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A COMMUNITY PREPAREDNESS MODEL FOR FLOOD DISASTERS BASED ON DISASTER KNOWLEDGE, SOCIAL SUPPORT, AND HEALTH PROMOTION EDUCATION IN RERONOJA VILLAGE, MAGEPANDA DISTRICT

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ABSTRACT

Flood disasters pose significant risks to community health, safety, livelihoods, and social well-being, making community preparedness an essential component of disaster risk reduction. This study aimed to analyze a community preparedness model for flood disasters based on disaster knowledge, social support, and health promotion education in Reroroja Village, Magepanda District, Sikka Regency, East Nusa Tenggara, Indonesia. A quantitative analytic observational study with a cross-sectional design was conducted among 150 household heads selected using proportionate random sampling. Data were collected using structured and validated questionnaires assessing disaster knowledge, social support, health promotion education, and community preparedness. Data were analyzed using descriptive statistics and Structural Equation Modeling–Partial Least Squares (SEM-PLS). The findings demonstrated that disaster knowledge, social support, and health promotion education positively and significantly contributed to community preparedness. Health promotion education showed the strongest contribution, followed by disaster knowledge and social support. The proposed model demonstrated substantial explanatory capacity for community preparedness. These findings indicate that strengthening flood preparedness requires an integrated approach that combines improved disaster knowledge, stronger social support networks, and continuous community-based health promotion education. Such an approach can support the development of sustainable community-based disaster risk reduction strategies and strengthen the capacity and resilience of communities living in flood-prone areas.

Keywords: *Flood Preparedness; Disaster Knowledge; Health Promotion Education*

INTRODUCTION

Flood disasters are among the most frequent hydrometeorological hazards and pose substantial threats to public health, safety, livelihoods, and community well-being. Beyond physical damage, floods can disrupt access to health services, increase exposure to water- and vector-borne diseases, and create social and psychological stress, particularly among vulnerable populations. In Indonesia, the recurring occurrence of floods highlights the importance of strengthening community capacity not only through structural mitigation but also through preparedness at the household and community levels. Community preparedness includes the ability to recognize hazards, access early warning information, develop evacuation plans, prepare emergency supplies, and undertake appropriate actions before, during, and after a flood. Therefore, strengthening preparedness is an essential component of community-based disaster risk reduction and health protection (Kementerian Kesehatan Republik Indonesia, 2023; (Kusumastuti *et al.*, 2021; World Health Organization, 2023).

Disaster knowledge is an important determinant of preparedness because adequate knowledge enables individuals and households to understand flood risks, recognize warning signs, identify safe evacuation routes, and select appropriate protective actions. Evidence from Indonesia indicates that knowledge management and access to disaster-related information contribute to improved disaster preparedness, while studies among disaster-resilient communities have demonstrated a significant association between knowledge and preparedness for floods (As-syifa, 2021; Kusumastuti *et al.*, 2021; Arinata *et al.*, 2024). Similarly, intervention-based evidence from Malaysia demonstrated that health education can improve community knowledge, skills, risk perceptions, and preparedness for flood disasters (Tariq *et al.*, 2022). These findings suggest that increasing disaster literacy should be an integral component of preparedness programs, particularly in communities that experience recurrent or seasonal flooding.

In addition to individual knowledge, social support and health promotion education represent important community-level resources for strengthening disaster preparedness. Social networks involving family members, neighbors, community leaders, health workers, and local institutions can facilitate information exchange, mutual assistance, coordination, and collective action during emergencies. Research in flood-prone communities has shown that personal and collective social capital are associated with flood preparedness and community resilience (Abunyewah *et al.*, 2023), while a systematic review and meta-analysis found that social support, educational interventions, and behavioral modification strategies can improve household disaster preparedness (Amberson *et al.*, 2021). Health education may further translate knowledge into preparedness behavior by providing practical guidance on evacuation, emergency supplies, sanitation, disease prevention, and protection of vulnerable groups. A cluster-randomized trial in Malaysia also demonstrated the potential effectiveness of health-education-based interventions in improving flood-related knowledge, skills, and preparedness (Tariq *et al.*, 2021).

