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MORALITY BEFORE KNOWLEDGE

Disaster preparedness in vulnerable rural communities: Integrating preparedness index and demographic variables in a post-landslide context

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ABSTRACT
Background: Landslides are natural disasters that often result in significant human and material losses, especially in areas with unstable topography. In Jombang Regency, East Java, a major landslide occurred on January 28, 2014, in Kopen Hamlet, Bareng District, killing 14 people and destroying infrastructure. This study aims to examine the level of disaster preparedness among the local community of Kopen Hamlet in anticipation of future landslides. **Methods:** This research employed a quantitative approach using survey and interview methods to collect primary data. A preparedness index was used to measure the readiness level of residents, while the Kolmogorov-Smirnov method was applied to test the normality of the data distribution based on demographic variables such as gender, age, and education. **Findings:** The study found that 68% of respondents were classified as sufficiently prepared, and 69% were nearly prepared depending on demographic factors. The Kolmogorov-Smirnov test yielded an Asymp. Sig (2-tailed) value of 0.063, indicating that the data were normally distributed. Preparedness levels were relatively consistent across different community groups. **Conclusion:** The results highlight the importance of demographic factors in community disaster preparedness and provide a foundation for targeted risk reduction interventions in similar vulnerable areas. **Novelty/Originality of this article:** This study uniquely integrates a preparedness index with demographic analysis in a post-disaster context, offering empirical insights from a localized rural community that has received limited prior research attention in Indonesian landslide risk studies.

KEYWORDS: BPBD (regional disaster management agency); community; disaster preparedness; landslides; risk evaluation.

1. Introduction

Geologically, Indonesia is an archipelagic country because it is situated on three tectonic plates: the Eurasian Plate (which encompasses the Asian Continent), the Indo-Australian Plate (encompassing the Australian Continent), and the Pacific Plate (encompassing the Indian and Pacific Oceans). A volcanic belt surrounds the islands of Sumatra, Java, Nusa Tenggara, and Sulawesi (BNPB, 2019). Thus, Indonesia is likely to experience natural disasters, including floods, earthquakes, volcanic eruptions, landslides, and tsunamis. Landslides are the movement of materials such as boulders and soil debris

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that form a slope and then flow downward due to gravity (Ratnawati et al., 2021). According to the BPS data cycle of East Java Province, 32 landslide events occurred in Jombang Regency from 2014 to 2021. There were seven landslides in Jombang Regency in 2014 (Statistics, 2023), causing casualties, damage to public infrastructure, and the destruction of residents' houses in Kopen hamlet on January 28, 2014, burying five homes and 14 people under the landslide, the land in Bareng sub-district stretched for 64.05 km (BPS JOMBANG, 2023). A series of steep mountains mark this location in the Anjasmara mountain range (Al Farisy et al., 2023).

East Java Province is particularly vulnerable to hydrometeorological disasters, with a significant increase in incidents over the past few years, including 78 disasters reported in early 2024 alone, mainly due to strong winds and floods (Adinata et al., 2025; Wardhani et al., 2022). The vulnerability of these regions is exacerbated by inadequate disaster management strategies and resource allocation, as highlighted by a study that categorizes areas into low, medium, and high-risk zones based on the frequency and impact of disasters (Adinata et al., 2025). In addition, flood vulnerability mapping in specific districts, such as Lamongan, employs a multi-criteria approach to assess risk, indicating that factors like population density and historical flooding have a significant impact on disaster outcomes (Fariza et al., 2022). The Geographically Weighted Regression (GWR) model further elucidates the relationship between environmental variables and flood events, achieving higher prediction accuracy compared to traditional methods (Nizar et al., 2023). Collectively, the study highlights the urgent need to enhance disaster preparedness and implement targeted interventions in East Java.

The latest report from the Indonesian Forum for the Environment/*Wahana Lingkungan Hidup Indonesia* (WALHI) of East Java highlights the profound impact of climate change, which is now increasingly tangible and measurable, especially in the East Java region. One of the most striking manifestations of the climate crisis is the emergence of conflicting extreme weather phenomena, such as prolonged droughts that hit much of the interior, as well as severe floods that occur in lowland and coastal areas. The combination of these two extreme events has affected at least 27 districts in East Java, with the primary impact being a water crisis in drought-prone areas and damage to flooded agricultural land in flood-affected areas. This condition is not a mere natural occurrence. Still, it is a real reflection of the climate pattern that has been disrupted by the accumulation of greenhouse gas emissions and the massive exploitation of natural resources over the past few decades. Global climate change has been shown to exacerbate hydrological extremes, which refer to conditions related to the distribution and intensity of water, including rainfall and drought. Changes in meteorological patterns influenced by global warming lead to an increase in the frequency and intensity of hydrometeorological events such as flash floods and extreme droughts, and this is increasingly triggered by human activities that undermine the environmental balance, such as deforestation and the development of infrastructure that is not environmentally friendly (Manfreda et al., 2018; Stott, 2016).

