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The Correlation between Family Resilience and Disaster Preparedness among Survivors of the Mount Semeru Eruption

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ABSTRACT

Introduction Natural disasters can reduce family resilience and affect disaster preparedness; this study aims to examine the relationship between family resilience and disaster preparedness among survivors of the Mount Semeru eruption in HUNTARA-HUNTAP, Lumajang Regency; **Method** This study using a quantitative approach with correlational research, involving a population of all survivors of the Mount Semeru eruption living in HUNTARA-HUNTAP, totaling 175 heads of households. The sampling technique used is simple random sampling, with a research sample size of 122. Data collection was done using family resilience and disaster preparedness questionnaires. The Family Resilience Questionnaire (Walsh Family Resilience Questionnaire) had a significant validity correlation of 0.851 ($p < 0.01$) and a Cronbach's Alpha reliability coefficient of 0.868, as tested by Nasa (2012). The Disaster Preparedness Questionnaire, validated by Wahyuni (2018), showed corrected item-total correlation values ranging from 0.440 to 0.964 and a reliability coefficient of 0.942, indicating that both instruments were valid and reliable. Data analysis was conducted using Spearman's Rank correlation test; **Result** The results showed that family resilience was categorized as moderate in 91 respondents (74.6%), while disaster preparedness was categorized as almost ready in 66 respondents (54.1%). There is a significant correlation between family resilience and disaster preparedness among Mount Semeru eruption survivors in HUNTARA-HUNTAP, Lumajang Regency ($p = 0.034$, $\alpha = 0.05$).

Keyword: Disaster Preparedness, Family Resilience, Semeru Eruption

INTRODUCTION

Natural disasters are events or a series of events that threaten and disrupt people's lives, caused by natural, non-natural, or human factors. These disasters often lead to casualties, property damage, environmental destruction, and psychological trauma for those affected. One such disaster is volcanic eruptions, which bring both material and non-

material consequences. To minimize these impacts, it is essential for communities to anticipate and manage potential threats as part of disaster preparedness efforts. Given the sudden and unpredictable nature of such events, many people are caught unprepared, increasing the likelihood of casualties (1–3). Disaster preparedness involves organized and effective measures to anticipate

emergencies and reduce the damage they cause. According to LIPI and UNESCO, five main components must be addressed: knowledge and attitudes toward disaster risks, policies and guidelines, emergency response plans, warning systems, and resource mobilization (1,4). Community awareness of disaster risks, reflected in their knowledge, skills, and attitudes, is key to adapting to high-risk areas. Unfortunately, many people living in disaster-prone zones still hold fatalistic beliefs, viewing disasters as unavoidable fate, continuing to reside in red zones, and relying on divine will for survival and outcomes (5). One major factor influencing disaster preparedness is resilience, or the capacity to confront, cope with, and adapt positively to adversity. Resilience includes seven traits: emotional regulation, impulse control, optimism, empathy, causal analysis, self-efficacy, and the willingness to seek new opportunities (6,7). Although everyone possesses these traits to some degree, individuals vary in how they apply and develop them. These skills enable people to overcome crises and recover more effectively, reducing stress during recovery and improving future readiness. However, even among those who have previously recovered from disasters, many still lack awareness and vigilance for future risks. Overall, the resilience level of Indonesians remains low, with many struggling under pressure and showing pessimism in difficult situations (8,9). In Southeast Asia, Indonesia is the only country with a very high disaster risk (10). Indonesia is located at the intersection of three major tectonic plates and is part of the Pacific Ring of Fire, with over 500 volcanoes, about 128 of which are active (11). Mount Semeru is an active volcano with a height of 3,676 meters above sea level, located in the Lumajang and Malang Regencies. After a long period of inactivity, Mount Semeru erupted again in 2021, 2022, and 2023. The 2021 eruption caused significant damage (12). During the emergency response phase, one of the priorities was to prepare relocation sites. The local government prepared temporary and permanent shelters (HUNTARA-HUNTAP) in Sumbermujur and

Sumberwuluh villages in Candipuro District, and in Oro-Oro Ombo village in Pronojiwo District for survivors of the Mount Semeru eruption (13). A previous study by Yulianti et al. found that resilient communities have sufficient experience with disasters, which helps them conduct disaster preparedness simulations. Strong community resilience positively impacts disaster preparedness, as it becomes the goal of communities living in disaster-prone areas (8). This aligns with a study by Sandrina et al., which found that resilience and disaster experience play a significant role in determining what actions to take during a disaster, as they possess the knowledge and experience from past events (9). Furthermore, the emphasis on preparedness at the family level, as highlighted in previous studies, aligns with this research's focus on the vital role of the family as the smallest unit within a community. Family resilience reflects the ability to manage stress and adapt to emergencies, serving as a fundamental basis for building a disaster-resilient society (14). Therefore, this study aims to analyze the relationship between family resilience and disaster preparedness in disaster-prone areas, in order to provide a basis for appropriate intervention strategies to enhance community-based disaster preparedness (15).

