

# The relationship between mount Merapi disaster and stress incidents in Kepuharjo Village, Cangkringan District, Sleman Regency, DIY

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**Abstract.** Indonesia has a high risk of natural disaster. Indonesia is a disaster-prone area because it is crossed by the ring of fire. The two psychological impacts experienced by victims of Mount Merapi are emotional impacts and cognitive impacts. This research is observational analytical quantitative research, using a cross-sectional research design. Sampling was carried out using a purposive sampling technique in Kepuharjo Village, Cangkringan District, Sleman Regency, DIY. The total research sample was 98 respondents. Research data was taken using the Depression Anxiety Stress Scale 42 (DASS 42) questionnaire and processed using the Chi-square statistical test. Most respondents were aged 26-45 years with a total of 46 respondents (46.9%), respondents who experienced stress were 43 people (43.9%) and those who did not experience stress were 55 people (56.1%), according to age There were 22 teenagers (22.4%), 46 adults (46.9), and 30 elderly people (30.6%). From the results of the Chi-square test, the Sig value was 0.028 (<0.050), which means there is a relationship between the Mount Merapi disaster and the year 2010 with stressful events in Kepuharjo Village, Cangkringan District, Sleman Regency, DIY. This research concludes that there is a relationship between the 2010 Mount Merapi disaster and stress events in Kepuharjo Village, Cangkringan District, Sleman Regency, DIY.

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## 1 Introduction

Indonesia has a high risk of natural disasters because it is located between the continents of Asia and Australia, as well as between the Pacific and Indian oceans. Indonesia is a disaster-prone area because it is crossed by the Ring of Fire. Indonesia is at the meeting of three of the world's main tectonic plates, making this region very vulnerable to natural disasters [1].

Disasters are serious disruptions to the functioning of society resulting in large losses in human, material, economic, and environmental aspects that exceed the ability of the affected community to handle them using their internal resources [2].

Indonesia has 129 active volcanoes, with 70 of them categorized as very dangerous. One of the active volcanoes in Indonesia is Mount Merapi. Mount Merapi is located in Central Java Province and the Special Region of Yogyakarta with a height of 2,968 meters above sea level. The impact of the eruption of Mount Merapi is very large, including physical and psychological disorders in society, such as trauma, stress, easy sadness, difficulty sleeping, loneliness, and so on [3].

Mount Merapi, a volcano in Indonesia, has very high volcanic activity and is interesting to study further regarding its subsurface structure, which plays an important role in the volcanic and tectonic processes within it. Mount Merapi is located on the border area between Central Java Province and the Special Region of Yogyakarta with a height of 2978 meters above sea level. Based on records from the Geological Agency since the 17th century, Mount Merapi has erupted more than 800 times with an average of once every 4 years. The eruption index of Mount Merapi has ranged between 1-3 since 1900, with a maximum eruption index of 3 occurring in 1930 and 1961, which produced hot clouds that spread up to 12 km to the southwest. In 1994, hot clouds from the eruption of Mount Merapi killed 66 people on the southwest slopes [4].

According to the Disaster Management Agency (BNPB), based on volcanic activity data, the Geological Disaster Research and Technology Development Center (BPPTKG) created sectoral mapping that estimates potentially dangerous areas. This mapping covers 12 villages spread across the Special Region of Yogyakarta and Central Java Province [5]. The three villages included in the predicted danger areas in DIY are Glagaharjo, Kepuharjo, and Umbulharjo, all of which are located in Cangkring District, Sleman [6].

There are two psychological impacts experienced by Mount Merapi victims, emotional impacts and cognitive impacts. The emotional impacts that are often experienced are feelings of anger, sadness, shock, and guilt, feeling helpless, sensitive, and still often remembering disaster events. Meanwhile, the cognitive impacts that are often experienced are difficulty in concentrating, feelings of confusion, lack of trust in information, difficulty in making decisions, decreased assessment of one's abilities, lack of focus, feelings of worry or anxiety, a tendency to blame oneself, and difficulty in dealing with thought disorders. and memories of disaster events [7]. Post-disaster stress cannot be identified quickly and it takes quite a long time whether someone is experiencing stress or not. Even though physically they look healthy, under certain conditions their behavior can be a sign of perceived trauma [8].

