

## Original paper

### **The Influence of Earthquake and Tsunami Mitigation Socialization on the Coastal Community of Palu, Central Sulawesi Province**

Selvi Alfrida Mangundap\*, Nurlailah Umar, Amyadin, Supirno

Palu Health Polytechnic Applied Undergraduate Study Program, Jl. Thalua Konchi No.19, Mamboro, Kec. North Palu, Palu City, Central Sulawesi 94145

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#### **Abstract**

**Background and aim:** This research discusses the tsunami disaster caused by an earthquake in coastal areas, especially in Palu Bay, Central Sulawesi. A tsunami is a water wave that occurs due to sudden changes in vertical sea level, which can be triggered by an earthquake under the sea. Palu Bay is a vulnerable area and has experienced a similar disaster on September 28 2018, which caused casualties and material losses. Mitigation to reduce the possibility of disasters and reduce community vulnerability. The results of interviews with affected communities showed a lack of preparation and panic reactions during the earthquake and tsunami. This research aims to analyze the influence of socialization on earthquake and tsunami mitigation on the knowledge, attitudes and actions of the community on the Palu Bay Coast.

**Materials and methods:** The research method uses a quasi-experimental design with a pre-post test in one group. This research was carried out in coastal communities in Palu City involving 136 respondents from 4 sub-districts, the sampling technique was purposive sampling.

**Results:** Characteristics of respondents: 53.7% male; the largest age category is 36-45 years 33.1%; marital status: 74.3% were married; Education level category 55.1% high school/equivalent; and 79.75% lived in Palu for more than 21 years. The results of research data analysis show that there is an increase in community knowledge and actions after socialization. Bivariate analysis using the Wilcoxon test shows pre-post knowledge with sig. 0.003 ( $< 0.05$ ); and pre-post action with sig 0.003 ( $< 0.05$ ), this shows that statistically there is an influence of socialization about mitigation on community knowledge and actions. Meanwhile, for pre-post socialization attitudes with sig. 0.639 ( $> 0.05$ ); this result shows that statistically there is no influence before and after mitigation socialization on community attitudes.

**Conclusion:** There is an influence of socialization on earthquake and tsunami mitigation on knowledge and action, and there is no influence of socialization on attitudes towards earthquake and tsunami mitigation after the socialization is carried out.

**Keywords:** *Mitigation, Earthquakes, Tsunamis*

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**\*Corresponding author:** Selvi Alfrida Mangundap, Palu Health Polytechnic Applied Undergraduate Study Program, Jl. Thalua Konchi No.19, Mamboro, Kec. North Palu, Palu City, Central Sulawesi 94145.

**E-mail address:** selvi.541.am@gmail.com

## **Introduction**

The natural geographical, geological, hydrological and demographic conditions in Indonesia allow natural, human and non-natural disasters to occur with serious impacts on humans, the environment and national development [1]. Earthquake shocks have the potential to trigger tsunami waves. Tsunamis occur due to sudden changes in sea level [2], [3]. The Palu Bay area in Central Sulawesi is a vulnerable area and experienced a similar disaster in 2018, causing loss of life and material damage.

Furthermore, it is important to emphasize the need for mitigation efforts, namely a series of actions to reduce disaster risks [4]. Increasing mitigation and preparedness can be done through outreach and simulations [5]. Disaster management in Indonesia is currently considered to be less effective because it is hampered by a management paradigm that is not yet integrated and tends to focus on the emergency phase, Nasution, 2012 [6].

The results of interviews with affected communities showed that most of them had no preparations when the earthquake and tsunami occurred. Therefore, educational communication efforts and providing information about mitigation and community preparedness are needed, especially on the coast of Palu City. One solution is through outreach, simulation and assistance in earthquake mitigation to minimize casualties and losses due to disasters.

This research has specific objectives which include assessing community knowledge, attitudes and actions regarding earthquake and tsunami mitigation, identifying mitigation equipment, education and outreach, as well as forming a disaster preparedness team in each sub-district. The existence of this research is very urgent because earthquakes and tsunamis in Palu City often occur periodically, so that coastal communities need to be accompanied, given information and mitigation training to be able to save themselves and help others in disaster situations.

