Disaster Risk Perception and Household Disaster Preparedness: Lesson Learned from Tsunami in Banten

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Abstract. This research aims to determine the effect of disaster risk perception on disaster preparedness for families on the coast of Sumur district, Pandeglang, Banten. Participants in this research are families who live in coastal area consisting of father or mother in each family. Total respondents were 174 people, all of them were victims of Banten tsunami. The measuring tool used in this research is the disaster risk perception that will be measured using the Risk Perception Belief for Disaster measurement tool that was used in the National Health Survey Risk Perception (NSHRP) in 2012 and further developed by Yong (2017). Disaster preparedness will be measured using instruments based on the grievances that have been put forward by Indonesian Institute of Sciences (LIPI) and Unesco regarding disaster preparedness. This research approach is a quantitative approach using the test of influence. The results found that there is positive influence between disaster risk perception on disaster preparedness on families in the coastal Sumur district (F = 28.23; p = 0.000 <0.05). The effect of Disaster Risk Perception on Disaster Preparedness is 14.1%. There is a significant influence between the disaster risk perception to disaster preparedness on the family in the coast of Sumur District, Pandeglang. If the disaster risk perception is high, the disaster preparedness will also increase. The implications of the results of this research are research subjects who have a high disaster risk perception, meaning that the community has the value of trust that the place they live has a risk of natural disasters and finally feels they have high responsibility, control, acceptance and response to disaster risk, so that this will encourage the community to be able to carry out disaster preparedness.

1. Introduction

Disaster is an event or a series of events that threaten and disrupt people's lives and livelihoods caused by both natural and/or non-natural factors as well as human factors resulting in fatalities, environmental damage, property losses, and psychological impacts [1]. Geographically, Indonesian archipelago is a disaster-prone area because it belongs to the Ring of Fire (Pacific volcanic area) whose shape is curved from the northern islands of Sumatra - Java - Nusa Tenggara to North Sulawesi. Indonesia has more than 400 volcanoes and 130 of them are active volcanoes, located both on the
 seabed and above sea level. One of the active volcanoes to this day is the Gunung Anak Krakatau volcano located in the middle of the Sunda Strait. This volcano first appeared at sea level in 1929 after the massive explosion of Krakatau Volcano which occurred in 1883, the explosion remembered as the biggest explosion at that time. The impact of the explosion destroyed Danan Mount, Perbuwatan Mount and part of Rakata Mount and also caused a tsunami disaster as high as 40 meters that destroyed any villages on the coast. When it happened, fatalities recorded reached 36,417 people [1].

Sunda Strait has complicated tectonic conditions and unstable seabed geology, coupled with the existence of the Anak Krakatau Volcano in the middle of the Sunda Strait. It makes this area has many tsunamigenic, such as various natural events that could potentially cause tsunamis. These events can be in the form of disruption of sea water by volcanic activities, earthquakes, coastal and undersea landslides, and other causes [2].

Based on history, in the Sunda Strait there have been many tsunami disasters recorded in the tsunami catalog. The tsunami that occurred was caused by a number of geological phenomena, including the eruption of the underwater volcano Krakatau that occurred in 416, 1883 and 1928, earthquakes in 1722, 1852 and 1958 and other causes of land failure in the form of landslides in both the coastal area and on the seabed in 1851, 1883, and 1889 [2].

In 2018, tsunami disaster occurred again in the Sunda Strait, precisely on December 22, 2018. Tsunami struck the coast of Banten and Lampung, which caused by high tides and underwater landslides due to the eruption of the Anak Krakatau Volcano in the Sunda Strait. Based on information from the National Disaster Management Agency (BNPB) the areas that affected the most by tsunami waves were in Pandeglang District, which is a tourist and residential area along the coast of Tanjung Lesung, Sumur, Lada Bay, Panimbang, and Carita. At least 429 people were killed, 1,485 injured and 154 people missing due to this event [3].