Disturbances in physical or psychological balance that cause an imbalance in homeostasis result in stress reactions. These disorders are referred to as stressors, while physiological and behavioral changes in response to exposure to stressors are stress responses [9].

The results of research conducted by McDermott show that teenagers victims of the fire disaster in Canberra, Australia, experienced post-disaster psychological disorders, including emotional disorders, behavioral disorders, and problems in establishing relationships with peers. The research was conducted six months after the fire disaster and involved 222 children aged 8-18 years as respondents [10].

The results of research conducted by Haqi in 2019 showed that the victims of the earthquake disaster in North Lombok in the teenage age group experienced the most mild

stress at 11 people (41%), the adult age group experienced the most moderate stress at 29 people (39%), and the adult age group experienced the most moderate stress at 29 people (39%), and The elderly group experienced the most moderate stress, 11 people (46%) [11].

Based on this background, researchers are interested in conducting this research to determine the relationship between the 2010 Mount Merapi disaster and stress events in Kepuharjo Village, Cangkringan District, Sleman Regency, DIY.

## 2 Material and Methods

This research is observational analytical quantitative research, using a cross-sectional research design. This research uses a sampling method with a purposive sampling technique, namely sampling using certain considerations according to the desired criteria to be able to determine the number of samples to be studied. This research employed purposive sampling method, which involves selecting samples based on specific considerations according to desired criteria to determine the sample size that will be studied [12]. The sample size calculation used the Slovin's formula, with 98 people adjusted to the inclusion criteria and exclusion criteria. The inclusion criteria in this study were residents of Kepuharjo Village, Cangkringan District, Sleman Regency, DIY, aged 17 to 65 years, had experienced the 2010 Mount Merapi incident, were present at the time of data collection, and were willing to be respondents. Meanwhile, the exclusion criteria in this research were not being a resident of Kepuharjo Village, Cangkringan District, Sleman Regency, DIY, never experiencing the 2010 Mount Merapi incident, not being present at the time of data collection, and not willing to be a respondent. In this study, a questionnaire was used as an instrument in the research area. Respondents will be given the Depression Anxiety Stress Scale 42 (DASS 42) questionnaire sheet [13]. The data analysis used in this research was univariate analysis and bivariate analysis. Univariate analysis was used to look at age, gender, and stress or not stress. Meanwhile, bivariate analysis was used to see the relationship between stress and the 2010 Mount Merapi disaster.

## 3 Results and Discussion

### 3.1 Results

The univariate analysis in this study was conducted to analyze the characteristics of research respondents based on age and stress.

**Table 1.** Respondent Characteristics

Characteristics	Frequency (n)	Percentage (%)
<b>Stress</b>		
Not Stressed	55	56.1%
Stress	43	43.9%
<b>Age</b>		
17 – 25	22	22.4%
26 – 45 (Dewasa)	46	46.9%
46 - >65 (Lansia)	30	30.6%
<b>Gender</b>		
Men	50	51.0%
women	48	49.0%
Total	98	100.0%

**Table 2.** Bivariate analysis

Character	Teenager frequency (%)	Adult frequency (%)	Elderly frequency (%)	P value
Stress	14 (14.2%)	22 (22.4%)	7 (7.2%)	0.028
Not stress	8 (8.2%)	24 (24.5%)	23 (23.4%)	

The bivariate analysis in this study was conducted to analyze the relationship between the Mount Merapi eruption in 2010 and the occurrence of stress in Kepuharjo Village, Cangkringan District, Sleman Regency, Yogyakarta. The bivariate analysis was performed using the Chi-square test, resulting in a p-value of 0.028. Since the p-value (2-tailed) of 0.028 is less than 0.050, the alternative hypothesis (H1) is accepted, indicating that there is a relationship between the Mount Merapi eruption in 2010 and the occurrence of stress in Kepuharjo Village, Cangkringan District, Sleman Regency, Yogyakarta

### 3.2 Discussion

The research results showed that 98 respondents met the inclusion criteria. The largest number of respondents in this study were adults with 46 adult respondents (46.9%), 30 elderly people (30.6%), and 22 teenagers (22.4%).

