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Variables That Distinguish the Levels of Trauma for the Victims of the Palu Earthquake, September 28, 2018

Rianti Setiadi^{a*}, Franky^b, ^aMathematics Department, FMIPA – University of Indonesia, ^bMagister Management Department, University Prof. Dr. Moestopo (Beragama), Email: ^{a*}rianti@sci.ui.ac.id

Palu was attacked by a 7.4 RS earthquake in September of 2018. The levels of trauma experienced by the victims can be distinguished by the victims gender, damage to their house, the number of family members killed, strength of religious beliefs, help from the communities, and help from the government. If the variables that distinguish levels of trauma can be identified, help can be allocated properly. The purpose of this study is to find variables that distinguish the levels of trauma in the Palu earthquake's victims. The sample was taken by purposive sampling. The method of the data analysis were frequency tables and a classification tree. The findings reveal that the variables that distinguish levels of trauma are gender, damaged to house, and the receiving of help from the government.

Key words: *Classification tree, earthquake, government help, severely damaged house, trauma level.*

Background

An earthquake is a disaster that causes multiple casualties and significant material loss. In September, 2018, Palu, Indonesia experienced an earthquake with a magnitude of 7.4 RS. Kompas.com reported that the earthquake in Palu killed 2,113 people. BNPB (National Board for Disaster Management) stated that Palu victims suffered financial losses of IDR 13.82 trillion. The earthquake in Palu has already caused trauma to the people at Palu. Meidiana Dwidiyanti and her friends (2018) said in their paper that an earthquake is known as a disaster causing considerable health problems and requires immediate post-trauma rehabilitation. Prominent health problems that emerge after a disaster concern psychiatric and mental health. A high trauma level can cause a victim's psychiatric condition to deteriorate for a long time. The high/low trauma level of victims of earthquake disasters needs to be



observed to provide help. This can be done if the variables that distinguish differing trauma levels of victims can be known.

The trauma level of Palu residents, due to the earthquake disaster, may be felt differently by men and women. Elaine Pearson and Alice Fothergill (2006) said that, at a practical level, researchers seek to bring a richer appreciation of inequalities and differences based on sex and gender to the art and science of disaster risk reduction. Otherwise, the earthquake disaster may be felt differently by those who suffered severe damage of their house, or by those who lost family members. In addition, it is suspected that high trauma levels are also strongly affected by religious beliefs. If victims have stronger religious beliefs, they should have a lower trauma level than those who have less conviction in religion. In addition, assistance from friends, from the community and from the government is very likely to affect the trauma levels of earthquake victims. These supports can provide comfort and can arouse enthusiasm in the victims of the earthquake in Palu. Therefore, the government and related agencies need to analyse the variables that distinguish the levels of trauma so that help can be provided in the right form. If the variables that distinguish the trauma levels of Palu residents who experienced the earthquake can be known and analysed, efforts to reduce the trauma level can be more successful.

Problem and Purpose

The problem in this study is how to conduct an analysis to obtain variables that can distinguish the trauma levels of the September 2018 Palu earthquake victims.

The purpose of this study is to analyse and determine the variables that distinguish trauma levels of the September 2018 Palu victims.

Literature Review

Trauma is a physical and psychological reaction of significant stress due to an event or spontaneous/sudden experience, causing surprise, shock, fright, unconsciousness, etc. in individuals, reactions which do not easily disappear from human memory (Aep Nurul Hidayah, 2016). James Drever (1987) says in the PIKIR journal that trauma is any injury, pain or shock that occurs in the physical and mental state of individuals which results in serious disorders. The Journal of Traumatic Stress said that trauma caused by an earthquake can affect children, adolescents, and adults. Therefore, age will be included in this research variable. Earthquakes, as a natural disaster, not only causes death, physical disease, damage to the infrastructure, and economic loss, it also inflicts long-lasting mental health effects on individuals involved. There will always be cases of psychological disorders such as Post Traumatic Stress Disorder (PTSD) and depression. It can disturb their mental health. Based



on the definition above, trauma needs to be anticipated and dealt with, or, possibly cured, so that the person who experiences it can recover and live a normal life. Large earthquakes can certainly cause trauma for those who experience it. Damaged houses and loss of family members inflict physical and psychological injuries. It is not easy to forget about the earthquake's occurrence. Therefore, it is necessary to take appropriate action to overcome and help trauma victims of the earthquake disaster.