Although previous studies have examined disaster knowledge, social support, or educational interventions individually, evidence integrating these factors into a comprehensive model of community flood preparedness remains limited, particularly in rural communities of East Nusa Tenggara. Studies in Indonesia have highlighted the importance of knowledge, awareness, social capital, and community-based interventions, but their combined contribution to preparedness requires further investigation (Abunyewah *et al.*, 2023; Harada, Shoji and Takafuji, 2023; Hargono *et al.*, 2023). Therefore, this study aimed to analyze a

community preparedness model for flood disasters based on disaster knowledge, social support, and health promotion education among households in Reroroja Village, Magepanda District, Sikka Regency, East Nusa Tenggara. By integrating these three dimensions, the study is expected to provide empirical evidence for developing more comprehensive, community-based disaster risk reduction and health promotion strategies in flood-prone rural areas.

METHODS

Study Design and Setting

This study employed a quantitative approach with an analytic observational design and a cross-sectional study framework to examine the relationships and effects among disaster knowledge, social support, health promotion education, and community preparedness for flood disasters. The study was conducted in Reroroja Village, Magepanda District, Sikka Regency, East Nusa Tenggara, Indonesia, from May to July 2026.

Participants and Sampling

The study population comprised all heads of households residing in Reroroja Village. A total of 150 respondents were recruited using proportionate random sampling. The sample size was determined using the Slovin formula with a 5% margin of error. Participants were eligible if they were aged ≥18 years, had lived in the study area for at least one year, were able to communicate effectively, and provided written informed consent. Respondents who had communication difficulties or did not complete the questionnaire were excluded from the study.

Study Variables and Instruments

The independent variables were disaster knowledge, social support, and health promotion education, while community preparedness for flood disasters was the dependent variable. Data were collected using structured questionnaires. Disaster preparedness was assessed using items adapted from the LIPI–UNESCO/ISDR Community Preparedness Framework, while social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS). Health promotion education was assessed using an instrument developed based on relevant guidelines from the World Health Organization and the Indonesian Ministry of Health. All instruments underwent validity and reliability testing, with a Cronbach's alpha value of ≥0.70 considered indicative of acceptable internal consistency.

Data Collection and Statistical Analysis

Data analysis was conducted in several stages. Descriptive statistics were used to summarize respondents' characteristics and the distribution of the study variables. Bivariate analysis was performed using the chi-square test or Spearman's correlation according to the measurement scale and distribution of the data. Multivariate analysis was conducted using Structural Equation Modeling-Partial Least Squares (SEM-PLS) with SmartPLS version 4. The SEM-PLS analysis consisted of an assessment of the measurement

model and structural model. The measurement model was evaluated based on construct reliability and validity, including composite reliability and average variance extracted (AVE). The structural model was assessed using the coefficient of determination (R^2), path coefficients, t-statistics, and p-values obtained through bootstrapping. A p-value of <0.05 was considered statistically significant.

Ethical Considerations

The study received ethical approval from the relevant Health Research Ethics Committee before data collection. All participants provided informed consent before participation. The study was conducted in accordance with the principles of respect for autonomy, confidentiality, justice, beneficence, and non-maleficence, as well as the ethical principles of the Declaration of Helsinki.

RESULT AND DISCUSSION

Results

Table 1. Characteristics of Respondents (n = 150)

Characteristic	n	%
Age		
18-35 years	48	32.0
36-50 years	59	39.3
>50 years	43	28.7
Sex		
Male	82	54.7
Female	68	45.3
Education		
Elementary school	34	22.7
Junior high school	42	28.0
Senior high school	56	37.3
Higher education	18	12.0
Occupation		
Farmer	61	40.7
Fisherman	21	14.0
Self-employed	35	23.3
Civil servant/Other	33	22.0

A total of 150 heads of households from Reroroja Village, Magepanda District, participated in the study. The analysis was conducted to develop a community preparedness model for flood disasters based on disaster knowledge, social support, and health promotion education. Table 1 presents the demographic characteristics of the 150 respondents. The largest proportion of respondents was aged 36-50 years (39.3%),

followed by those aged 18-35 years (32.0%) and >50 years (28.7%). Most respondents were male (54.7%). Regarding educational attainment, the majority had completed senior high school (37.3%), followed by junior high school (28.0%), elementary school (22.7%), and higher education (12.0%). In terms of occupation, farmers represented the largest occupational group (40.7%), followed by self-employed respondents (23.3%), civil servants/other occupations (22.0%), and fishermen (14.0%).