Most tsunamis are triggered by earthquake activity, but it does not happen in the current tsunami disaster. There are no signs, such as a large earthquake or sudden receding sea water, that indicate a tsunami will occur, so people do not expect that a tsunami will happen. Even though the cause of the tsunami in the Sunda Strait was not only due to an earthquake, but also could be due to the activities of Anak Krakatau Volcano.

The lack of experience that was faced by the surrounding community for tsunami disasters that were not caused by the earthquake but caused by something else, made the community take no steps to anticipate the tsunami disaster. The disaster in Sunda Strait, which has a lot of tsunamigenic conditions, should be a call to increase research into various causes that can cause tsunamis and tsunami preparedness. Maintenance of preparedness from time to time is important for self-defense [4]. Improving disaster preparedness will make people know how to respond in an emergency situation so that they can reduce the risk of loss of life, loss of property and changes in people's lives.

Social scientists, disaster management and public policy makers generally organize disaster reduction research and guidance in four phases, namely mitigation, preparedness, response and recovery [5]. Community-based disaster preparedness is needed, especially in the pre-disaster stage. According to IDEP [6], there are several reasons why community-based preparedness is needed. First, disaster risk reduction is the responsibility of all parties, not only the government. Second, everyone has the right to get protection for dignity, safety and security of a disaster. Third, community is the first party that will directly face the threat of disaster, therefore the community's preparedness and preparedness will determine the size of the impact of the disaster on community. Fourth, community is an important actor to reduce risk by increasing their ability to handle disasters.

Disaster preparedness defines as actions that enable government, organization, society, community and individuals to be able to respond to a disaster situation quickly and efficiently [7]. Included in preparedness measures are preparation of disaster management plans for resource maintenance and
personnel training [8]. According to the Law of the Republic of Indonesia No.24 Year 2007, Preparedness is a series of activities carried out to anticipate disaster through organizing as well as through appropriate and efficient steps. Basically, preparedness is a form of activity to avoid the risks that occur when a disaster occurs at a time and if a disaster still takes a long time.

According to LIPI-UNESCO [7] the family is the main stakeholder in community preparedness, because it is the spearhead, subject and object of preparedness, because it has a direct effect on disaster risk. The household is the smallest unit in society which will later shape behavior in the community (Lenawida, 2011). Parents, especially mothers in the family, are the foundation of behavior, especially health behaviors for family members [9].

Disaster preparedness for the family is very important because when a disaster strikes, the family will face a large risk impact from the disaster such as the separation of family members, the impact of physical disability, death, mental stress, reduced ability to overcome family problems and conflicts. The purpose of disaster preparedness on families for disasters is to minimize the impact of disasters so as to maintain survival and maintain quality of life by meeting basic human needs when a disaster occurs [10].

Disaster preparedness for families is actions that can be taken in the household to prepare themselves and families for disasters before disasters [11]. These actions can be in the form of predicting, preventing, or reducing the impact of disasters by making preparation and adjustments such as food and water storage, preparing household emergency plans, emergency equipment, securing household items and others whose purpose is to reduce risk, injury or damage due to disaster [12].

There are many factors that can influence disaster preparedness in families, some researchers in this field have tried to find what these factors are. Dantzlzer [12] in his research suggested several factors that could influence disaster preparedness in the family, firstly socioeconomic factors (income, education, age, gender, race and ethnicity), knowledge and behavior, socio-psychological or control beliefs influence (risk perception, self-efficacy, response efficacy), structural and normative.

The relationship between disaster risk perception and disaster preparedness has been explored much before. Research has shown that when people feel the risk of an unacceptable event, they will engage in the behavior that they believe is most appropriate and will give the best results to minimize risk [12]. Perception of the risk of danger has been claimed as the most important factor that drives disaster preparedness [13]. Several studies that have been conducted have similarities, namely individual subjective assessment and risk assessment or risk perception as one of the important factors that explain emotional response, behavior, and cognitive process in responding to a disaster [14].

