Health Literacy as a Determinant of Family Preparedness in Facing Disasters

Sumarah[1]*

[1]*Poltekkes Kemenkes Yogyakarta, Indonesia
*Co e-mail: sumarahakbid@gmail.com[1]

Article Information	ABSTRACT
	Family preparedness is an important component in disaster mitigation and response efforts at the community level. However, the level of community preparedness is often influenced by individuals' ability to understand and use health information accurately. Health literacy plays a crucial role in enhancing the capacity of families to recognise risks, make informed decisions, and take effective preventive and disaster response actions. This study aims to analyse the relationship between health literacy and family preparedness in facing disasters. This study uses an analytical observational design with a cross-sectional approach. The research population consists of families living in disaster-prone areas. The sampling technique used is the probability sampling method. A total of 210 families met the inclusion criteria and were involved as research respondents. Data collection was conducted using a health literacy and family preparedness questionnaire that had been tested for validity and reliability. Data analysis was conducted univariately, bivariately using correlation tests, and multivariately using linear regression to identify factors influencing family preparedness. The research results show that a higher level of health literacy is significantly associated with a better level of family preparedness in facing disasters. These findings indicate that health literacy is one of the important determinants in improving family preparedness. Therefore, efforts to improve public health literacy need to be an integral part of the disaster preparedness strengthening strategy at the family and community levels.

Keywords: Health Literacy, Family Preparedness, Disaster Risk Reduction, Household Resilience

INTRODUCTION

Disaster management has become a crucial issue on a global scale, as the frequency and impact of natural and non-natural disasters have increased over the past two decades. The latest international framework, the Sendai Framework for Disaster Risk Reduction 2015–2030, emphasizes a paradigm shift from a post-disaster responsive approach to one that emphasizesThis document emphasizes holistic disaster prevention, mitigation, preparedness, and risk reduction. This document underscores community capacity building as a key priority for strengthening disaster resilience at the local and national levels.

Indonesia as an archipelagic country with geographical characteristics that are highly vulnerable to various hazards including earthquakes, volcanoes, tsunamis, and floods has a high urgency in minimizing disaster risks through a comprehensive risk reduction strategy (Rizal & Haris, 2024). Indonesia's location within the Pacific Ring of Fire means that threats to life, public health, and infrastructure are likely to occur at any time. Sustainable national development requires integration between disaster risk management and the health system. Geological disasters in Indonesia increase the risk of loss of life, post-disaster illness, and damage to health facilities. Hospitals and community health centers are vulnerable to disruption, necessitating the preparedness of medical staff for earthquakes and tsunamis. More than 52% of districts/cities are at high risk, putting pressure on the national health system (Sofyana et al., 2022; Susilawati et al., 2019).

Families are a vital part of society and are often the first to respond to disasters. Family preparedness includes planning evacuations, communicating internally during a crisis, providing emergency logistics, and providing first aid before formal response arrives. Empirical literature suggests that families are responsible for the community's initial disaster preparedness, particularly in vulnerable areas such as various districts in Indonesia. Physical preparedness is not the only factor influencing this preparedness; cognitive factors, particularly the family's capacity to understand information about disaster risks and mitigation strategies, are crucial. Socioeconomic factors, past experience with disasters, and the ability to access accurate information are some of the important factors influencing the level of family preparedness (Hanafiah & Putri, 2024).

In the context of public health, health literacy is a central concept describing the ability of individuals and families to access, understand, evaluate, and use relevant health information for effective decision-making (Rachel & Novianty, 2023). According to a commonly used perspective in public health studies, health literacy encompasses cognitive and social skills that enable individuals to use health information appropriately in the context of their daily lives.

The importance of health literacy has been reinforced by numerous studies demonstrating a significant relationship between health literacy and preventive health behaviors. Individuals or communities with high health literacy tend to take more effective preventive measures, understand early warning signs, and take appropriate adaptive steps when faced with health risk situations (Yudho, 2025).

