The Improvement of Community Knowledge about Tsunami Disaster in Sawarna Village, Bayah Subdistrict, Lebak Regency, Banten Province

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Abstract. This study aimed to determine the improvement of community knowledge of the tsunami disaster before and after being given training. This study was located in Sawarna Village, Bayah Subdistrict, Lebak Regency, Banten Province. The population in this study was the Tourism Awareness Group (POKDARWIS). This research uses the descriptive quantitative method, while data was collected using a questionnaire for pre-test and post-test. The Paired Sample T-Test analyze was used to determine whether or not there was an improvement of community knowledge of the tsunami disaster after training. The results showed that there was a significant improvement in community knowledge about tsunami disaster after training. Therefore, similar training needed to be carried out continuously by both the government and non-governmental organizations.

1. Introduction

Tectonic plate activity that occurs in Indonesia causes volcanic arcs to form along the islands of Sumatra, Java-Bali-Nusa Tenggara, North Sulawesi-Maluku, to Papua, this is because Indonesia is located at the confluence of four active moving plates, namely plates Eurasia, Indo-Australian Plate, Pacific Plate and Philippine Plate [21]. The volcanic series in Indonesia is part of a series of volcanoes along the Asia-Pacific which is often referred to as the Ring of Fire or the Pacific Circum series (Figure 1). The zone or region that is between the confluence of plates and volcanic series is called an active zone or known as the forearc, in this region there are generally many active faults and earthquakes often occur, for example the western region of the Bukit Barisan Mountain Range, the southern coast of Java, and the north coast of Papua. Whereas zones or areas that are on the side after a series of volcanoes that can be known as back arcs tend to be found more rarely with active faults and are often found alluvial and swamp deposits, such as the east coast of Sumatra, the north coast of Java, and the south coast of Papua [3].

Based on the tectonic conditions of the Indonesian archipelago which is a confluence of four active moving plates namely, the Eurasian Plate and the Indo-Australian Plate in the western part of Indonesia and the Indo-Australian Plate, the Pacific Plate, and the Philippine Plate in the eastern part of Indonesia which results in the form of subduction zones, accretion zones prismatic, magmatic arcs, facial basins, back basins, and geological structural patterns (Figure 2.) [11]. Thus, almost all parts of Indonesia are vulnerable to disasters. Among the many islands, Kalimantan is relatively stable and safe from disasters. Tectonic earthquake events will very likely occur at any time and it is very difficult to predict when and exactly where the disaster will occur. Earthquakes are partially centered at the bottom of the Indian Ocean, and some can trigger large ocean waves called tsunamis. Impulsive interference that is transient (waves are faulty) as a tsunami generator is at least sourced from earthquakes on the seabed, volcanic eruptions on the seabed, and landslides that occur on the seabed. Therefore, disaster mitigation efforts need to be done as an effort to minimize and reduce the impact caused by the disaster [9].

It is known that 12 disaster threats are grouped in geological disasters, hydrometeorological disasters, and anthropogenic disasters. Tsunami is one of the geological disaster group. Based on Indonesian Disaster Risk Index data, there are 254 million exposed to moderate and high disaster risks by the end of 2018 and disasters have increased significantly in the last decade one of which is the tsunami disaster [3].
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Figure 1. Asia-Pacific Volcano Trail (Ring of Fire) Distribution Map

Figure 2. Indonesian Archipelago Tectonic Condition (Hall, 2002)
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In 2018, the National Disaster Management Agency noted in Banten province suffered two earthquakes and one tsunami, which caused many fatalities, damage to homes, damage to public facilities. The earthquake caused one person died, and two people were injured, 139 houses were severely damaged, 162 houses were moderately damaged, 786 houses were lightly damaged, one unit of health facility was damaged, six groups of worship facilities were damaged, and six units of education facilities were damaged. The tsunami disaster at the end of 2018 caused 325 people to die and disappear, 10,051 people were injured, 32,959 people were affected and displaced, 983 houses were severely damaged, and 70 homes were slightly damaged [4]. The epicenter data of earthquake and tsunami-prone zones present in Figure 3.

![Figure 3. Earthquake Epicenter and Tsunami Prone Zone Data in Banten Province](image)

The earthquake and tsunami in Banten caused damage to public facilities, one of which is educational facilities. There were six units of educational facilities damaged during the 2018 period [4]. We cannot avoid natural disasters; what can do is to reduce the risk of disasters.