In addition to drought and floods, the WALHI report also highlights the increasing incidence of forest and land fires in East Java in recent years. During 2024 alone, more than 18,000 hectares of land were recorded as experiencing fires, making this province one of the regions with the highest rates of forest and land fires in Indonesia. This phenomenon cannot be separated from the drying up of climatic conditions, which are exacerbated by unsustainable land-clearing practices and weak land-use control. As stated by Tabari (2020) and Gu et al. (2022), climate change contributes significantly to the increase in the average temperature of the earth's surface, which has a direct impact on increasing the risk of fires and exacerbating the impact of floods due to reduced water absorption by barren and damaged soils. The combination of these three threats—drought, floods, and forest fires—reflects the high ecological vulnerability of the East Java region in the face of climate change dynamics.

Although the East Java Provincial Government has implemented several mitigation efforts, including the construction of embankments, the provision of emergency logistics, weather modification, and disaster socialization, these efforts have not been fully effective in significantly reducing disaster risk. East Java's Disaster Risk Index/*Indeks Risiko Bencana* (IRB) continues to show relatively high numbers from year to year, indicating that the biggest challenge lies in community preparedness and the overall resilience of the environmental system. Gu et al. (2022) revealed that the success of disaster risk reduction in the context of climate change is highly dependent on sustainable, community-based strategies supported by spatial planning policies that prioritize environmental sustainability. Thus, the urgency to strengthen people's adaptation capacity, revise development policies, and build synergy among governments, academics, and civil society is becoming increasingly important in facing a future full of climate uncertainty.

Based on the background review described at the top thus, the purpose of this study is to determine and understand the level of community readiness in facing potential disasters in the Bareng area. The title of this study is "Preparedness of Residents of Kopen Hamlet, Bareng District, Jombang Regency to Face Landslide Disasters."

2. Methods

This research study uses mixed methods. This method combines qualitative and quantitative research. The data obtained were the results of interviews with affected residents and questionnaires distributed to respondents using purposive sampling techniques. The data received will then be processed using validity tests, reliability tests, and normality tests. Then, it will be analyzed using the Preparedness Index to determine the percentage of preparedness among the people of Kopen Hamlet against the threat of landslides. In this study, Kopen Hamlet, located on Arimbi Street in Ngrimbi, Bareng District, Jombang Regency, is the site where the research was conducted. Data collection commenced on November 7, 2023, and will continue until all necessary information has been collected and finalized.

2.1 Tools and materials

First, Interview table. The interviews were conducted by asking questions to the victims to ascertain the steps taken by residents in preparing for and managing the landslide disaster. It is semi-structured to facilitate the collection of answers that are relevant to the context being studied. Second, Kuisioner. Through the use of quiz sheets containing questions or written statements, respondents were given quizzes to obtain data on the preparedness of the people of Kopen Hamlet against the threat of landslide disasters (Budiastuti & Bandur, 2018).

Table 1. Variable x questionnaire grid

Variable (X)	Indicator	Statement items	Total statements
Knowledge and Attitudes	Insights into landslide incidents	1, 2, 3, 4, 5	5
	Causes of landslide incidents	6, 7	2
Policies and Guidelines	Integrated infrastructure to respond to disasters	13, 15	2
Emergency Response Plan	Response during a landslide emergency	16, 21	2
	Plans for evacuation	17, 18	2
	Completion of basic needs	14	1
Early Warning System	Traditional systems in disaster response	19, 20	2
	Landslide disaster emergency training and simulation	27, 28, 29, 30	4
Resource Mobilization	Institutional governance	24	1
	Command system	25	1
	Communication between relevant skateholders	22, 23	2

Variable (X)	Indicator	Statement items	Total statements
	Coordination of technical and material guidance	26	1

(Santoso et al., 2021)

In addition to recording devices (such as mobile phones), photo tools, and stationery. The instrument is used for research purposes to collect data. Third, Observation is carried out by researching, observing, and recording the conditions and conditions in the field or target objects (Budiastuti & Bandur, 2018). Using the observation method, the researcher will observe the location and situation, the situation on the spot, natural phenomena, and activities of residents in Kopen Hamlet, Bareng District.