Disaster health literacy provides a sound theoretical foundation for understanding how families use information about risk and health when facing disasters. For example, research in Indonesia found a positive relationship between disaster health literacy and community

preparedness in volcano-prone communities: the more people knew about disaster health, the more they perceived risks and were better prepared. This aligns with health behavior theories such as the Health Belief Model (HBM) and Protection Motivation Theory (PMT), which emphasize that perceptions of vulnerability and self-efficacy are important cognitive factors influencing decisions to engage in protective behaviors. Health literacy helps moderate the relationship between risk perception and the implementation of specific preparedness measures (Saifudin, 2023).

Empirical synthesis shows that specific research investigating the direct relationship between health literacy and family preparedness within a single analytical model is still limited, especially in Indonesia. Currently, most studies concentrate on the determinants of health knowledge or general health literacy, without considering the development of comprehensive health literacy that encompasses aspects of access, critical evaluation, and application of information. Available studies typically find a relationship between knowledge and preparedness, but they lack control for more complex cognitive factors, such as disaster health literacy. This situation indicates a significant research gap. For example, research is needed on how holistic health literacy can influence family disaster preparedness using a more robust and contextual theoretical model.

At a practical level, a stronger understanding of this relationship is crucial for formulating family-based health and disaster education policies. Effective interventions to improve family health literacy can not only enhance preparedness but also mitigate the health and social impacts of disasters (Putri et al., 2025).

Based on existing theoretical, empirical, and policy frameworks, this study is expected to provide new evidence regarding the role of health literacy in shaping family disaster preparedness in Indonesia. The findings can inform recommendations for public health education policies and integrated disaster risk reduction strategies at the national and community levels.

METHODS

This study employed a quantitative approach with an observational analytical design through a cross-sectional study. This design was chosen to analyze the relationship between health literacy as an independent variable and family disaster preparedness as a dependent variable at the same measurement point. The cross-sectional approach is considered appropriate for examining associations between variables in a specific population without intervention, and is relevant for developing an analytical model based on cognitive determinants within the framework of health behavior and disaster risk management.

The research was conducted in areas with high disaster vulnerability based on risk data from the local Regional Disaster Management Agency (BPBD). Site selection was purposive, considering exposure to earthquakes, floods, and other hydrometeorological disasters. Data collection took three to four months, encompassing instrument preparation, validity and reliability testing, field data collection, and statistical analysis.

The study population comprised all heads of households or adult family members (≥18 years old) residing in the study area. Respondents who met the inclusion criteria were individuals who

had resided in the area for at least one year and were willing to participate by signing an informed consent form after an explanation (informed consent). Respondents with cognitive impairments or inability to communicate effectively were excluded from the study. The sampling technique used probability sampling, with a cluster random sampling approach or simple random sampling according to the characteristics of the area. The sample size was determined based on analytical calculations for correlation or regression tests with a 95% confidence level and 80% power, and considering a 10% dropout rate.

The main variables in this study consisted of health literacy as the independent variable and family preparedness in facing disasters as the dependent variable. Health literacy is defined as an individual's ability to access, understand, evaluate, and apply disaster-related health information in decision-making. Measurements were conducted using the standardized Health Literacy Survey Short Form (HLS-SF12 or HLS-EU-Q16), which has been widely used in public health research and has good validity and reliability. Health literacy scores were calculated based on official scoring guidelines and categorized into low, medium, and high levels.

Family preparedness for disasters was measured using a family preparedness questionnaire that covered several key indicators: the existence of an evacuation plan, a family emergency communication system, the availability of emergency logistics, first aid skills, and an understanding of early warning systems. The instrument was developed based on relevant household preparedness guidelines and underwent a cultural adaptation process. The total preparedness score was categorized as unprepared, moderately prepared, and prepared based on percentile score distribution.