In Aceh Besar Regency and Banda Aceh City, there is research on how to empower the local community to recognize valuable IK for the DRR tool based on Smong (The story means “tsunami in” Devayan Language) success story in Simeulue Island [28]. The research in SE Bangladesh aims to understand how the local perceive and prepare for earthquake and tsunami through discussions and direct interviews [1]. Two of the research above aimed at local communities only. Tourism Awareness Group (POKDARWIS) in Sawarna Village was chosen in this study considering that Sawarna Village is a tourist destination. Therefore, increasing Tourism Awareness Group (POKDARWIS) knowledge and awareness is directed to minimize the risk by increasing the capacity of human resources and infrastructure by providing education, skills, and building disaster care behaviors (pre-disaster, emergency response, early recovery, and post-disaster). Based on this, increasing the knowledge and awareness of Tourism Awareness Group (POKDARWIS) Sawarna Village, Bayah District, Lebak Regency, Banten Province in dealing with the earthquake and tsunami disasters is an important thing to do.
2. Methods

This study location is in Sawarna Village, Bayah Subdistrict, Lebak Regency, Banten Province (Figure 4) and the population in this study was 44 peoples as a member of the Tourism Awareness Group (POKDARWIS). This research uses the descriptive quantitative method, while data was collected using a questionnaire. As such, Tourism Awareness Group (POKDARWIS) survey questionnaires, a questionnaire will be part of two; pre-test and post-test.

Besides, after the pre-test to find out the Tourism Awareness Group (POKDARWIS) knowledge about the tsunami disaster, there is a training on preparedness and mitigation will hold in dealing with tsunamis that are at risk of occurring in the Sawarna Beach and surrounding areas. A post-test will be conducted after the training to measure whether there has been an increase in knowledge about the tsunami disaster and how to prepare for and mitigate it. The Paired Sample T-Test analyze is used to determine whether or not there was an improvement of community knowledge of the tsunami disaster after training. The data analyzed through Paired Sample T-Test comes from pre-test and post-test that have done to the Tourism Awareness Group (POKDARWIS) before.

3. Results and Discussion

3.1. The Improvement of Knowledge for Tourism Awareness Group (POKDARWIS) about Tsunami Disaster

Tsunamis can trigger by earthquakes, landslides in the bottom of the sea, volcanic activity until meteors or asteroids fall. The most common cause of tsunami is earthquakes, and especially those occurring in the subduction zone. Based on the simulation model known that the estimated times of arrival for the tsunami-prone cities are then one hour [29]. For example, Banda Aceh 35 min, Sabang 22 min, Lageun 25 min, Calang 29 min, Teunom 29 min, Meulaboh 35 min, Sinabang 20 min, Singkil 53 min, and Tapaktuan 24 min. Tsunami occur in Sawarna Village, Bayah Subdistrict, Lebak District, Banten Province has had lost their lives and material losses. Because of the tsunami, now Sawarna Beach has also experienced a decline in visitors, so it is crucial for local community awareness to face the same danger, so that’s why they need the training to face the situation and condition.
The government of Indonesia has undertaken the number of efforts to decrease hazard risk reduction; one of these is the improvement of human knowledge. Communication is a common strategy to deal with real catastrophe in Indonesia. One of the implementations for increasing the mitigation knowledge is occupying mass communication, such as deliver the information or give training about mitigation directly to the community [26]. With this effort, it expects that all people, especially those close to the location of tsunami risk, are ready to face the tsunami disaster, and this can reduce or reduce the number of victims and losses exposed from the tsunami. One of the efforts made is to increase disaster preparedness so that people know what to do when the tsunami occurs.

Tourism Awareness Group (POKDARWIS) has chosen for given training about tsunami disaster and mitigation because Sawarna Village is a tourism area. Tourism Awareness Group (POKDARWIS) in Sawarna Village, a community that involves the locals in promoting sustainable development in the tourism sector. This research adopts the concept of communication for development in its analysis and focuses on community participation in building local tourism [25]. POKDARWIS in Sawarna Village is expected to be able to help the surrounding community and visitors from outside regions to understand what must do when the tsunami disaster comes suddenly.

How to increase knowledge about tsunamis in Tourism Awareness Group (POKDARWIS) is to provide training on mitigation, and there will be a pre-test and post-test to measure differences in Tourism Awareness Group (POKDARWIS) knowledge before and after the training given to them. The form of pre-test given to Tourism Awareness Group (POKDARWIS) is in the form of a questionnaire containing questions about disaster and tsunami mitigation. This is done to test the extent of Tourism Awareness Group (POKDARWIS) knowledge before the training. The training is given about what is tsunami disaster and how to survive, mitigation, and simulation when the tsunami comes [28]. Meanwhile, the form of post-test given Tourism Awareness Group (POKDARWIS) is in the form of a questionnaire containing questions about what has explained in training. It was done to test the extent of Tourism Awareness Group (POKDARWIS) knowledge after the training on tsunami disaster. The T-Test analyzes is used to determine there is an improvement of community knowledge of the tsunami disaster after training or not (Table 1).