Table 1. Variable questionnaire grid y

Variable (Y)	Indicator	Statement items	Total statements
Disaster Preparedness	Disaster response and safety priorities before and during the event	8, 9, 10. 11, 12	5

(Santoso et al., 2021)

2.2 Types of research

The research was carried out qualitatively through observations, interviews, and document analysis, as well as quantitatively using questionnaire data collection methods, to analyze the preparedness of the people of Kopen Hamlet for landslides.

2.3 Data collection, processing, and analysis methods

Primary data can be obtained from field observations and interviews, which can be used to support the submission and dissemination of questionnaires to the community in Kopen Hamlet. First, this study employs observation methods at the location of the research object, followed by interviews with residents of the affected hamlet, and then distributes questionnaires containing questions about landslide disaster preparedness.

To obtain secondary data, it can be collected from studies of relevant sources. During the research, data were collected from population data received from the Ngrimbi Village Office, Bareng District, and also from the Jombang BPBD Office.

The determination of the total sample in this study was obtained using the Slovin formula. This formula is used when involving a relatively large population by taking a sample that represents that population as described in this first equation.

$$JS = [\frac{JP}{1+JP.e^2}] \quad \text{(Eq. 1)}$$

In the formula used, JS represents the total sample size drawn for the study, while JP denotes the total population from which the sample is taken. The variable e refers to a constant value of 10%, which indicates the margin of error or the accepted level of uncertainty in the sampling process. This constant helps ensure that the selected sample is sufficiently representative of the overall population, within a reasonable range of statistical accuracy. The results of the calculation of the number of samples to be studied were rounded to 70 families (Equation 2).

$$JS = [\frac{JP}{1+JP.e^2}]$$

$$JS = [\frac{239}{1+239.0.10^2}]$$

$$JS = 70.50 = 70 \quad \text{(Eq. 2)}$$

2.4 Data processing

The validity test is an essential step in assessing the accuracy and appropriateness of a research instrument in measuring what it is intended to measure. It functions as an index to determine the level of validity or inaccuracy of the actual measurement tool, typically a questionnaire, by examining whether each item in the instrument correlates significantly with the total score. A questionnaire is considered valid when the correlation coefficient for each item is positive and the calculated r-value exceeds the critical r-value in the statistical table (Janna & Herianto, 2021). In addition to validity, a reliability test is also crucial, as it serves as an indicator of consistency or trustworthiness. It provides information about the extent to which a measurement yields stable and consistent results over time or across various conditions. Reliability ensures that the instrument produces dependable results that can be interpreted with confidence and not influenced by random errors or external factors. Furthermore, a normality test is conducted to determine whether the dataset follows a normal distribution, which is a fundamental assumption in many parametric statistical analyses. Ensuring normal distribution allows researchers to apply further statistical tests appropriately and draw valid conclusions from their data (Susanti & Saumi, 2022). Together, these three statistical procedures—validity, reliability, and normality testing—form the foundational checks for ensuring that the data collected through research instruments are both credible and suitable for further analysis.

3. Results and Discussion

Data collection was conducted by distributing questionnaires to a total of 50 respondents in the community of Kopen Hamlet, Bareng District, Jombang Regency. The following explains the identification of respondents with details according to the characteristics of the respondents as follows:

3.1 Characteristics of respondents based on education

From the 50 respondents who have filled out the questionnaire given, it can be analyzed to find out the distribution of education in the form of percentages. From Table 3, it can be seen that the highest percentage of respondents' education was high school at 52%. Meanwhile, the lowest rate of education is Elementary and S1 Graduate Schools at 2%. In elementary education, the percentage is 14%. In junior high school education, the percentage is 20%, and D4 has a rate of 10%.

Table 2. Distribution of respondents' education

No.	Final Education	Sum	Percentage(%)
1	Not Finished Elementary School	1	2
2	Elementary School	7	14
3	Junior High School	10	20
4	Senior High School	26	52
5	Applied Bachelor's Degree	5	10
6	Bachelor's degree	1	2
N	Sum	50	100

3.2 Characteristics of respondents by age

From Table 4, it can be seen that the highest percentage of respondents are 42-47 years old at 46%. Meanwhile, the lowest age percentage is 48-53 years old at 12%. At the age of 30-35 years, the rate is 18%. At 36-41 years old, the percentage is 24%.