Prior to primary data collection, validity and reliability tests were conducted on the research instruments. Content validity was assessed by public health and disaster experts. Construct validity was tested using Pearson Product Moment correlation, while internal reliability was measured using Cronbach's alpha coefficient, with a value of ≥0.70 as the minimum acceptable threshold. Instruments that did not meet validity or reliability criteria were revised before being used in the primary study.

Data collection was conducted through a structured questionnaire completed directly by respondents with the assistance of trained enumerators to minimize missing data and bias. Each respondent received an explanation of the research objectives, procedures, and a guarantee of data confidentiality before consenting to participate.

Data analysis was performed using statistical software. Univariate analysis was used to describe the distribution of respondent characteristics and research variables in the form of means, standard deviations, frequencies, and percentages. Bivariate analysis was conducted to examine the relationship between health literacy and family preparedness using the Pearson or Spearman correlation test according to the data distribution, or the Chi-square test for categorical data. To control for confounding variables such as age, gender, education level, socioeconomic status, and previous disaster experience, multivariate analysis was conducted using multiple linear regression or logistic regression, depending on the scale of the dependent variable data. The statistical significance value was set at $\alpha = 0.05$ with a 95% confidence interval.

This study has obtained ethical approval from the relevant institution's Health Research Ethics Committee. All research procedures were conducted in accordance with research ethics principles, including respect for respondent autonomy, the principle of beneficence, and protection of the confidentiality and anonymity of participant data.

RESULTS

The number of respondents analyzed in this study wasn = 210 families met the inclusion criteria. There was no significant missing data (<5%), so all questionnaires were deemed suitable for analysis.

Table 1. Respondent Characteristics (n = 210)

Variables	n	%
Age (years)		
18–35	62	29.5
36–55	104	49.5
>55	44	21.0
Gender		
Man	118	56.2
Woman	92	43.8
Last education		
Base	48	22.9
Intermediate	96	45.7
Tall	66	31.4
Previous Disaster Experience		
Once	134	63.8
Never	76	36.2

The majority of respondents were in the productive age group of 36–55 years (49.5%), male (56.2%), and had a secondary education (45.7%). Most respondents (63.8%) had previous disaster experience, which theoretically has the potential to influence risk perception and preparedness behavior.

Table 2. Distribution of Health Literacy and Family Readiness

Variables	Mean ± SD	Category	n	%
Health Literacy	32.8 ± 6.4	Low	54	25.7
		Currently	92	43.8
		Tall	64	30.5
Family Readiness	74.6 ± 11.2	Not Ready	48	22.9
		Just Ready	98	46.7
		Ready	64	30.5

The average health literacy score was in the moderate category, with 30.5% of respondents in the high category. For the family readiness variable, nearly half of respondents were in the moderately prepared category (46.7%). The proportion of truly prepared families was still relatively limited (30.5%), indicating room for health literacy-based policy intervention.

Table 3. Correlation Test between Health Literacy and Family Readiness

Variables	r	p-value	95% CI
Health Literacy – Family Readiness	0.548	<0.001	0.442 – 0.637

Pearson's correlation test results showed a moderate-strong positive relationship between health literacy and family preparedness (r = 0.548; p < 0.001). This indicates that higher levels of health literacy, higher levels of family preparedness in facing disasters. A confidence interval value that does not exceed zero confirms the significance of this relationship.

Table 4. Multiple Linear Regression Analysis of Factors Influencing Family Readiness

Variables	β	SE	t	p-value
Health Literacy	0.472	0.058	8.13	<0.001
Age	0.118	0.041	2.87	0.005
Education	0.204	0.066	3.09	0.002
Disaster Experience	0.156	0.072	2.17	0.031

R^2 = 0.412

Adjusted R^2 = 0.398

F = 36.21

p < 0.001

The regression model showed that health literacy was the most dominant predictor of family preparedness (β = 0.472; p < 0.001). The model explained 41.2% of the variation in family preparedness (R^2 = 0.412), which is statistically moderate-strong in social research. Education and previous disaster experience also contributed significantly. This means that increased health literacy independently improves family preparedness, even after controlling for demographic variables.