Risk perception refers to "subjective judgments about the likelihood of certain types of events occurring and how concerned we are with consequences" [15]. Risk perception includes an evaluation step of the possibilities and negative consequences of a risk [15]. Risk perception defines as a person's beliefs, attitude, judgment and feeling, as well as the social or cultural values that a person adopts, against the dangers and benefits [16].

People respond to the danger they feel, if their perception are wrong then self-protection efforts, public, and environment will also tend to be wrong [17]. Several factors that can influence the disaster risk perception have been identified. One of them is that personal experience has a strong impact on the disaster risk perception, and makes people think more about the risks they might receive [18]. It was also found that knowledge of disasters would lead to more accurate perception of risk [17].

In their research entitled Risk Perception, Bodemer and Gaissmaier [16] have analyzed various factors that can influence disaster risk perception based on psychometric, social and cultural approaches, namely fear, The Role of Affect: Risk-as Feelings and the Affect Heuristic, heuristic availability such as how much is the likelihood that a event that is remembered and has happened will happen again in the future, optimism bias, representation of risk and media.

Research has shown consistently with increasing disaster risk perception, decision to adopt behaviors
that are considered to reduce risks to disasters also increase [19]. Research conducted by Hidayati [19] entitled "The Relationship between Risk Perception and Disaster Preparedness for Unsyiah Students" shows a different thing, that there is no significant relationship between risk perception and disaster preparedness for Unsyiah students. That is, the higher risk perception is not followed by high disaster preparedness. Conversely, the lower risk perception is also not followed by low disaster preparedness.

The phenomenon that occurs in the Banten coastal communities that were affected by tsunami also did not think that a tsunami would occur, whereas at that time the status of Anak Api Krakatau Mount was erupting and earthquakes also occur frequently, these natural events were able to cause tsunami tsunami and should these events be able to give warnings and perception of possible risks to the community so that they prepare themselves for disaster, but in reality there are still many people who ignore it.

Based on the description above, it can be concluded that there are still inconsistencies between the theory and facts of the phenomenon with the theories related to Disaster Risk Perception and Disaster Preparedness. That is what underlies this research with the title, "The Effect of Disaster Risk Perception on Disaster Preparedness in Families in Coastal Coast Sumur district, Pandeglang".

2. Method

This research was used ex post facto quantitative research method. Dependent variable in this research was disaster preparedness and independent variable in this research was disaster risk perception. The population in this research was coastal community in Sumur District. The sample in this research were families living in the coastal areas of the wells, Pandeglang Banten and experienced directly from Banten Tsunami disaster. Total samples obtained were 174 people. The sampling technique uses non-probability sampling technique and the type of technique used is purposive sampling because not all individuals in the population are included, but are given equal opportunities to become sample members and based on certain criteria which are the research objectives. In this research the instrument given was Likert scale model. Likert model scale used in this questionnaire contained six answer choices namely Very Unsuitable (STS), Unsuitable (TS), Somewhat Unsuitable (ATS), Somewhat Suitable (AS), Suitable (S), Very Suitable (SS). Data analysis and hypothesis testing using one predictor regression analysis with the help of IBM SPSS 23 for Windows application. In this research there are two research instruments, namely instruments made by researcher based on dimensions compiled by Indonesian Institute of Sciences (LIPI) and UNESCO/ISDR and Risk Perception Beliefs for Natural Disaster instrument developed by Yong [14], to measure the level of disaster risk perception in research subject.

3. Results and discussion

Based on data collection that has been done, the majority of families have high disaster preparedness, which is 83% or as many as 144 families and all research subjects have a high disaster risk perception as many as 174 people with percentage of 100%. This is consistent with the results of correlation test which has significant positive direction (see table 1).