Table 3. Age distribution of respondents

No.	Age	Sum	Percentage(%)
1	30-35	9	18
2	36-41	12	24

3	42-47	23	46
4	48-53	6	12
N	Sum	50	100

3.3 Characteristics of respondents by gender

From Table 5, it can be seen that the highest percentage of respondents' genders are male at 82%. Meanwhile, the lowest rate of sex is female at 18%.

Table 4. Distribution of respondents gender

No.	Gender	Sum	Percentage(%)
1	Male	41	82
2	Female	9	18

3.4 Validity test, reability test, and normality test

This validity test is conducted to assess the validity of each question item using the product-moment correlation. In determining the validity of these values, the data is analyzed to determine if the significant correlation level of 5% for 50 respondents is 0.2353 and compared to the results of the R calculation value.

Table 5. Validity test recap

Statement	R count	R table 10%	Sig	Criterion
P1	0.347	0.1982	0.003	Valid
P2	0.408	0.1982	0.000	Valid
P3	0.475	0.1982	0.000	Valid
P4	0.420	0.1982	0.000	Valid
P5	0.586	0.1982	0.000	Valid
P6	0.509	0.1982	0.000	Valid
P7	0.632	0.1982	0.000	Valid
P8	0.467	0.1982	0.000	Valid
P9	0.586	0.1982	0.000	Valid
P10	0.475	0.1982	0.000	Valid
P11	0.571	0.1982	0.000	Valid
P12	0.401	0.1982	0.001	Valid
P13	0.390	0.1982	0.001	Valid
P14	0.560	0.1982	0.000	Valid
P15	0.340	0.1982	0.004	Valid
P16	0.689	0.1982	0.000	Valid
P17	0.733	0.1982	0.000	Valid
P18	0.673	0.1982	0.000	Valid
P19	0.432	0.1982	0.001	Valid
P20	0.362	0.1982	0.002	Valid
P21	0.482	0.1982	0.000	Valid
P22	0.488	0.1982	0.000	Valid
P23	0.438	0.1982	0.000	Valid
P24	0.624	0.1982	0.000	Valid
P25	0.443	0.1982	0.000	Valid
P26	0.606	0.1982	0.000	Valid
P27	0.496	0.1982	0.000	Valid
P28	0.442	0.1982	0.000	Valid
P29	0.504	0.1982	0.000	Valid
P30	0.537	0.1982	0.000	Valid

Based on Table 6, the results of the validity test of the Disaster Preparedness level questionnaire. Of the 30 questionnaire statements given to respondents, the validity test was declared valid all because the requirements of the R-value calculated > the R table value were all met. For example, if the calculation is P1=0.347>0.1982, then the data is declared valid. All questions utilize the same calculations as the test tools on the instrument to provide accurate results.

Furthermore, based on the data in Table 6, it can be concluded that all indicators used in the instrument for measuring community preparedness for landslides (P1 to P30) have met the validity requirements, indicated by the R count value exceeding the R table value of 0.1982 and a significance value (Sig.) of 0.000. This validity indicates that each questionnaire item accurately measures the intended construct, specifically aspects of preparedness such as knowledge, attitudes, awareness, and actions in response to potential landslides. The validity of this instrument is a fundamental basis in integrating the preparedness index and demographic factors, because valid data is an absolute requirement for drawing valid conclusions. In this context, further analysis can be directed at how demographic variations, such as age, gender, and educational level, affect the score of each preparedness indicator. For example, suppose indicators like P2 or P3 (which may measure the ability to recognize early signs of a landslide) score low among older age groups or respondents with lower education levels. In that case, a significant gap in preventive awareness has been identified that should be addressed through educational interventions. With all items validated, researchers can construct an aggregate index of demographic-based preparedness using a quantitative approach, such as creating a total score stratified by age or education group.

After the validity test is conducted, a reliability test is performed. This aims to measure the consistency (reliability) of questionnaire data. The results of the reliability test using the Cronbach's Alpha method are presented below. A reliable statement is indicated if the value of the Cronbach's Alpha coefficient is greater than 0.60. The following presents the results of the data reliability test completed by the respondents. From Table 7, the results of the flood disaster management reliability test were obtained at 0.897, which can be declared reliable because 0.897 > 0.60. It can be concluded that the instrument used in the study is reliable. Based on the results of the above reliability test, which show high reliability, indicating minimal error in variance, the respondents' answers to the questions on the questionnaire, used to measure each variable, are deemed consistent and reliable.