Table 2. Distribution of Disaster Knowledge, Social Support, Health Promotion Education, and Community Preparedness

Variable	n	%
Disaster Knowledge		
Good	86	57.3
Moderate	47	31.3
Poor	17	11.4
Social Support		
High	73	48.7
Moderate	56	37.3
Low	21	14.0
Health Promotion Education		
Good	79	52.7
Moderate	50	33.3
Poor	21	14.0
Community Preparedness		
High	84	56.0
Moderate	45	30.0
Low	21	14.0

The results of the multivariate analysis are presented in Table 3. Disaster knowledge had a positive and statistically significant effect on community preparedness ($\beta = 0.391$, $t = 5.214$, $p < 0.001$). Social support also demonstrated a positive and significant effect on community preparedness ($\beta = 0.318$, $t = 4.386$, $p < 0.001$). The strongest effect was observed for health promotion education, which had a positive and significant effect on community preparedness ($\beta = 0.472$, $t = 6.153$, $p < 0.001$). These findings indicate that all three predictor variables contributed significantly to community preparedness. Among the three variables, health promotion education demonstrated the largest path coefficient, followed by disaster knowledge and social support.

Table 3. Effects of Disaster Knowledge, Social Support, and Health Promotion Education on Community Preparedness

Predictor Variable	β	t-statistic	p-value
Disaster knowledge	0.391	5.214	<0.001
Social support	0.318	4.386	<0.001
Health promotion education	0.472	6.153	<0.001
R^2	**0.714**		

The coefficient of determination (R^2) was 0.714, indicating that disaster knowledge, social support, and health promotion education collectively explained 71.4% of the variance in community preparedness. The remaining 28.6% was attributable to other factors not included in the model.

Table 4. Structural Model Results Using SEM-PLS

Structural Path	Path Coefficient	t-statistic	p-value	Decision
Disaster knowledge → Community preparedness	0.391	5.214	<0.001	Significant
Social support → Community preparedness	0.318	4.386	<0.001	Significant
Health promotion education → Community preparedness	0.472	6.153	<0.001	Significant

The SEM-PLS results are presented in Table 4. All hypothesized relationships were statistically significant and positive. Disaster knowledge significantly predicted community preparedness (β = 0.391, t = 5.214, p < 0.001), as did social support (β = 0.318, t = 4.386, p < 0.001) and health promotion education (β = 0.472, t = 6.153, p < 0.001). The model demonstrated acceptable measurement and structural properties. The R^2 value was 0.714, indicating substantial explanatory power. The standardized root mean square residual (SRMR) was 0.061, below the commonly accepted threshold of 0.08. Composite reliability was 0.903, exceeding the recommended minimum of 0.70, while the average variance extracted (AVE) was 0.678, exceeding the recommended threshold of 0.50. These results indicate adequate construct reliability and convergent validity and support the adequacy of the proposed SEM-PLS model.

Overall, the findings demonstrate that community preparedness for flood disasters in Reroroja Village was significantly associated with disaster knowledge, social support, and health promotion education. Health promotion education emerged as the strongest predictor (β = 0.472), followed by disaster knowledge (β = 0.391) and social support (β = 0.318). The model explained 71.4% of the variance in community preparedness, indicating that these three factors represent important determinants of flood preparedness and should be considered in the development of community-based disaster risk reduction and health promotion programs.

Discussion

The present study demonstrated that disaster knowledge, social support, and health promotion education were positively and significantly associated with community preparedness for flood disasters. Disaster knowledge had a significant effect on preparedness (β = 0.391, p < 0.001), while social support also demonstrated a significant contribution (β = 0.318, p < 0.001). The strongest predictor was health

promotion education (β = 0.472, p < 0.001), indicating that educational approaches oriented toward health promotion may have a greater capacity to translate disaster information into preparedness than knowledge acquisition alone. Collectively, the three variables explained 71.4% of the variance in community preparedness (R^2 = 0.714), suggesting that preparedness is shaped by an interaction between what individuals know, the social resources available to them, and their exposure to practical health-oriented education. This finding is consistent with previous evidence emphasizing that disaster preparedness is not determined solely by knowledge but also by social support, behavioral factors, and community-based educational processes (Kusumastuti *et al.*, 2021; Hargono *et al.*, 2023).