The results of the analysis showed that there is a relationship between the 2010 Mount Merapi disaster and stress events (p value <0.050). These results are in line with research conducted by Haqi (2019) in North Lombok Regency, research involving 125 respondents resulted in the adolescent age group experiencing mild stress as many as 11 people (41%), and the adult age group experiencing moderate stress as many as 29 people (39%). %, while the elderly group experienced moderate stress as many as 11 (46%).

This study also concluded that the most common mental status of adolescents was mild stress. According to Jatmika (2009), several difficulties or dangers that adolescents may experience include variations in mental conditions, one day they may appear quiet, sullen, and isolated. himself, but at other times he looks the opposite, cheerful, radiant and confident. The mental status most commonly found in adults is moderate stress[14]. According to Hurlock (1986), one of the characteristics of early adulthood is that it is a period full of emotional tension. Emotional tension is often expressed in fears or worries. The fear or worry that arises generally depends on the achievement of adjustments to the problems faced at a certain time or the extent of success or failure experienced in solving problems[15]. The most common mental status of elderly people is moderate stress. Changes in the environment where the elderly live mean that the elderly must be able to adapt to their current lives. If the elderly cannot adjust and cannot accept the existing situation, the elderly can be said to be affected by stress[16].

This is also in line with research conducted by Nikhita (2018) in Manado City. This research used a descriptive research type and cross-sectional design which found that the level of anxiety obtained was mild anxiety as many as 11 people (25.6%), moderate anxiety as many as 22 people. people (51.1%), 8 people had severe anxiety (18.6%), and 2 people did not have anxiety (4.7%). This research also concluded that the majority of people who live in landslide-prone areas of Ranomut Manado experience anxiety, especially moderate anxiety[17].

This is also in line with research conducted by Ernawati (2020) on the natural disaster after the Merapi eruption a decade ago. This research was a qualitative descriptive type of research with data collection carried out using interviews and observations and involving 220 adults (20-60 years). people who experienced the eruption of Merapi in 2010, found that they experienced the eruption of Merapi in 2010, still felt trauma (easily remembering the event of Mount Merapi erupting even though they didn't want to remember it), anxiety if Merapi

experienced increased activity, and hoped that the eruption of Merapi in 2010 would not happen again[18].

This is also in line with research conducted by Sumarno (2017), this research is a qualitative descriptive research type. The data is in the form of written descriptions of psychological disorders and analyzed descriptively from three victims of the Merapi eruption with the results showing the post-traumatic psychological impact experienced by the three victims. namely always remembering traumatic events (intrusive re-experiencing) in this case the Merapi eruption disaster. Of the three victims, they experienced excessive awareness (arousal) which caused them to experience sleep disturbances, avoidance, and avoid conversations related to the eruption of Merapi. Excessive awareness disorder experienced by the victim, where it becomes difficult for him to concentrate. Efforts to deal with the psychological impacts of post-trauma include strengthening intentions and getting closer to Allah SWT, socio-cultural activities, as well as therapy with relaxation and games[19].

Stress due to disaster trauma is an emotional and psychological response that arises after someone experiences or witnesses a catastrophic event that threatens their safety and well-being. This can include feelings of anxiety, fear, anxiety, sadness, and certain physical symptoms such as sleep disturbances or muscle tension. Disaster trauma can have a long-term impact on a person's mental well-being, and it is important to get the right support and treatment to deal with its effects. Post-traumatic stress is very important for us to know, apart from the many disasters that occur, stress can also attack anyone who experiences a traumatic event, regardless of age and gender. To restore emotional health after a disaster, it is recommended to share experiences with those closest to you, express feelings or convey felt feelings such as talking to family or friends, recording in a journal, or engaging in activities and creativity[20].

## 4 Conclusion

The research concludes that there is a significant relationship between the 2010 Mount Merapi disaster and stress experienced by the residents of Kepuharjo Village, Cangkringan District, Sleman Regency, Yogyakarta. Indonesia's position in a disaster-prone area, due to its location on the Ring of Fire, increases its vulnerability to natural calamities such as volcanic eruptions. Psychological impacts, particularly emotional and cognitive, were observed among the victims. Using the Depression Anxiety Stress Scale (DASS 42) and a sample of 98 respondents, it was found that 43.9% experienced stress. A Chi-square test yielded a significant result ( $\text{Sig} = 0.028$ ), indicating a clear association between the disaster and the stress levels among residents.

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