

## Community Preparedness Level in the Area Nurul Haq Shelter Against the Threat of Earthquake and Tsunami Disasters

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### ABSTRACT

*The city of Padang is an area that is prone to earthquakes that have the potential to cause tsunamis. This can be seen from historical data on earthquakes in Padang City. There is a prediction of a large-scale earthquake caused by the Mentawai megathrust fault, where the city of Padang is predicted to be affected by the earthquake and tsunami. Parupuk Tabing is included in the red area if a tsunami disaster occurs. Parupuk Tabing has a shelter to reduce the impact if an earthquake and tsunami disaster occurs. One of them is the Nurul Haq Shelter. Currently, the population around the shelter is around 4,000 people, but the level of preparedness for the dangers of earthquakes and tsunamis is not yet known. This research uses parameters compiled by LIPI – UNESCO 2006, where the parameters tested are; knowledge about earthquake and tsunami disasters, emergency response plans, early warning systems, and resource mobilization. Based on the results of data analysis and research discussions, it was concluded that the level of community preparedness in facing earthquake and tsunami disasters in the area around the Nurul Haq Shelter was included in the very prepared category, namely with an index of 80.97. Then, the knowledge and attitude parameters have a score of 84.78 or "Very Ready", and for the emergency response plan parameters they get a score of 76.57 or "Ready", and for the disaster warning parameters they get a score of 78.36 or "Ready", finally, for the resource mobilization parameter, it got a score of 80.97 "Very Ready". In general, the conclusion is that the community around the shelter understands and is ready to face the threat of earthquakes and tsunamis.*

**Keywords:** Preparedness; Earthquake; Tsunamis; shelter, LIPI - UNESCO.

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### INTRODUCTION

Based on the earthquake catalog from the Meteorology, Climatology and Geophysics Agency (BMKG), West Sumatra has experienced 7 damaging earthquakes. These earthquakes include the Singkarak earthquake (1926 and 1943), Pasaman (1977), Solok (2004), Batu Sangkar (2007) which occurred twice, and in the city of Padang (2009) [1]. The largest earthquake that rocked the city of Padang and its surroundings was on September 30 2009 with a magnitude of 7.9, resulting in 385 deaths and 1,216 injuries. Meanwhile, 135,448 houses were heavily damaged, 65,380 houses were moderately damaged, & 78,604 houses were slightly damaged [2].

Experts predict that if the Mentawai Megathrust fault occurs it will result in an earthquake measuring 8.9 magnitude followed by a tsunami wave as high as 6-10 meters in the city of Padang [3]. If we look at the threat of the tsunami disaster in Padang City, by looking at the tsunami hazard map issued by BNPB in 2013, it is stated that 7,613 Ha of the total area of

Padang City or 19.41% of the area of Padang City is in the high danger area. Even though it is less than 20% of the area of Padang City as a whole, the high-hazard class area covers almost most of the coastal area of Padang City, especially in the areas of population centers and community activities [4].

Koto Tangah District is one of the sub-districts in Padang City, with an area of 232.25 km<sup>2</sup>. Koto Tangah District has 13 sub-districts. Parupuk Tabing is a sub-district in the Koto Tangah sub-district with an area of 9.41 KM<sup>2</sup> which is directly adjacent to the beach. With a population of 19,512, with a population density of 2073/km<sup>2</sup> [5]. A shelter is a location that can be used as a temporary evacuation location to reduce the impact of a disaster [6]. The city of Padang, which is on the west coast of South Sumatra, is at high risk of being affected by a tsunami, so the government is trying to build and provide evacuation places, both permanent and temporary. One of the temporary evacuation places that has been built by the Padang City government is a vertical evacuation place or shelter in the red disaster zone. Currently, there are 3 official shelters in Padang City, namely the Nurul Haq shelter, Darussalam shelter, and Ulak Karang shelter.

The concept of disaster management is known as three stages, namely "before, immediately, and after a disaster", where each stage occurs in a cycle or interrelated cycle. Disaster management in Indonesia generally only focuses on the stage when a disaster occurs "emergency response", even though there should be a stage before a disaster that includes mitigation and preparedness [7].

Disaster mitigation is an effort to reduce the risk of disasters, both through physical development and awareness and increasing capacity to face the threat of disasters [8]. Disaster mitigation is an effort aimed at reducing the impact of natural and man-made disasters on a country or society. Several important things in disaster mitigation are the availability of disaster hazard maps for each type of disaster, socialization to increase public awareness and understanding of disasters, knowing what needs to be done and avoided and knowing what to do when a disaster occurs, organizing and structuring disaster-prone areas to reduce the threat of disaster.

The results of initial observations carried out by interviewing the chairman of the Disaster Preparedness Group on Tuesday 20 June 2023, and having held discussions with Mr Masrul Effendi obtained the following information; Disaster training is routinely carried out in the Tabing area and surrounding areas to increase public understanding of disaster preparedness. However, the limited number of sources and varying levels of awareness in the socialization of preparedness for earthquakes and tsunamis have caused the public's knowledge about disasters to be uneven. When the earthquake occurred on April 25, some people were still confused about dealing with an earthquake that had the potential for a tsunami. The condition of the facilities and infrastructure of the Nurul Haq shelter is good, for example in the earthquake with a magnitude of 6.9 on April 25, when people went to the shelter, the padlocks had been opened and the lights had been turned on, but because the Nurul Haq shelter was in a residents' complex, so There are roads that are portrayed by residents for security reasons so the evacuation route is blocked.

Preparedness involves a series of activities aimed at anticipating disasters through organizing and taking effective and useful steps [9]. Preparedness is all actions that enable governments, organizations, communities, and individuals to be able to respond to a disaster situation

effectively [10].