Table 6. X and Y variable reliability tests

Cronbach Alpha	Alpha	Criterion
0.897	0.60	Reliabel

After the validity and reliability test was carried out, the results of the questionnaire data obtained from the distribution to the people of Kopen Hamlet, Bareng District, Jombang Regency, were tested for normality to ensure that the data collected was normally distributed or not.

Table 7. X and Y variable normality test

Variable	Kolmogorov-Smirnov	
	Sig.	Criterion
X (Attitude Knowledge, Emergency Response Plan, Early Warning System, Policies and Guidelines, Resource Mobilization) Y (Disaster Preparedness)	0.200	0.05

It was found that the Kolmogorov-Smirnov technique used to detect normal distributions in the data of this study is correct. Then, from the above result, the Sig value for X and Y is 0.200. Because the value of sig. in both groups was >0.05, according to the basis of decision-making in the Kolmogorov-Smirnov normality test, the data can be concluded to be normally distributed.

3.5 Preparedness level results

The table consists of several key components used to assess disaster preparedness parameters. The column labeled K contains descriptions of each parameter. The IP column refers to the Parameter Index, which quantifies each variable. The P column lists the Parameters being evaluated in the study. These parameters include Pe (Education), U (Age), Jk (Gender), and Ka (Category), which represent the demographic characteristics of the respondents. Further parameters related to disaster preparedness are also included, such as PS (Knowledge and Attitude), RTD (Emergency Response Plan), SPD (Early Warning System), KP (Policies and Guidelines), MBS (Resource Mobilization), and KSB (Disaster Preparedness). Finally, the IRT column shows the Average Index of All Parameters, providing an overall measure of disaster preparedness based on the combined evaluation of all the listed indicators.

Table 8 displays the results of measuring the level of landslide disaster preparedness by integrating the Parameter Index (IP) and demographic factors (education, age, gender, and respondent category). The preparedness index is calculated from six main parameters: PS (Knowledge and Attitude), RTD (Emergency Response Plan), SPD (Early Warning System), KP (Policy and Guidelines), MBS (Resource Mobilization), and KSB (Disaster Preparedness), and is averaged using the Total Average Index (IRT). This integration enables a more precise mapping of community preparedness levels based on various social characteristics.

Table 8. Preparedness level results

K	P	Landslide disaster preparedness level					
		Pe	Ka	U	Ka	Jk	Ka
IP	PS	53	Ks	55	Hs	47	Ks
	RTD	71	S	76	S	63	Hs
	SPD	68	S	71	S	65	S
	KP	80	Ss	89	Ss	81	Ss
	MBS	69	S	66	Hs	54	Ks
	KSB	62	Hs	71	S	62	Hs
	IRT	67	S	71	S		

In terms of education (Pe), preparedness scores vary considerably, with PS at 53 (KS = *kurang siap*/less prepared), RTD at 71 (S = *siap*/ready), and the highest KP at 80 (SS = *sangat siap*/very prepared). This suggests that, although knowledge and attitudes remain low, understanding of disaster policy is relatively high because formal education and training experience are more evenly distributed among groups with secondary and higher education levels. This highlights the importance of enhancing disaster literacy within the formal education system.

For age (U), the IRT score reached 71 (ready), with SPD and KSB scores also high (71). This indicates that the productive age group, which tends to be more adaptable to new information and physically active, has better preparedness. However, PS was only 55, indicating that conceptual understanding is not as high as technical readiness. This reflects the need to integrate practical knowledge and theoretical experience in age-based training.

For gender (Jk), the KP and SPD parameters showed the highest scores (81 and 65), with PS at 47 (categorized as less prepared). This suggests that, although participation in policies and warning systems is relatively high, personal understanding and attitudes toward risk remain low, which may be influenced by gender norms and domestic roles that limit access to disaster education and information.

In terms of respondent categories (Ka), SPD, KP, and IRT scores remained stable at 63–71, but PS again achieved the lowest (47–53). This indicates that across all demographic groups, knowledge and attitudes remain key weaknesses in preparedness. Therefore, community-based awareness-raising and targeted risk communication strategies should be prioritized, especially for groups with limited access to information.

Overall, the IRT (average index of all parameters) is in the ready category for all groups, but with uneven distribution. This underscores the importance of a policy approach that goes beyond infrastructure or warning systems and also considers capacity differences across social groups. Integrating preparedness indices and demographic factors like these opens up opportunities for more inclusive, participatory, and data-driven mitigation program design, allowing disaster risk reduction strategies to be tailored to the diverse and contextual profiles of communities in landslide-prone areas.