### Table 1. Result of Post-Test and Pre-Test Tourism Awareness Group (POKDARWIS) after Given Training About Tsunami Disaster with SPSS

|          | Mean  | N  | Std. Deviation | Std. Error Mean |
|----------|-------|----|----------------|-----------------|
| Pre-Test | 74.3575 | 44 | 8.44495        | 1.27312         |
| Post-Test| 84.0800 | 44 | 6.62566        | 0.99886         |

Source: Analysis Data (2019)

In this output, we show a summary of the results of the descriptive statistics from two samples studied, namely the pre-test and post-test values. For the pre-test score, the knowledge of the POKDARWIS disaster or mean is 74.3575. As for the post-test value obtained an average value of 84.0800. The number of respondents used as research samples is 44 people for the value of Std. Deviation (standard deviation) in the pre-test was 8.44495, and the post-test was 6.62566. Finally, the amount of Std. Error Mean for pre-test is 1.2773, and the post-test is 0.99886.

Because of the average value of disaster knowledge in the pre-test 74.3575 < post-test 84.0800, then that means descriptively, there is a difference in the average learning outcomes between pre-test and post-test results. Furthermore, to prove whether the difference is real (significant) or not, then we need to interpret the results of the paired sample T-Test contained in the "Paired Samples Test" output table.

### Table 2. Correlation Result with SPSS

|          | N  | Correlation | Sig.  |
|----------|----|-------------|-------|
| Pre-Test & Post-Test| 44 | 0.463 | 0.002 |

Source: Analysis Data (2019)
The above output shows the correlation test results or the relationship between two data or the relationship of the pre-test variable with the post-test variable. Based on the high output, it is known that the correlation coefficient (Correlation) is 0.463 with a significance value (Sig.) Of 0.002. Because of the value of Sig. 0.002 < probability 0.05, it can be said that there is no relationship between pre-test variables and post-test variables.

Table 3. Result of the Improvement of Community Knowledge About Tsunami Disaster Tourism Awareness Group (POKDARWIS) in Sawarna Village with SPSS

| Paired Differences | t    | df | Sig. (2-tailed) |
|--------------------|------|----|----------------|
| Mean               | Std. Deviation | Std. Error | 95% Confidence Interval of the Difference | Lower | Upper |
| Pre-Test           | 9,72250 | 7,96582 | 1,20089 | - | - | 43 | ,000 |
| – Post-Test        | 12,14433 | 7,30067 | 8,096 | | |

Source: Analysis Data (2019)

This third output is the most crucial because, in this third part, we find the answers to what are the questions in the example case above, namely regarding the presence or absence of influence from the dissemination of disaster knowledge. Before interpreting the results in the T-Test table, we first need to know the research hypothesis formulation.

Then, we can know that H0 = there is no average difference between the results of pre-test knowledge and post-test, which means that there is no influence from the dissemination of disaster knowledge to increasing disaster awareness of the Tourism Awareness Group (POKDARWIS) [22].

Ha = there is an average difference between the results of pre-test and post-test knowledge, which means that there is an influence from the dissemination of disaster knowledge to the increase of Tourism Awareness Group (POKDARWIS) about tsunami disaster. From the table above, we can know the value of Sig. (2-tailed) < 0.05, meaning that H0 rejected and Ha is accepted [22]. So, there is an increase in knowledge in Tourism Awareness Group (POKDARWIS) after being given training, and the results can seem from the post-test. Training methods more effectively improve the Tourism Awareness Group (POKDARWIS) disaster prevention and mitigation capabilities compared with socialization, same case in Kajenjeng Inpres Primary School, Makassar City, Indonesia [22] [27].

4. Conclusions
The result of this study shows that there has been changing the knowledge of Tourism Awareness Group (POKDARWIS) in Sawarna Village about tsunami disasters before and after given training. The training was able to reconstruct and increase the understanding of disaster seen. The highest increase occurred after the Tourism Awareness Group (POKDARWIS) in Sawarna Village got the training and done the post-test. The disaster mitigation indicators were successfully mastered by more than 70 percent of Tourism Awareness Group (POKDARWIS) in the good that adopted, especially about tsunami disasters. This research aims that after increasing POKDARWIS knowledge in Sawarna Village, they will be more alert and ready to face the potential tsunami disaster that can come on Sawarna Beach which included in their area.

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