The trauma condition that occurs can cause anxiety and fear of reoccurrence in a victim. This can make them unable to recover from the downturn they have experienced. Earthquakes can also cause the destruction of personal aspirations. Many have the desire to leave their place of residence as an effort for them to eliminate or reduce the trauma levels experienced.

The trauma levels of someone caused by the occurrence of an earthquake, such as in Palu, can be reflected in difficulties sleeping, reactions of shock when vibrations are felt, a sense of a 'lost grip on life', experiencing negative emotions often, and so on (John Briere and Marsha Runtz, 1989). There are people who can control and overcome their trauma by believing that God works in everything they experience (David C Wang, 2014). Some feel they must keep fighting because they still possess life. Reactions like this should be observed in the case of the earthquake in Palu, September 2018. Based on existing characteristics, a questionnaire was constructed which measured the level of traumatic experience. The measurement of trauma levels is made by the Likert Scale 1-5 in which item statements are as follows:

1. Every tremor feels frightening
2. Now I am afraid to stay near the sea
3. The earthquake is shadowing me
4. It is difficult for me to have a good night's
5. I am afraid that the earthquake will happen again
6. The earthquake has made me sad
7. My life is broken
8. I have lost my way of life
9. Loud noises cause me shock
10. I'm desperate

Methodology

Population and Sample

Population: Palu residents who were victims of the Palu earthquake, September 2018

Samples: 128 Palu residents who were victims of the Palu earthquake, September 2018, and older than 20.

Samples were taken by purposive sampling in Palu, one month after the earthquake. The surveyor came to a refugee camp in Palu city and gave out questionnaires to victims who



were willing to respond. 128 people answered the questionnaire. This method was carried out due to the poor condition of Palu residents who were victims of the earthquake. Many are still in disaster camps and need a lot of help. The surveyor could not go to other refugees as he was limited by money and time.

Research Variables

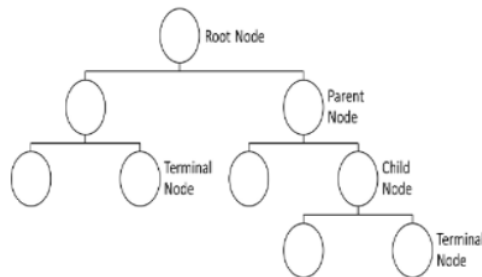
The variables involved in this study were the gender of the respondent (male or female), their region of origin (Palu or elsewhere), their presence at the location of the earthquake (yes or no), damage to their house to the extent that it could no longer be occupied (yes or no), injuring of family members (yes or no), death of family members (yes or no), faith in God (yes or no), reception of support from the government (yes or no), reception of community help (yes or no), and trauma levels measured with a 1-5 Likert scale.

Method of Analysis Data

The method of data analysis was done by a frequencies table, and a classification tree. The classification Tree used here is CRT.

¹² CRT is a statistical technique⁹ for finding and describing structural patterns of data as tree structures. The root node is the initial node that contains all of the data. The root node will divide or split by the most significant independent variable to produce the earliest branch. Nodes that will divide are called parent nodes and the resulting divisions are called child nodes. Nodes that⁹ cannot be divided because there is no significant independent variable to divide them again are called terminal nodes. A general example of the classification tree can be seen below:

Figure 1. Classification Tree



Splitting Criterion

For splitting the parent node into child nodes, the Split Criterion Method used here was the Gini Split/Gini Index. CRT divides data sets using all independent variables to repeatedly create two child nodes. The best independent variable to split the parent node is chosen using the Gini Impurity Measure in node t

$$g(t) = \sum_{i \neq j} C(i|j) \cdot p(i|t) \cdot p(j|t)$$

$g(t)$ = gini index in node t

$C(j|i)$ = probability of misclassification category j to category i in node t

$p(i|t)$ = proportion data in node t that are in category i

$p(j|t)$ = proportion data in node t that are in category j

The Gini criterion function that divides node t by variable s is defined by:

$$Q(s, t) = g(t) - p_L g(t_L) - p_R g(t_R)$$

t_L left child node divided from node t

t_R right child node divided from node t

s is the best variable that will divide node t if $Q(s, t)$ has the greatest value among $Q(s^*, t)$, s^* are other independent variables