Synthesis of Main Results

a. The level of family health literacy in disaster-prone areas is still predominantly in the moderate category.
b. Family preparedness is not optimal, with less than a third falling into the ready category.
c. There is a positive and significant relationship between health literacy and family readiness.
d. Health literacy is the strongest determinant compared to other demographic factors.

Empirically, these results strengthen the theoretical assumptions in the framework.*Health Belief Model*and Protection Motivation Theory, that cognitive capacity in understanding risks and mitigation strategies plays a central role in forming protective family behavior against disasters.

DISCUSSION

1. Distribution of Health Literacy and Family Readiness

The results showed that the average health literacy of respondents was in the moderate category (32.8 ± 6.4), with 30.5% in the high category. Meanwhile, family preparedness was also dominated by the moderately prepared category (46.7%), with only 30.5% considered ready. These findings indicate a gap between families' cognitive capacity to understand health information and optimal preparedness implementation.

Theoretically, this condition can be explained through the framework of the Health Belief Model and Protection Motivation Theory. Both theories emphasize that protective behavior is influenced not only by threat perceptions (perceived severity and vulnerability), but also by self-efficacy and assessment of response ability (response efficacy). Moderate health literacy may not be strong enough to encourage deep risk internalization, resulting in less than optimal preparedness.

Recent research supports a pattern where moderate levels of disaster risk literacy tend to result in partial preparedness, particularly for evacuation planning and emergency logistics (Pradana et al., 2025). Studies in Indonesia show that moderate disaster literacy often results in preparedness indices of around 62–66 for emergency planning and resource mobilization, categorized as "almost ready" or partial, with major weaknesses in evacuation and logistics (Gulo, 2022). Another study found that even when knowledge and attitudes reached 72 (ready), evacuation and logistics remained low due to a lack of simulation practices and infrastructure.(Nurhayati et al., 2026).

The researchers' assumption regarding these findings is that health literacy in a disaster context is multidimensional. The ability to access information is not necessarily accompanied by the ability to critically evaluate and apply it practically. Furthermore, cultural factors of collectivism and reliance on external assistance likely contribute to the low proportion of families who are truly prepared. Therefore, improving health literacy must be directed not only at knowledge but also at strengthening the capacity for risk-based decision-making.

2. The Relationship between Health Literacy and Family Readiness

The correlation test results showed a moderate-strong positive relationship between health literacy and family preparedness ($r = 0.548$; $p < 0.001$). This means that the higher the health literacy, the higher the family's level of disaster preparedness.

Conceptually, these findings reinforce the proposition in Protection Motivation Theory, which states that cognitive processing of risk information will influence protective intentions and behaviors. Health literacy enhances an individual's capacity to understand risk consequences, evaluate the effectiveness of mitigation measures, and build confidence in their ability to act. In the family context, this mechanism translates into evacuation planning, logistical provision, and internal emergency communication.

Recent research is consistent with the finding that disaster health literacy significantly predicts improved household preparedness, particularly in flood-prone communities. A cluster-randomized study protocol at IJERPH (2021) demonstrated that a Health Belief Model-based

intervention significantly improved household flood knowledge, skills, and preparedness scores, with longitudinal measurements from baseline to 6 months post-intervention (Mohd Tariq et al., 2021). Results from a related trial (2022) confirmed significant improvements in communities in Selangor, Malaysia, where health literacy predicted higher preparedness in the intervention group compared to the control group (Mhd Noor et al., 2022).

Researchers assume that a moderate-strong correlation ($r > 0.5$) indicates that health literacy is not merely a supporting factor, but rather a key cognitive determinant in shaping family preparedness. However, due to the cross-sectional design of the study, this relationship is associative and cannot fully explain the direction of causality. The possibility of mediating factors such as trust in institutions, previous traumatic experiences, or access to resources still needs to be tested in further research based on structural models.