## **Material and Methods**

This research chose a quantitative approach with a quasi-experimental design and pre-post test design on one group of subjects. The population studied were people living on the coast of Palu City. The sampling technique was carried out using purposive sampling and involved 136 respondents who met the inclusion criteria, namely aged between 15-70 years, had the ability to read and write, and were willing to participate in this research. The variables studied include knowledge, attitudes and actions related to earthquake and tsunami mitigation.

## **Results**

This research data was analyzed using univariate analysis, which includes the distribution and characteristics of the respondents. The next analysis is bivariate analysis, which begins with testing the data distribution. The results of this test show that data regarding knowledge, attitudes and actions have a non-normal distribution. This is shown by the Kolmogorov-Smirnov test value for knowledge before intervention of 0.043, knowledge after intervention of 0.033, attitude before intervention of 0.004, attitude after intervention of 0.022, action before intervention of 0.200, and action after intervention of 0.033. Therefore, for subsequent Bivariate Analysis, the Wilcoxon test [7] was used. The results of this analysis will be described as follows:

**Table 1.** Frequency distribution & characteristics of respondents Gender

Gender	Frequency	Percent
Male	73	53.7
Female	63	46.3

Based on the table above, the number of respondents was 136 people, mostly men (53.7%), and the largest age category was 36-45 years (33.1%). Most of the respondents were married (74.3%) and the majority of respondents' education level was high school/equivalent (55.1%). Judging from the category of length of stay in the city of Palu, most are more than 20 years (79.4%). Univariate data analysis of 136 respondents using numerical data processed using a computer program, as in the following table:

**Table 2.** Knowledge, attitudes and actions before and after socialization regarding Earthquake and Tsunami Disaster Mitigation

Variabel		Mean	Median	Modus	SD	Min-Max
Knowledge	Pre	29.4	29	35	6.808	14-46
	Post	31.86	32	36	6.931	13-48
Attitude	Pre	32.32	33	36	7.742	5-48
	Post	32.96	33	36	7.145	5-48
Action	Pre	23.29	23	23	9.971	2-44
	Post	26.41	27	22	7.662	4-44

Based on the table above, it shows that out of 136 people, there was an increase in the mean value of knowledge before and after being given socialization by 2.46; for attitude the mean value increased by 0.64 and for action there was an increase in the mean value of 2.72. Meanwhile, for the median value of the knowledge variable, there was an increase of 3; There was no change in the median value for attitude and the median value for action increased after socialization by 4. Variations in this value occurred where respondents involved in socialization varied in terms of age and level of education which could differ in their ability to receive and understand information during socialization. Bivariate analysis with the Wicoxon test results are shown in the table below:

**Table 3.** Results of Analysis of the Effect of Socialization on Earthquake and Tsunami Disaster Mitigation on the Palu Bay Coast

Variabel		N	Negative Rank	Positive Rank	Ties	Sig
Knowledge	Pre-Post	136	50	82	4	0.003
Attitude	Pre-Post	136	68	60	8	0.639
Action	Pre-Post	136	47	81	8	0.003

## Discussion

The discussion is described in 3 (three) things which include knowledge, attitudes and skills in mitigating earthquake and tsunami disasters, as follows:

### - Knowledge

The results of data analysis show that there is an increase in the knowledge of socialization participants, seen from the average and median values before and after socialization regarding earthquake and tsunami mitigation. Statistical tests also show that there is an influence of

socialization on knowledge. Researchers assume that knowledge about earthquake and tsunami mitigation is very important for the coastal communities of Palu Bay. This helps reduce the risk of loss of life and property. This knowledge allows the public to understand risk zones, safe areas, and correct evacuation procedures. It can also increase community awareness, enabling planning and design of buildings that are more resilient to shocks. This knowledge is the key to minimizing the impact of the earthquake and tsunami disaster on the Palu Bay coastal area. Earthquakes can occur at anytime and anywhere without knowing the location or time [1]. One form of mitigation effort is through education and socialization training [8].

