a strong positive relationship ($r = 0.682$; $p < 0.001$) between community empowerment and health preparedness. This finding confirms that the better the empowerment process received by the community, the higher the level of health preparedness they have. This relationship can be explained through the theoretical framework that community empowerment functions as a catalyst in increasing the capacity of individuals and communities to identify risks, make decisions, and manage their resources in facing disaster threats. This finding is supported by research by Suparji et al. (2025) which shows that local wisdom-based mitigation significantly increases the effectiveness of disaster risk reduction with a coefficient of 1.201 (T-statistic 4.885) (Suparji et al., 2025).

Researchers assume that the strong relationship between empowerment and preparedness occurs through mechanisms that increase social capital and community adaptive capacity. Effective empowerment creates a conducive environment for knowledge exchange, strengthening social networks, and developing local leadership. This aligns with the findings of Fatmah (2024), who showed that health cadres and community leaders with a good understanding of natural hazards and flooding were 4.52 times more likely to have good flood management practices than those with inadequate knowledge (Fatmah et al., 2024). The social capital built through the empowerment process enables communities to support each other, share resources, and respond collectively when disasters occur.

Furthermore, research on community resilience to health emergencies identifies ten capabilities necessary for community resilience, including adaptation, transformation, absorption, anticipation, preparation, prevention, self-organization, inclusion, connection, and coping (Kessel et

al., 2025). These findings are relevant to research showing that comprehensive community empowerment encompasses multiple dimensions of these capacities. The practical implication of these findings is the importance of designing empowerment programs that focus not only on increasing knowledge but also on developing communities' adaptive and transformative capabilities in the face of increasingly uncertain environmental conditions due to climate change.

4. The Role of Disaster Education as a Dominant Factor in Improving Health Preparedness

The results of multiple linear regression analysis identified disaster education as the most dominant factor influencing health preparedness ($\beta = 0.341$; $p < 0.001$). This finding indicates that increasing public knowledge about health risks, disease prevention measures, and emergency response procedures is a key foundation in building community health preparedness. Effective disaster education not only transfers knowledge but also builds critical public awareness of the risks faced and encourages behavioral changes towards preventive measures.

Researchers assume that the dominance of disaster education occurs because knowledge is a fundamental prerequisite for preparedness. Without adequate understanding of the health risks associated with flooding, communities will lack the motivation and capacity to prepare. These findings confirm that education delivered through a direct and participatory approach has a significant impact on changing public health behaviors.

Furthermore, the effectiveness of disaster education depends heavily on delivery methods that adapt to local contexts. Community-based training programs involving simulations, role-playing, and hands-on practice have been shown to be more effective than conventional lectures. In Bangladesh, the Cyclone Preparedness Program (CPP), involving over 76,000 volunteers, successfully reduced post-cyclone diarrheal disease outbreaks by 40% through an educational approach integrated with early warning and evacuation systems (Cianconi et al., 2020). The implication of these findings is the need to develop a standardized yet flexible disaster education curriculum that can be adapted to local conditions, as well as to strengthen the capacity of local facilitators who understand the characteristics and needs of local communities.

5. Contribution of Community Participation, Disaster Preparedness Cadres, and Institutional Support

The analysis results showed that community participation ($\beta = 0.298$; $p < 0.001$), the presence of disaster preparedness cadres ($\beta = 0.243$; $p < 0.001$), and institutional support ($\beta = 0.187$; $p < 0.001$) significantly contributed to strengthening public health preparedness. This finding confirms that health preparedness is not only influenced by individual factors, but also by the social and institutional capacity developed within the community. The presence of disaster preparedness cadres who function as agents of change at the community level has proven effective in bridging formal programs with the real needs of the community. Research by Fatmah (2024) shows that health cadres and community leaders have the potential to become disaster preparedness cadres due to good disaster knowledge and the existence of a flood early warning system in the community (Fatmah et al., 2024).

Researchers assume that community participation plays a critical role in creating a sense of ownership of preparedness programs, which in turn increases program commitment and sustainability. Communities actively involved in program planning and implementation tend to be



more motivated to maintain preparedness behaviors in the long term. An integrated health intervention program in Aceh Tamiang demonstrated that active community participation in Clean and Healthy Living Behavior (PHBS), the use of Family Medicinal Plants (TOGA), and sanitation management contributed to strengthening community health resilience post-disaster (Sakti et al., 2026). The involvement of community leaders and local cadres also plays a crucial role in maintaining program sustainability by strengthening soft skills in health communication, community collaboration, social empathy, and adaptive preparedness.