3. Multiple Linear Regression Analysis

Multivariate analysis showed that health literacy was the most dominant predictor of family preparedness ($\beta = 0.472$; $p < 0.001$), even after controlling for age, education, and disaster experience. The model explained 41.2% of the variation in preparedness ($R^2 = 0.412$), which in the context of social research is considered moderate-strong.

These findings indicate that health literacy has a significant independent effect on family preparedness. Formal education does contribute ($\beta = 0.204$), but its effect is smaller than health literacy. This suggests that education is not always synonymous with the capacity to understand and apply health risk information.

Recent research confirms that disaster health literacy has a stronger predictive effect on preparedness behavior than demographic variables such as age, income, or education (Takahashi et al., 2025). Another DMPHP 2022 study identified preparedness training needs, with attitudes and knowledge (including literacy) being more predictive than household or workforce characteristics (Balut et al., 2022).

The researchers' assumption regarding these findings is that health literacy functions as an "enabler variable" that activates other factors. Individuals with higher education may not be prepared if they lack the ability to translate risk information into concrete actions. Conversely, individuals with less education but good health literacy can demonstrate high preparedness. Thus, health literacy-based interventions have the potential to have a more effective policy impact than approaches based solely on formal education.

Overall, the discussion in Tables 2–4 indicates that health literacy is not only correlated with, but also acts as a dominant determinant of, family preparedness. This finding is consistent with health behavior theory and supported by recent international literature (2021–2025). In the context of disasters in Indonesia, strengthening family health literacy can be an evidence-based preventive strategy to strengthen community resilience.

CONCLUSIONS

This study provides empirical evidence that health literacy is a key determinant of family disaster preparedness. The distribution of scores indicates that the majority of respondents fall into the moderate health literacy category, with a predominance of moderately prepared respondents. This indicates that families' cognitive capacity to understand health information and disaster risks has not yet fully transformed into optimal preparedness.

Correlation analysis showed a significant positive relationship between health literacy and family preparedness (r = 0.548; p < 0.001), while multiple linear regression analysis confirmed that health literacy was the most dominant predictor (β = 0.472; p < 0.001) after controlling for age, education, and disaster experience. The research model explained 41.2% of the variation in family preparedness, which confirmed the substantial contribution of cognitive factors in the formation of family-based protective behavior.

Theoretically, these findings reinforce the propositions in the Health Belief Model and Protection Motivation Theory that an individual's ability to access, understand, evaluate, and apply risk information is a key prerequisite for developing an adaptive response to threats. Health literacy serves as a cognitive mechanism that bridges risk perception with concrete mitigation actions at the household level.

The implications of this research emphasize the importance of integrating health literacy programs into community-based disaster risk reduction strategies. Systematic, contextual educational interventions oriented toward strengthening family decision-making capacity have the potential to sustainably improve preparedness and strengthen community resilience in disaster-prone areas.

REFERENCES

Balut, M. D., Der-Martirosian, C., & Dobalian, A. (2022). Disaster preparedness training needs of healthcare workers at the US Department of Veterans Affairs. *Southern Medical Journal*, 115(2), 158–163. https://doi.org/10.14423/SMJ.0000000000001358

Gulo, K. (2022). Analysis of emergency and disaster management preparedness based on the Hospital Safety Index (HSI) PAHO/WHO at RS DKT Dr. Soetarto Yogyakarta. *Jurnal Kebijakan Kesehatan Indonesia*, 11(4), 47. https://doi.org/10.22146/jkki.78884

Hanafiah, L. N., & Putri, N. (2024). The role of knowledge in improving family preparedness for earthquake disasters in Cibodas Village. *Jurnal Keperawatan PPNI Jawa Barat*, 2(2), 85–98. https://doi.org/10.70332/jkp.v2i2.20