METHOD

This study used a quantitative approach with correlational research. It was conducted in August 2024, with a population consisting of 175 families living in temporary and permanent shelters (HUNTARA HUNTAP) following the Mount Semeru eruption. The sample was selected using simple random sampling based on inclusion and exclusion criteria, resulting in a sample size of 122 respondents. Inclusion criteria included being a family head willing to participate, literate, aged 20-60 years, and affected by the eruption. Exclusion criteria included respondents absent during data collection, unwilling participants, infants and children, and isolated locations. Data was collected using the Walsh Family Resilience

Questionnaire (WFRQ) for family resilience and a disaster preparedness questionnaire from LIPI-UNESCO/ISDR. The family resilience questionnaire consists of 32 items, covering 3 aspects: Belief Systems, Organizational Patterns, and Communication Processes, with answers rated on a 5-point Likert scale. The disaster preparedness questionnaire consists of 20 items measuring knowledge, attitudes, emergency response plans, warning systems, and resource mobilization. Reliability tests produced Cronbach's Alpha values of 0.868 for family resilience and 0.942 for disaster preparedness. The researcher obtained permission from the Bangkesbangpol of Lumajang Regency and the Head of Sumbermujur Village to conduct the study in the HUNTARA-HUNTAP area. Coordination was carried out with local authorities,

followed by site observation, respondent selection based on inclusion criteria, and distribution of questionnaires. Data analysis was conducted through editing, coding, scoring, and tabulation, and the results were analyzed using Spearman's Rank correlation with SPSS 26. This study received ethical clearance from the Health Research Ethics Committee at Hafshawaty Zainul Hasan University Number: 230/KEPK-UNHASA/VII/2024.

RESULT

This study was conducted at the relocation site for Mount Semeru eruption survivors (HUNTARA HUNTAP) in Sumbermujur village, Candipuro District. The location spans 81.55 hectares, with a capacity of approximately 2,000 units. The sample consisted of 122 family heads.

Table 1. Characteristics of Mount Semeru Eruption Survivors (n=122)

No	Characteristics	Frequency (f)	Percentage (%)
1	Gender		
	Male	103	84,4
	Female	19	15,6
2	Age		
	20-30 years	33	27,0
	31-40 years	36	29,5
	41-50 years	27	22,1
	51-60 years	26	21,3
3	Education Level		
	No Schooling	10	8,2
	Elementary School	71	58,2
	Junior High School	29	23,8
	Senior High School	6	4,9
	D3/S1	6	4,9
4	Occupation		
	Teacher	1	,8
	Private Sector	15	12,3
	Farmer	35	28,7
	Housewife	14	11,5
	Driver	9	7,4
	Sand Miner	20	16,4
	Other	28	23,0

Table 1 shows that the majority of respondents were male, with 103 respondents (84.4%); most respondents were aged 31-40 years, totaling 36 respondents (29.5%); the majority of respondents had an education level at the

elementary school level, with 71 respondents (58.2%); and the majority of respondents' occupation was farmers, with 35 respondents (28.7%).

Tabel 2. Family Resilience and Disaster Preparedness of Mount Semeru Eruption Survivors (n=122)

No	Characteristic	Frequency (f)	Percentage (%)
1	Family Resilience		
	Low	2	1,6
	Moderate	91	74,6
	High	29	23,8
	Total	122	100,0
2	Disaster Preparedness		
	Not Ready	1	0,8
	Less Ready	34	27,9
	Nearly Ready	66	54,1
	Ready	19	15,6
	Preparedness	2	1,6
	Total	122	100,0

Table 2 shows that the majority of family resilience among survivors of the Mount Semeru eruption falls into the moderate category, with 91 respondents (74.6%), and most disaster preparedness among the survivors of the Mount Semeru eruption is in the "almost ready" category, with 66 respondents (54.1%).