Finding and Discussion

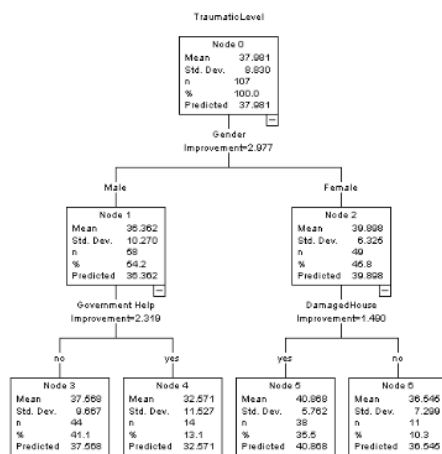
The findings of this study are as follows:

1) From the data analysis, using the frequency table, it was found that 87.9% of the respondents had high trauma levels. 59.4% were aged less than or equal to 40 years old, 84.3% were native to Palu, 95.3% were at the location of the earthquake when the earthquake occurred, 86.7% suffered severe house damage, 41.6% had severely injured family members,

41.6% had family members who died, 81.1% did not lose their purpose of life, 94.5% felt strengthened by God, 53.5% felt strengthened by their family, 27.6% felt strengthened by friends, 18.9% of respondents received support from the government, 17.5% received support from the community, 88.9% did not want to leave Palu, and 81.1% did not feel lost in their personal aspirations.

2) By using the classification tree (figure 2) it was found that the main variable that most distinguished the trauma level of the Palu earthquake victims was gender. Men experienced lower trauma levels compared with women. Another variable that determined trauma levels in men was the reception of help from the government. Men who received help from the government had a lower trauma level compared with men who did not receive help from the government. So, in men, the variable that distinguished trauma levels was the help from the government. The variable that distinguished the trauma levels in women was that of damage to their house. Women who suffered severe home damage had a higher trauma level than women who did not suffer severe home damage. So, in women, the variable that distinguished trauma levels was the presence of severe home damage.

Figure 2. Classification Tree of Traumatic Level



The discussion of these findings above is written below

In the findings of the data analysis above it can be seen that, psychologically, men and women have different levels and characteristics of trauma. The variables that differentiate trauma levels are also different. Men have lower levels of trauma when compared with women. This is possibly because men have a nature that is stronger than women and can feel that they have a responsibility to protect their wives and families. This desire to try to protect



their families can distract them from the trauma they might otherwise experience. It is possible that thoughts concerning how they might restore the condition of their families and communities prevents them from degenerating further. Men who receive help from the government have a lower level of trauma compared with men who do not receive help from the government. Assistance from the government can greatly reduce the trauma level experienced. Government assistance enables men to focus their attention on helping their families and communities. Without the help of the government, the burden of men's suffering will increase as they still have to think about the needs they must bear. Unfortunately, this study found that only 18.9% of men in this refugee camp received help from the government. It is possible that the assistance from the government was not distributed well. It can be concluded that assistance from the government will reduce trauma levels, especially in men.

Women often feel unable to do anything, especially in disasters. Women are more likely to panic. If a woman has children, her attention will be diverted by efforts to save and survive for her child. The presence of men, who are calmer, can help women to overcome their panic and anxiety. In women, the variable that most affect levels of trauma is the damaged to their homes. It is likely that women are more concerned with their later lives, especially women who are still young. A young age causes more concern for their life in the post-earthquake period. Young women still have children to look after. This can cause women who have severely damaged home to become discouraged and experience trauma.

In the descriptions of existing data, there are positive characteristics that allow for the survival of Palu residents who were victims of the September 2018 earthquake. The majority believe in God (94.5%), they did not lose their sense of life's purpose and or their hopes (81.1%) and the majority still want to recover (97.4%). This is a positive response that can be an input for the government and related agencies to continue to provide spiritual assistance and to continue to support their enthusiasm to recover from their trauma.

Conclusion and Suggestion

The conclusions that can be drawn from this study are:

The variable that most differentiated trauma levels of victims of the earthquake disaster in Palu, September 2019 was gender. Men had lower level of trauma compared with women, especially if they received help from the government. Trauma levels in women depend on the presence of severe house damage. Those who suffered severe house damage had a high level of trauma.

These findings suggest the need for government and other related agencies to provide spiritual help, strengthening faith and motivation, physical assistance and building houses for those victims dealing with trauma from the earthquake. Men need to be motivated to protect



and strengthen their families. It can be concluded that Palu earthquake caused a need for direction from the government or other related agencies in terms of disaster management.

Similar research needs to be done for children, as there are also many children who have lost their parents and siblings in the earthquake.

Research can be continued to determine variables that differentiate the rate of recovery for earthquake victims, as experienced by residents of Palus.



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