Increasing understanding of disasters can be achieved through outreach activities that provide education with the aim of reducing disaster risk in an area [9]. This finding is in line with Setiadi's research which shows that there is a relationship between community knowledge about tsunami disaster preparedness [2]. Therefore, it is recommended that community health centers in Bayah carry out outreach and training regarding preparedness so that the community is ready to face disasters [10]. Anugraha's research results (2023) also show that socialization activities are very effective in increasing knowledge. Most respondents felt the benefits of this effort were in increasing knowledge related to tsunamis [11]. Some of the main factors that cause many victims due to earthquake disasters are the lack of public knowledge about disasters and inadequate preparedness in anticipating these disasters, [12]. People living in disaster-prone areas must be aware of this. Therefore, it is important to provide information through outreach or other methods so that people understand how to reduce risks, such as knowing what actions to take when an earthquake occurs, evacuation directions, location of gathering points, and appropriate sources of information regarding disasters, as well as who to ask for help [3].

#### *- Attitude*

The results of data analysis regarding the attitudes of socialization participants showed a slight change in the average value, but there was no significant change in the median value. Some respondents showed a decline in attitudes, and statistically showed that socialization did not have a significant influence on respondents' attitudes. The right attitude in mitigating earthquake and tsunami disasters is very important for people living on the coast of Palu Bay. A vigilant attitude and awareness of potential dangers helps people recognize early signs of disaster and take quick steps to protect themselves and those around them. A proactive attitude in understanding evacuation plans and safety zones is also very important to minimize the risk of injury or loss of life. A collaborative attitude in working with the government and related institutions also helps build overall community preparedness. With the right attitude, communities can significantly increase their safety and preparedness for the risk of earthquake and tsunami disasters in the Palu Bay coastal area. Attitude can be explained as a person's response or reaction to a stimulus, as well as views or feelings that accompany the tendency to act [13]. Theory also suggests that attitudes are a predisposition to carry out or not carry out a certain behavior. Therefore, attitude is not just an internal psychological state, but rather an individual process of consciousness, [14].

#### *- Action*

The results of data analysis in this research show an increase in action in efforts earthquake and tsunami mitigation, and statistically shows that socialization has a significant impact on community mitigation actions. Appropriate action in mitigating earthquake and tsunami disasters for the coastal communities of Palu City Bay is the key to safety. Know quick steps when an earthquake occurs, such as taking shelter under a sturdy structure. Have an evacuation plan and know the route to higher areas to avoid the risk of a tsunami. Involve in evacuation and community safety drills, and collaborate with the government and disaster mitigation agencies. With this

action, society can protect lives and property from potential natural disasters.

Community involvement in disaster management efforts at the sub-district or village level can be done through launching policies and programs aimed at gathering local knowledge about disasters and increasing community preparedness [15].

This capacity building activity will help the community prepare for disaster events. According to the National Disaster Management Agency (BNPB), mitigation efforts for earthquake disasters include building public awareness of risk, [16], as well as steps to reduce the risk of earthquake disasters including increasing public awareness of the dangers of earthquakes, knowing what actions to take. carried out when an earthquake occurs, implementing safety measures for dangerous goods, participating in training programs for rescue efforts and community awareness, forming disaster rescue action groups with training, and supporting an early warning system to anticipate tsunami events, [17].

## **Conclusion**

There is an influence of socialization on earthquake and tsunami mitigation on knowledge and action, and there is no influence of socialization on attitudes towards earthquake and tsunami mitigation after the socialization is carried out. The suggestion is that the Palu Bay coastal area is an area prone to earthquake and tsunami disasters. There needs to be increased mitigation efforts in the form of outreach and simulations as well as assistance to the community to reduce the risk of victims.

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## **Conflict of interests**

The authors declare that there are no competing interests.