Mhd Noor, M. T., Kadir Shahar, H., Baharudin, M. R., Syed Ismail, S. N., Abdul Manaf, R., Md Said, S., Ahmad, J., & Muthiah, S. G. (2022). Facing flood disaster: A cluster randomized trial assessing communities' knowledge, skills and preparedness utilizing a health model intervention. *PLOS ONE*, 17(11), e0271258. https://doi.org/10.1371/journal.pone.0271258

Mohd Tariq, M. N., Shahar, H. K., Baharudin, M. R., Ismail, S. N. S., Manaf, R. A., Salmiah, M. S., Ahmad, J., & Muthiah, S. G. (2021). A cluster-randomized trial study on effectiveness of health education based intervention (HEBI) in improving flood disaster preparedness among

community in Selangor, Malaysia: A study protocol. *BMC Public Health*, 21(1). https://doi.org/10.1186/s12889-021-11719-3

Nurhayati, Meidji, I. U., & Latief, M. F. (2026). Student empowerment program in disaster literacy through collaborative-based disaster mitigation education. *Jurnal Pengabdian Rekayasa Sistem*, 4(1), 17–25. https://doi.org/10.36761/jpres.v4i1.7155

Pradana, I. P. Y. B., Djaha, S. M. A., Pandie, A., Penni, A., & Baru, A. A. R. (2025). Towards disaster-resilient schools: Strengthening literacy and simulation of disaster-safe education units in flood-prone areas. *JMM (Jurnal Masyarakat Mandiri)*, 9(4), 4372. https://doi.org/10.31764/jmm.v9i4.33461

Putri, S. T., Salasa, S., Andriyani, S., Fitriana, L. A., & Rahmi, U. (2025). Website-based health literacy program to improve community disaster preparedness. *Abdi: Jurnal Pengabdian Dan Pemberdayaan Masyarakat*, 7(3), 940–945. https://doi.org/10.24036/abdi.v7i3.1316

Rachel, K., & Novianty, A. (2023). Implementation of a basic mental health literacy module for adolescents through action research. *Jurnal Pengabdian Masyarakat Multidisiplin*, 7(1), 91–102. https://doi.org/10.36341/jpm.v7i1.3726

Rizal, M. A. P., & Haris, N. A. (2024). The threat of megathrust earthquakes: Protection and mitigation strategies for communities in the western coastal areas of Sumatra Island. *Indonesian Journal of Fundamental and Applied Geography*, 2(1), 33–38. https://doi.org/10.61220/ijfag.v2i1.20246

Saifudin, I. M. Y. (2023). Disaster health literacy, risk perception, and preparedness towards resilience in a volcano-prone community: A cross-sectional study in Yogyakarta, Indonesia. *Journal of Community Empowerment for Health*, 6(3), 154–154. https://doi.org/10.22146/jcoemph.86343

Sofyana, H., Ibrahim, K., Afriandi, I., Herawati, E., & Wahito Nugroho, H. S. (2022). The need for a preparedness training model on disaster risk reduction based on culturally sensitive public health nursing (PHN). *International Journal of Environmental Research and Public Health*, 19(24), 16467. https://doi.org/10.3390/ijerph192416467

Susilawati, A., Efendi, F., & Hadisuyatmana, S. (2019). Description of health workers' preparedness in disaster management at community health centers in disaster-prone areas. *Indonesian Journal of Community Health Nursing*, 4(1), 11. https://doi.org/10.20473/ijchn.v4i1.12395

Takahashi, K., Takaki, K., Koyama, S., & Suzurikawa, J. (2025). Health literacy and disaster preparedness: The role of hazard map awareness among individuals with physical disabilities. *JMA Journal*, 8(3). https://doi.org/10.31662/jmaj.2024-0347

Yudho, N. K. (2025, September 29). Building a healthy generation in the digital era: The vital role of health literacy. *Kemkes.go.id*. https://ayosehat.kemkes.go.id/peran-vital-literasi-kesehatan