Table 8 broadly shows that the level of community preparedness for landslides has been measured through six main parameters—namely, knowledge and attitudes (PS), emergency response plans (RTD), early warning systems (SPD), policies and guidelines (KP), resource mobilization (MBS), and general preparedness (KSB)—integrated with demographic factors such as education, age, gender, and respondent category. The results indicate that most preparedness scores fall into the "Ready" category, particularly for systemic aspects such as policies and emergency plans, reflecting the presence of a relatively robust disaster response structure within the community. However, across almost all demographic groups, the lowest scores were found for the knowledge and attitudes (PS) parameter, which ranged between the "Less Ready" and "Almost Ready" categories. This indicates that despite the availability of infrastructure and policies, individual awareness and understanding of disaster threats remain relatively low. Differences in scores across social groups also confirm that productive age and education level contribute more to preparedness than gender or other social categories. Therefore, it can be concluded that success in improving preparedness not only requires strengthening systems and policies but must also be balanced with an educational approach that is inclusive, participatory, and sensitive to the social characteristics of the community, so that disaster risk reduction strategies can run effectively and sustainably.

3.6 Discussion

Based on the processed data, the education factor in community landslide preparedness is categorized as ready, with an average index score of 67%. However, further analysis of the knowledge and attitude parameters reveals a concerning trend, where these aspects are still in the unprepared category, with a percentage of 53%. This indicates that despite formal education attainment, there remains a substantial gap in specific disaster knowledge and awareness, particularly regarding early indicators of landslide risk such as prolonged heavy rain and strong winds in sloped areas. This finding aligns with similar conclusions by Sholikah et al. (2021), who found that general awareness does not always correlate positively with education level unless accompanied by targeted disaster literacy programs. Recent studies have emphasized the role of experiential knowledge and community-based training in enhancing disaster preparedness beyond formal education credentials (Fu & Zang, 2024; Kesumaningtyas et al., 2022).

The age factor shows a higher level of readiness, with an average index score of 71%. Further data breakdown shows that the majority of respondents fall into the productive age group (26–35 years old), which tends to exhibit better cognitive capacity and physical resilience in disaster scenarios. However, when isolated to the knowledge and attitude parameters, the score drops to 55%, categorized as almost prepared. This decline may be attributed to the relatively low proportion of respondents in this age group (only nine people), suggesting a limited representation that affects generalization. Moreover, physical signs of aging and limited access to updated disaster information further reduce preparedness levels among older residents. A study by Putra & Podo (2017) supports this trend, indicating that while age can be a positive factor in disaster preparedness, its influence diminishes significantly when not supported by continuous information access and physical capability. In contrast, that younger populations tend to be more responsive to disaster warnings but require structured guidance for proper interpretation and action (Sopha, 2022, 2023).

For the gender factor, preparedness is classified in the almost ready category with an index value of 62%. The analytical results indicate that gender alone is not a significant determinant of preparedness, as it primarily functions as an indicator variable, while knowledge remains the core control variable influencing the outcome. This is consistent with the trend found in the education factor, where both men and women showed low scores in the knowledge and attitude parameters. This suggests that gender-based differences in disaster preparedness may be less about inherent capability and more about differential access to information and training. Akyüz & Başaran, (2023) emphasize that equitable disaster education is essential to ensure both men and women understand and adopt appropriate preparedness behaviors. Without targeted interventions, the gap in disaster awareness and response between genders may persist, regardless of structural gender roles in the community.

In conclusion, the analysis reveals that knowledge and attitude parameters consistently score lower across all demographic categories, highlighting a critical area for improvement. These findings underscore the need for enhanced, localized disaster education strategies that go beyond general schooling and address community-specific vulnerabilities through participatory training and inclusive communication approaches.

3.7.1 Correlations related to villager preparedness for disaster response and management

Based on the age and gender distribution of respondents surveyed in Ngrimbi Village, Bareng District, Jombang Regency, important insights can be drawn regarding the community's preparedness for natural disasters, particularly landslides, which frequently occur in the area. Table 4 shows that the majority of respondents were aged 42–47 (46%), followed by those aged 36–41 (24%) and those aged 30–35 (18%), with only a small proportion in the 48–53 age group (12%). This composition confirms that the productive-age adult population dominates the respondent community, which generally provides an advantage in the context of preparedness because this age group has relatively high physical strength, access to information, and social engagement.