Institutional support, although contributing less than other factors, remains significant in creating a conducive environment for the development of health preparedness. This support includes supportive policies, resource allocation, coordination between stakeholders, and strengthening the primary healthcare system. Studies on the role of non-structural mitigation indicate that strengthening risk identification, integrating disaster education into the curriculum, and community engagement are crucial for increasing mitigation effectiveness (Suparji et al., 2025). These findings imply the importance of multisectoral collaboration between communities, local governments, healthcare facilities, educational institutions, and community organizations in developing holistic and sustainable health preparedness programs.

6. Research Limitations

This study has several limitations that should be considered. First, the cross-sectional design used only measured variables at a single point in time, thus precluding strong causal inferences between community empowerment and health preparedness. Future longitudinal research is needed to confirm the direction of the relationship and the dynamics of change over time as the intervention continues.

Second, self-report-based measurements using questionnaires have the potential to introduce social desirability bias and recall bias. Although the instruments have undergone validity and reliability testing, these subjective measurements may not fully reflect the community's actual preparedness capacity. Future research is recommended to combine quantitative measurements with direct observation and in-depth interviews.

Third, the study was conducted in only one location (Aia Pacah Village, Padang City), so generalizing the findings to areas with different geographic, social, cultural, and economic characteristics requires caution. Replication of the study across different regions is necessary to test the consistency of the findings.

Fourth, this study did not deeply explore contextual variables that might moderate or mediate the relationship between the two variables, such as socioeconomic status, education level, access to health services, and previous flood severity. Research using a mixed-methods approach or path analysis could help identify mechanisms that facilitate or hinder the effectiveness of empowerment.

Fifth, the relatively short timeframe of the study did not allow for an evaluation of the long-term impact of the empowerment program. Research with a longer observation period is needed to assess the program's sustainability and effectiveness in the long term.

Sixth, the study did not stratify respondents based on the level of flood vulnerability in their residential areas. Communities in highly vulnerable zones may have different experiences and levels

of preparedness than those in lower-risk zones. Research with stratified sampling based on geographic vulnerability could provide a more in-depth understanding.

Seventh, the research instrument may not fully encompass all relevant dimensions of community empowerment and health preparedness. Future research is recommended to develop and validate a more comprehensive instrument with additional indicators such as collective self-efficacy, social capital, and community adaptive capacity.

However, these limitations do not diminish the important contribution of the study in providing empirical evidence on the role of community empowerment in improving health preparedness in flood-prone areas, as well as paving the way for further research to address the limitations that have been identified.

CONCLUSIONS

Based on the research results and discussions that have been described, this study concludes that the level of community empowerment and health preparedness in Aia Pacah Village is still dominated by the medium category, at 50.7% and 47.9% respectively, with a still quite significant proportion of the low category (16.2% and 17.6%), indicating that community capacity in dealing with health risks due to flooding still requires continuous strengthening, especially in the aspects of first aid, family health equipment, and utilization of emergency health services. Correlation analysis proves a strong positive relationship between community empowerment and health preparedness ($r = 0.682$; $p < 0.001$), which confirms that increasing community capacity through disaster education, training, community involvement, and institutional support contributes significantly to increasing community ability to anticipate and respond to health risks during floods. The results of multiple linear regression analysis identified disaster education as the most dominant factor ($\beta = 0.341$; $p < 0.001$), followed by community participation ($\beta = 0.298$; $p < 0.001$), the presence of disaster preparedness cadres ($\beta = 0.243$; $p < 0.001$), and institutional support ($\beta = 0.187$; $p < 0.001$), with the research model able to explain 54.9% of the variation in public health preparedness. These findings confirm that community empowerment is an important strategy in increasing community health resilience in facing flood disasters, so that the development of community-based health programs integrated with the disaster management system needs to be a priority for local government policy in efforts to reduce disaster risks holistically and sustainably, considering the increasing threat of hydrometeorological disasters due to climate change.

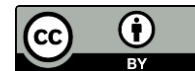
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