Tabel 3. Cross-tabulation of Family Resilience and Disaster Preparedness among Mount Semeru Eruption Survivors in Temporary and Permanent Housing, Lumajang Regency (n=122)

		Disaster Preparedness					Total
		Not Ready	Less Ready	Almost Ready	Ready	Very Ready	
Family Resilience	Low Resilience	0 (0%)	1 (50%)	1 (50%)	0 (0%)	0 (0%)	2 (1,6%)
	Moderate Resilience	1 (1,1%)	28 (30,8%)	49 (53,8%)	12 (13,2%)	1 (3,4%)	91 (74,6%)
	High Resilience	0 (0%)	5 (17,2%)	16 (55,2%)	7 (24,1%)	1 (3,4%)	29 (23,8%)
	Total	1 (0,8%)	34 (27,9%)	66 (54,1%)	19 (15,6%)	2 (1,6%)	122 (100%)

p-value of 0.034 with $\alpha = 0.05$

Based on Table 3, it was found that 49 respondents (53.8%) with moderate resilience were at an "almost ready" level of disaster preparedness. In the high resilience group, 16 respondents (55.2%) were also "almost ready." Meanwhile, in the low resilience group, one respondent (50%) was at the "less ready" level, and another (50%) was "almost ready."

To test the relationship between the two variables, a Spearman Rank analysis was conducted using SPSS 26, showing a p-value of 0.034 with $\alpha = 0.05$. Since $p < \alpha$ ($0.034 < 0.05$), it can be concluded that there is a significant relationship between family resilience and disaster preparedness among Mount Semeru eruption survivors in

temporary and permanent housing (Huntara-Huntap), Lumajang Regency.

DISCUSSION

3.1 Family Resilience Among Mount Semeru Eruption Survivors

The study found that the majority of families affected by the Mount Semeru eruption exhibited moderate levels of resilience, with 74.6% of respondents falling into this category. Resilience refers to an individual's capacity to face, overcome, and positively respond to adversity by adapting and turning challenges into manageable conditions. This concept extends to families, where resilience is defined as their ability to adjust and cope

effectively with both current and future stressors. The presence of moderate resilience among respondents suggests that, while they have been through traumatic events, they have developed certain coping mechanisms that enable them to maintain psychological and functional stability (16). Another study conducted by Rahmawati et al. on the Resilience of Communities Affected by the Mount Semeru Eruption During the COVID-19 Pandemic also showed that the majority of survivors had moderate resilience in dealing with the disaster. This is because they have varying capacities and abilities in coping with the event (7). The results of this research indicate that most respondents exhibited moderate resilience. This suggests that the respondents have sufficient capacity and ability to face and overcome natural disasters that may threaten their lives at any time. This is likely because they have previously experienced being victims of the Mount Semeru eruption, living in disaster-prone areas such as Sumberwuluh Village, particularly in Kamar Kajang Hamlet, Curah Kobokan Hamlet, Kajar Kuning Hamlet, and Supiturang Village, especially in Summersari Hamlet. Additionally, factors influencing resilience include gender and age. In this study, most respondents were male, with 103 respondents (84.4%). Men tend to have higher resilience than women because they can adapt quickly in the face of problems and tend to think rationally, while women may struggle to adapt and be more resistant to change. Age also influences resilience, as older individuals tend to have higher resilience than younger individuals. This is due to their life experience and maturity, which provide them with better problem-solving skills compared to younger people. In this study, most respondents demonstrated moderate resilience. Therefore, efforts should be made to increase family resilience through collaboration with relevant parties from the village level to the central government levels. Families with high resilience can minimize the risk of severe setbacks when faced with life-threatening conditions.

3.2 Disaster Preparedness Among Survivors of the Semeru Volcanic Eruption

The study found that most of the disaster preparedness among survivors of the Semeru volcanic eruption falls into the "nearly prepared" category, with 66 respondents (54.1%). Preparedness involves a series of activities undertaken to anticipate disasters through effective and efficient organization and measures aimed at minimizing post-disaster losses (4,20). According to the Indonesian Institute of Sciences (LIPI) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), preparedness includes actions designed to enhance the ability to perform emergency actions to protect property from damage and disruption caused by disasters, as well as the capacity to engage in restoration and early recovery activities post-disaster (18,19). The concept of preparedness emphasizes an individual's or community's ability to quickly and accurately undertake emergency preparedness actions (6,20). Several factors may contribute to why many respondents fall into the nearly prepared category. These include limited access to accurate and timely information, lack of disaster education and training, insufficient community-based disaster risk reduction programs, and socio-economic constraints that limit the capacity to act on preparedness knowledge (8,9). Moreover, past trauma from previous disasters can lead to feelings of fatalism or denial, reducing individuals' motivation to take proactive measures (18). The study found that most respondents experienced disaster preparedness in the "nearly prepared" category, which could be influenced by education level and personal experience. In this study, the majority of respondents had an elementary school education, with 71 respondents (58.2%). An individual's education level is a crucial factor in improving human resource capabilities and quality, meaning higher education levels generally correspond to greater knowledge in specific fields, including disaster management. Additionally, personal experience with disasters is another factor