However, it is essential to note that productive age does not automatically equate to optimal preparedness. Although they are more easily reached by training or outreach programs, their levels of disaster literacy, direct experience with disasters, and awareness of early warning systems can vary significantly. In the context of Ngrimbi Village, which is geographically located in a hilly area prone to landslides, this age group has great potential as agents of community preparedness, provided they receive adequate training. They are actively involved in village-level disaster simulations and planning.

Meanwhile, Table 5 reveals a significant gender distribution gap, with 82% of respondents being male and 18% being female. This disparity may reflect two factors: first, low female participation in public decision-making or formal activities such as surveys and disaster outreach; and second, possibly persistent social norms that place women in domestic roles, resulting in their limited involvement in community-based disaster activities. Yet, within the context of families and local communities, women play a central role in information dissemination, child and elderly protection, and emergency logistics management, all of which are crucial in disaster situations.

This situation suggests that, although Ngrimbi Village has a potential age structure that supports preparedness, a more inclusive and gender-equitable strategy is still necessary to optimize the potential of all villagers. The village government can facilitate capacity building through age- and gender-based training programs, ensuring that women and older adults have the opportunity to participate in disaster policy planning and implementation. Furthermore, adaptive educational approaches should be implemented, such as community discussion forums, family-based disaster simulations, and the active involvement of women's and youth groups in the early warning system.

Taking into account existing age and gender characteristics, the disaster preparedness strategy in Ngrimbi Village must be directed at developing social capital and community capacity comprehensively, ensuring that all levels of society—young and old, men and women—have equitable access to information, training, and roles in disaster mitigation and response systems. Integrating demographics into preparedness is not just about data; it also ensures the sustainability, effectiveness, and equity of disaster risk management at the village level.

In line with this explanation, age plays a significant role in shaping preparedness within the community, specifically among the residents of Ngrimbi Village, Jombang Regency. As previous research has shown, there is a positive significance in interpreting a disaster and responding to it. This study explains that disasters viewed from a disaster preparedness perspective are those for which individuals have been exposed to extensive disaster-related education. For example, the floods that hit Jombang Regency could have been overcome if the community understood the signs of impending flooding, whether by obtaining information from relevant parties such as the Meteorology, Climatology, and Geophysics Agency (BMKG) or recognizing signs of climate change in nature (Aziz, 2023; Widyasari & Setyoningsih, 2020). The intuition possessed by rural communities, especially those working as farmers, tends to be more sensitive to the seasons because they observe natural movements that serve as a reference in farming. This signal is then used as one of the primary bases closely related to the preparedness of village communities to respond when a disaster occurs.

3.7.2 Preparedness of ngrimbi village residents

Based on the analysis of landslide preparedness data integrated with demographic factors in the community of Ngrimbi Village, Bareng District, Jombang Regency, the overall picture shows that community preparedness is generally categorized as "Ready." However, there is significant variation between parameters and across social groups. Using six key parameters—Knowledge and Attitudes/*Pengetahuan dan Sikap* (PS), Emergency Response Plans/*Rencana Tanggap Darurat* (RTD), Early Warning Systems/*Sistem Peringatan Dini* (SPD), Policies and Guidelines/*Kebijakan dan Pedoman* (KP), Resource Mobilization (MBS), and General Preparedness (KSB)—it was found that the community has relatively strong basic structures and systems in place to face potential disasters. This is evident from the high preparedness index scores for the RTD, SPD, and KP aspects, indicating that the Village Government and residents have begun implementing mitigation policies and systems, such as developing evacuation routes, establishing disaster preparedness groups, and disseminating information through village guard posts and neighborhood associations.

However, one crucial finding that deserves attention is the low scores on the knowledge and attitude (KID) parameter, which in some groups of respondents even fell below the "ready" threshold, placing them in the "Less Prepared" category. This phenomenon suggests that, despite established systems and policies, not all residents fully comprehend the potential risks of landslides, their early warning signs, or the appropriate procedures for action in the event of a disaster. These results reinforce the point that the ideal level of preparedness relies not only on structural aspects but also heavily on mental readiness, local knowledge, and community attitudes toward disaster threats.

Demographic factors in Ngrimbi Village also influence variations in preparedness. Residents with secondary or higher education tend to demonstrate higher levels of readiness, particularly in the KP and SPD parameters. In contrast, residents with lower education levels exhibit a limited understanding of early warning mechanisms and evacuation procedures. In terms of age, the productive age group (26–45 years old) appears to be more active in disaster preparedness training and disaster response activities compared to older people, who tend to be less active and have limited physical capabilities and access to information. Meanwhile, gender differences were not significant in the aggregate scores. However, it was observed that men tended to be more dominant in resource mobilization and technical management, while women were more active in logistics and family communication during emergencies.