## **Reference**

- [1]. Inayah R, Julianto V, Qonita AK, Sri TA. The Influence of Disaster Preparedness Socialization on Students' Knowledge in Facing Tsunami Disasters in Kiluan Negeri Village. Panangkaran: Journal of Religion and Society Research. 2020;3(1):87-95.
- [2]. Utomo DP, Purba B. Application of Datamining on Earthquake Data on Tsunami Potential in Indonesia. . Indonesian Biomedical Journal. 2019;(September):846-53.
- [3]. Agustina D. Earthquake and Tsunami Disaster Mitigation Assistance Based on Local Knowledge for Disaster-Vulnerable Communities in Mukomuko Regency, Bengkulu. Engagem J Service to the Community. 2020;4(1):87-99.
- [4]. Muksin Z, Rahim A, Hermansyah A, Samudra AA, Satispi E. Earthquake Disaster Mitigation in Cianjur. JIIP - J Ilm Educator Science. 2023;6(4):2486-90.
- [5]. Supirno S, Umar N, Mangundap SA. Increasing Community Capacity to Provide Basic Life Support in Labuanberu Mamboro Palu. Journal Community Service Lentora. 2021;1(1):1-6.
- [6]. Supirno S. Fire Prevention and Preparedness Training in Wani Dua Village, Tanantovea Donggala District, Central Sulawesi. Indonesian Biomedical Journal. 2023;3(1):1-5.

- [7]. Nursalam. *Nursing Science Research Methodology*. 4th ed. Salemba Medika. Jakarta, Indonesia; 2015.
- [8]. Idrus HH, Mustamin M, Zulfahmidah. Evaluation of a Multidisciplinary Extracurricular Event Using Kolb's Experiential Learning Theory: A Qualitative Study [Letter]. *Journal of Multidisciplinary Healthcare*. 2023;16:39-40.
- [9]. Idrus HH, Sunarno, Rijal S. Detection of Antibiotic Resistance Genes in *Pseudomonas aeruginosa* by Whole Genome Sequencing. *Infect Drug Resist*. 2022;15:7125-6.
- [10]. Pahleviannur MR. Disaster Awareness Education through Disaster Socialization as an Effort to Increase Students' Knowledge of Disaster Mitigation. *J Social Science Educator*. 2019;29(1):49-55.
- [11]. Ramos. Community in Facing the Tsunami Disaster, Bayah Community Health Center, Lebak Regency. *J Heal Soc*. 2021;10(1):76-84.
- [12]. Anugrahadi A, Dalimunthe YK, Guntoro AG, Ahmad Azizi M, Yunita Puteri A, Agustin S. Impact of Socialization on Earthquake and Tsunami Disaster Mitigation for Teachers and Students of SMAN Bina Insani, Tangerang Banten. *J Migasian*. 2023;7(1):12-27.
- [13]. Rauzana A, Dharma W, Zardan M. Socialization of Community-Based Disaster Mitigation in Peunayong Village. *Jurnal Pengabdian Kepada Masyarakat*. 2022;3(1):119-24.
- [14]. Munanda FY, Trismiyana E, Elliya R. Counseling on flood disaster preparedness on knowledge and attitudes in the community. *Holistic J Health*. 2022;16(1):91-9.
- [15]. Susilowati T, Puji Lestari RT, Hermawati H. Relationship between Earthquake Preparedness Knowledge and Students' Attitudes towards Preparedness at SD Negeri 2 Cepokosawit. *Gaster*. 2020;18(2):172.
- [16]. Anam K, Mutholib A, Setiyawan F, Andini BA, Sefniwati S. Readiness of Local Institutions in Facing Tsunami Disasters: Case Study of Air Manis Village and Purus Village, Padang City. *J Wil and Lingkung*. 2018;6(1):15.
- [17]. Rahman F, Laily N, Wulandari A, Riana R, Ridwan AM, Yolanda ZW. Community Capacity Building Program in Community-Based Flood Disaster Risk Reduction Efforts. *SELAPARANG J Community Servant Progress*. 2022;6(4):1724.