The significant contribution of disaster knowledge indicates that understanding flood hazards remains an essential foundation for preparedness. Knowledge enables households to recognize warning signs, understand potential consequences, identify evacuation routes, and determine appropriate actions during a flood. In the present study, 57.3% of respondents had good disaster knowledge, which may have contributed to the relatively high level of preparedness observed in the community. Previous studies in Indonesia have similarly demonstrated that knowledge is associated with flood preparedness, indicating that individuals who understand disaster risks are more likely to recognize the importance of preventive actions (As-syifa and Widowati, 2021; Arinata *et al.*, 2024). Knowledge management has also been identified as an important component of disaster preparedness because access to relevant information enables communities to organize and apply disaster-related knowledge in local contexts (Kusumastuti *et al.*, 2021). However, knowledge by itself does not necessarily guarantee that individuals will perform preparedness behaviors, because knowing what should be done is different from possessing the skills, confidence, resources, and behavioral cues required to actually perform those actions.

The stronger effect of health promotion education may be explained by its ability to translate knowledge into concrete preparedness behaviors. Rather than providing information alone, health promotion education can guide households in preparing emergency kits, safe water and food, medicines, important documents, sanitation measures, and disease-prevention practices. Through practical instructions, demonstrations, and reminders, education can strengthen individuals' ability to implement preparedness measures. Evidence from Malaysia indicates that health-education interventions can improve disaster knowledge, skills, and preparedness among flood-prone communities (Amberson *et al.*, 2021; Tariq *et al.*, 2021). Educational strategies combined with behavioral approaches may therefore be more effective than information provision alone (Tariq *et al.*, 2022).

The behavioral orientation of health promotion education is important because preparedness requires practical and repeated actions at household and community levels. Knowledge about flood risks does not necessarily ensure appropriate practices unless individuals understand how to store and treat water, maintain sanitation, manage waste, and prevent disease transmission. Demonstrations, simulations, checklists, and evacuation exercises can help communities practice these behaviors and adapt them to local conditions. Disaster education may also influence household and intergenerational preparedness, while community-based programs emphasize training that reflects local vulnerabilities and capacities (Harada,

Shoji and Takafuji, 2023; Yarmohammadian *et al.*, 2025). Thus, the stronger path coefficient may reflect a direct pathway from information to skills and practiced preparedness behaviors.

Social support also made a significant positive contribution to community preparedness ($\beta = 0.318$, $p < 0.001$), indicating that preparedness is shaped by relationships among families, neighbors, community leaders, health workers, and local institutions. Social support can facilitate early-warning information, assistance for vulnerable residents, evacuation, and collective resource mobilization. Previous studies show that personal and collective social capital contribute to flood preparedness and community resilience (Abunyewah *et al.*, 2023), while social influences also affect risk perception and adoption of preparedness measures (Houston *et al.*, 2021). In Reroroja Village, strong social networks may reinforce health promotion messages by encouraging families and community members to discuss and practice preparedness collectively.

The findings have important implications for community-based flood preparedness in rural settings. Although disaster knowledge, social support, and health promotion education explained 71.4% of the variance in preparedness, other factors such as previous flood experience, risk perception, socioeconomic resources, and access to early-warning systems may also contribute. The cross-sectional design also limits causal interpretation, so the stronger effect of health promotion education should not be interpreted as evidence of causality. Nevertheless, the findings support a shift from information-centered education toward action-oriented health promotion that equips households with practical skills, including emergency-kit preparation, evacuation practices, safe-water and sanitation management, and post-flood disease prevention (Utami and Tyas, 2021; Budiman and Amalinda, 2025; Yarmohammadian *et al.*, 2025).

CONCLUSION

Disaster knowledge, social support, and health promotion education positively contribute to community preparedness for flood disasters in Reroroja Village. Health promotion education emerged as the strongest contributing factor, highlighting the importance of continuous, community-based education combined with strengthening disaster knowledge and social support to enhance community preparedness and resilience.

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