These findings provide important insights for disaster risk reduction efforts in Ngrimbi Village. While overall preparedness is considered good from an institutional and technical perspective, significant gaps remain in community disaster literacy. Therefore, future preparedness strengthening strategies should focus on enhancing individual capacity through an inclusive, community-based disaster education approach. Socialization programs, disaster simulations, and training based on local wisdom should be intensified, particularly targeting vulnerable and low-risk groups, such as the elderly, female heads of households, and residents with limited education. Furthermore, collaboration between community leaders, village officials, and disaster volunteers can strengthen information networks and build a more equitable and sustainable disaster preparedness culture.

Thus, the integration of preparedness index parameters and demographic data in Ngrimbi Village has opened new insights into understanding the strengths and weaknesses of community preparedness. This provides an essential basis for policymakers and disaster actors to design interventions that are more targeted, evidence-based, and address the root of the problem at the community level.

3.7.3 The ngrimbi village government's contribution to villager preparedness

Based on the analysis of community preparedness data in Ngrimbi Village, Bareng District, Jombang Regency, it appears that the community's overall preparedness level is in the "Ready" category. This is reflected in high scores on several key parameters, such as the emergency response plan (RTD), early warning system (SPD), and policies/guidelines (KP). However, the knowledge and attitude (PS) parameter shows low scores across most demographic groups, particularly among older people and those with a primary education background. These findings demonstrate a gap between structural and individual preparedness, where the community has access to mitigation systems and institutional structures but does not fully understand or apply them in their daily lives.

In this context, the Ngrimbi Village Government has a strategic role to address this gap through integrated, collaborative, and community-based innovation. One key innovation that can be implemented is the establishment of a Village-Based Disaster Preparedness Education Center. This open learning space serves as a venue for regular outreach, evacuation simulations, disaster volunteer training, and the dissemination of locally relevant information. This activity not only improves community knowledge and attitudes but also serves as a platform for fostering a collective culture of preparedness.

Another innovation that can be developed is the use of simple yet effective local technology, such as installing community-based landslide sensors connected to early warning alarms in residents' homes or mosques. This system can be developed through collaboration between youth organizations (*Karang Taruna*), farmer groups, and village youth with basic technological skills, resulting in an affordable yet impactful early warning system. Furthermore, the use of WhatsApp-based village alert groups, which include all hamlet heads, neighborhood associations (RT), and volunteers, can accelerate coordination and the real-time dissemination of emergency information during potential disasters.

Village governments can also integrate elements of local wisdom into mitigation strategies, for example, by reviving the tradition of night patrols or village gatherings (jagong kampung) to incorporate disaster information. Such activities serve a dual purpose: they provide community-based social control and serve as informal forums for preparedness education. In the long term, the Ngrimbi Village Government needs to develop a Village Regulation (Perdes) on Disaster Preparedness, which outlines operational standards for evacuation, logistics distribution, and the rights and obligations of each community element in emergencies.

The implementation of these innovations is crucial because they not only strengthen the technical aspects of disaster risk reduction but also strengthen the community's social and cultural capacity to build collective resilience. With data-driven innovations, local wisdom, and appropriate technology, the Ngrimbi Village Government can serve as a model for other villages in creating comprehensive, inclusive, and sustainable preparedness for the threat of landslides.

4. Conclusions

The results of the analysis show that this is due to the lack of knowledge and public attitudes about the forecast of landslide disasters; people do not think that when heavy rain accompanied by wind in slope areas will cause aftershocks, which is evidenced in the questionnaire in the category of underprepared with a percentage result of 53%, namely the parameters of knowledge and attitude.

The results of the age factor analysis are relatively complete, with an average index value of 71%. When viewed through the five parameters of knowledge and attitudes categorized, readiness is almost ready, with a percentage of 57%, due to the average age of residents being 26-35 years. This refers to the research which argues that the productive age is the age that plays the most significant role and exhibits dense activity, as well as good cognitive abilities.

The results of the analysis show that gender is only an indicator variable, while knowledge is a control variable. This is consistent with the results for educational factors, where knowledge parameters and attitudes are categorized as less prepared. Therefore, public knowledge must be improved so that men and women can understand related to preparedness attitudes.

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