Table 1. Hypothesis Significance Test

| F - count | F table | p value | α  |
|-----------|---------|---------|----|
| 28.23     | 3.89    | 0.00    | 0.05 |
Based on the results of hypothesis significance test with regression analysis it can be seen that calculated F count obtained is 28.23 with F table value is 3.89, then F count is greater than the F table. The value of p = 0.00 and the value of p is smaller than the value of α = 0.05. Thus, Ha is accepted and Ho is rejected which means there is a significant influence between the disaster risk perception to disaster preparedness in households in the coastal communities of Sumur District, Pandeglang.

Based on the results of data analysis that has been done in this research, it is obtained that Ho is rejected and Ha is accepted which shows that there is an effect of the disaster risk perception on disaster preparedness for families on the coast of Sumur District. The results of this research indicate that between disaster preparedness variables and disaster risk perception, has significant positive effect, meaning that the higher disaster risk perception of a person, the higher disaster preparedness level.

### Table 2. Model Summary

| Variabel                        | R       | R Square | Adjust R |
|---------------------------------|---------|----------|----------|
| Disaster risk perception        | 0.376   | 0.141    | 0.136    |
| with disaster preparedness      |         |          |          |

Analysis of determination coefficient obtained based on calculation of correlation index between the two variables shows R Square value of 0.141 (see table 2). This figure can be interpreted that there is 14.1% tendency of the contribution of the disaster risk perception to disaster preparedness and other 85.9% is influenced by other factors not examined in this research, so that the disaster risk perception is proven to have influence on disaster preparedness in families on the coast of District Sumur by 14.1%.

The results of this research is in line with research conducted by Goddard with research title "Disaster Preparedness Knowledge, Beliefs, Risk-Perception, and Mitigating Factors of Disaster Preparedness Behaviors of Undergraduate Students at a Large Midwest" the results of this research are students with knowledge of disaster preparedness, high risk perception and ability to prepare for disaster have a better level of disaster preparedness than student with basic knowledge, low risk perception and low self-efficacy [20]. These results are also in line with research conducted by Lindel and Hwang in analyzing what factors can influence disaster preparedness and one of these factors is the perception of risk of disaster [21].

There are several factors that can influence disaster risk perception, in his research entitled Risk Perception [22]. Bodemer and Gaismaier [16] have analyzed various factors that can influence risk perception based on psychometric, social and cultural approaches, namely dread risk, the role of affect, availability heuristic, optimism bias, representation of risk, and media. In this research it is known that all research subjects have a high level of disaster risk perception, this could be due to the tsunami disaster that occurred on December 22, 2018, making the community have experience that affects their disaster risk perception. This experience makes people have fears of catastrophic events and risks they have experienced, the availability of heuristics or the availability of events that have been experienced and remembered as an unpleasant event is also thought to be one of the reasons why the level of disaster risk perception owned by the community is high. However, it still needs further research to find out what factors that can significantly influence the level of disaster risk perception.

From this research, if the disaster risk perception is high, community has the value of trust that the place they live has a risk of natural disasters and finally feels they have high responsibility, control, acceptance and response to disaster risk and this will encourage them to better prepare themselves in the face of a tsunami disaster that might happen again. People who have a perception of the risk of a disaster
will feel that they need to take actions that can reduce that risk and one of them is by making disaster preparedness, whereas if the disaster risk perception in the community is low, it shows a lack of confidence in the risk they might receive as a result from disaster so as to reduce the responsibility, control, acceptance and response for disaster preparedness.

4. Conclusion

Based on statistic hypothesis testing results it can be concluded that there is significant and positive influence between disaster risk perception to disaster preparedness for families on the coast of Sumur district, Pandeglang. If the research subjects have a high disaster risk perception, it means that the community has a value of trust that the place they live has risk of natural disasters and finally feels they have high responsibility, control, acceptance and response to disaster risk, it will encourage the community to make preparedness disaster. The effect of disaster risk perception on disaster preparedness is 14.1%.

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