influencing disaster preparedness, as previous experience determines the actions to take when disasters recur based on prior knowledge and experience. Individuals who have experienced disasters are likely to be better prepared because their experiences shape and influence their responses to environmental stimuli. This is also true for Semeru eruption survivors, who have experienced eruptions consecutively over three years: 2021, 2022, and 2023. Survivors are likely to be more prepared for future eruptions, as their experiences drive them to seek additional knowledge about disaster preparedness. This is reflected in the questionnaire responses, where a majority of respondents reported having seen/heard/read information on disaster response. Disaster preparedness is particularly important for communities living in disaster-prone areas, including all of Indonesia, given that it is located on the Pacific Ring of Fire, making it a country prone to natural disasters. By improving community disaster preparedness, threats can be minimized, vulnerabilities can be reduced, and the impacts of disasters can be lessened. The sudden occurrence of the Semeru eruption has drawn significant attention from stakeholders, especially those in Lumajang Regency, including the DPD PPNI (Indonesian Nurses Association) of Lumajang Regency. One form of responsibility, particularly in the health sector, can be shown by healthcare workers, especially nurses who are members of the DPD PPNI Lumajang Regency. These nurses have been active in providing medical care at facilities and in the field, assisting those affected by the Semeru eruption. Moreover, during the difficult times following the eruption, these nurses have been involved in social service activities such as health checks, health education, group exercises, and providing aid to those impacted. It is hoped that the DPD PPNI Lumajang Regency can mobilize nurses to collaborate in disaster simulation exercises for Semeru eruptions to enhance the preparedness of those living in transitional housing in Lumajang Regency.

3.3 The Correlation between Family Resilience and Disaster Preparedness among Survivors of the Mount Semeru Eruption

The study found that the results of the Spearman Rank correlation analysis using SPSS 26 indicate that the p-value is $0.034 < \alpha = 0.05$, which suggests that there is a relationship between family resilience and disaster preparedness among survivors of the Semeru volcanic eruption in transitional and permanent housing in Lumajang Regency. This study found a significant relationship between family resilience and disaster preparedness among survivors of the Semeru volcanic eruption residing in transitional and permanent shelters in Lumajang Regency. Specifically, the Spearman Rank test yielded a p-value of $0.034 (< \alpha = 0.05)$, indicating that stronger family resilience tends to be associated with higher levels of disaster preparedness. In factual terms, families with high resilience generally demonstrate better psychological, emotional, and structural readiness when facing disasters. They are more likely to communicate effectively, support each other under stress, and recover more quickly after traumatic events. These characteristics contribute directly to disaster preparedness behaviors, such as planning evacuation routes, maintaining emergency supplies, and participating in preparedness training. However, the data also revealed a notable exception: five respondents with high resilience still showed low levels of preparedness. This suggests that resilience alone is not sufficient. Without access to accurate information, regular training, and community engagement, even resilient families may underestimate the complexity of disaster scenarios, failing to take preventive measures like securing important documents or using proper protective gear during volcanic eruptions. The relationship between family resilience and preparedness is supported by various studies. For instance, Gumelar et al. reported that family resilience significantly influenced disaster preparedness among residents in flood-prone areas of West Java (19). Similarly,

Primasari et al. found that resilient families were more likely to engage in proactive disaster planning, such as assembling emergency kits and participating in drills (7). Moreover, emphasized that resilient families are typically better at interpreting disaster risks and transforming past experiences into preparedness strategies (20). This aligns with the findings of Yulianti et al. (2023), which concluded that community resilience—including the family unit—has a direct and positive effect on disaster readiness, as seen in Girijaya Village, Sukabumi (8). In summary, family resilience plays a critical role in disaster preparedness. Resilient families are better equipped to handle uncertainty and disruption, enabling them to take timely and effective actions before, during, and after a disaster. Nonetheless, resilience must be complemented by access to disaster education, community support systems, and continuous preparedness initiatives to maximize its impact on reducing disaster-related risks and losses.

CONCLUSION

Based on the research findings, it was found that most of the Semeru eruption survivors in HUNTARA HUNTAP in Lumajang Regency have a moderate level of resilience (74.6%), and their disaster preparedness is mostly in the "nearly prepared" category (54.1%). The study also revealed a significant relationship between family resilience and disaster preparedness, with a p-value of 0.034, indicating that more resilient families tend to be better prepared for disasters. The implications of these findings highlight the importance of strengthening family resilience as part of efforts to improve disaster preparedness in the future. Future research is recommended to explore other factors that influence disaster preparedness, such as the role of disaster education and community support in enhancing family resilience.

Conflicts Of Interest

The authors declare that there are no competing interests in the production of this manuscript.

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