The specific objective of disaster preparedness efforts is to ensure that existing systems, procedures, and resources are appropriately prepared in their respective places to provide effective and immediate assistance to disaster victims to facilitate recovery and rehabilitation services. Preparedness can minimize the negative impacts of the threat of disaster by taking appropriate preventive actions appropriately and correctly [11].

Research Location Based on data that has been explained on astronomical, geographical, and administrative locations, it is confirmed that Koto Tangah District has the potential to be affected by the tsunami disaster. The Nurul Haq Mosque Shelter is an official shelter belonging to the BNPB which is located at coordinates 0°52'52.2"S 100°20'22.3"E. The Nurul Haq Mosque Tsunami Shelter is located in the Jondul IV Complex, Parupuk Tabing, Koto Tangah District, Padang City. This shelter has a capacity of approximately 3,668 people close to the Nurul Haq Mosque. This shelter is managed by BPBD and only functions as a tsunami shelter.

## MATERIALS AND METHODS

This research is in the form of quantitative research, a type of case study research with a descriptive approach where this research will explore community preparedness in facing earthquake and tsunami disasters. Meanwhile, quantitative research is research that uses numbers, starting with collecting numbers, interpreting data, and looking at other results. The research method used in this research is descriptive-quantitative because this research aims to reveal detailed facts about preparedness for earthquake and tsunami disasters.

Primary data was obtained by distributing questionnaires directly by researchers to respondents, namely the people who live around the Nurul Haq Parupuk Tabing Shelter. Primary data collection is open and limited according to the scope of the research. In this research, primary data was used to analyze the preparedness of the community living around the Nurul Haq Parupuk Tabing Shelter. Secondary data was obtained from the results of previous research to create a questionnaire as a tool to measure community preparedness. The preparedness indicators in this research use parameters which according to LIPI-UNESCO (2006) are the key to success in facing natural disasters. The parameters tested are; knowledge about earthquake and tsunami disasters, emergency response plans, early warning systems, and resource mobilization [12].

Categories for scoring answers to the questionnaire can be seen in the following table:

Table 1. Research Questionnaire Scores

No	Choice	Score
1.	Very ready	80-100
2.	Ready	65-79
3.	Almost ready	55-64
4.	Not ready	40-54
.5.	So unprepared	0-39

(Source: LIPI – UNESCO, (2006))

After obtaining the score for each question, a calculation is then carried out to determine the value of each parameter which is calculated using the following formula:

$$\text{Index} = \frac{\text{Total Skor Rill Parameter}}{\text{Skor Maksimum Parameter}} \times 100$$

The community preparedness level index value is obtained based on the Preparedness Study formula which has been prepared by LIPI UNESCO/ISDR, as follows:

Preparedness Level = (0.45 x KA index) + (0.35 x EP index) + (0.15 x RMC index) + (0.05 x WS index)

Where :

KA Index = Knowledge and attitude value (Knowledge and Attitude)

EP index = Emergency planning value (Emergency Response System)

WS Index = Warning System Value (Early Warning System)

RMC Index = Resource Mobilization Capacity Value (Resource Mobilization)

## RESULTS AND DISCUSSION

Questionnaire Results Based on the results of data collection in the field regarding the level of preparedness for earthquakes and tsunamis in the area around the Parupuk Tabing Nurul Haq Mosque Shelter, namely by distributing 100 questionnaires to several communities in the area. From the questionnaire data that the author obtained, the following analysis and description of the data were carried out:

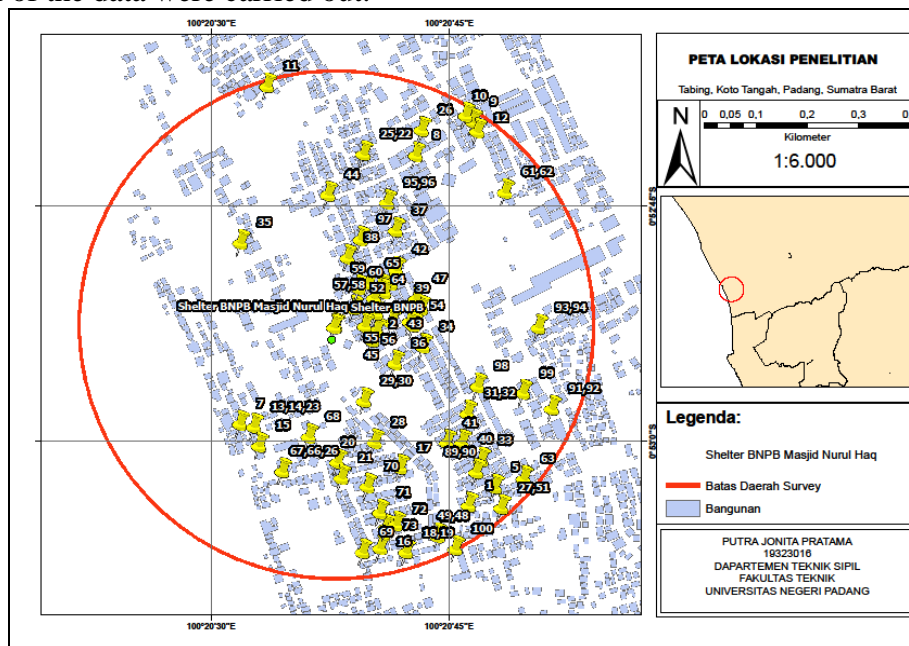


Figure 1. Map of Questionnaire Distribution

### Data from research results on the level of knowledge and attitudes of the community

Data on the knowledge of the community around the Nurul Haq Mosque Shelter was obtained using a knowledge questionnaire which was tested on 100 respondents. The Knowledge and Attitude Questionnaire consists of 14 statements, the results of which are then categorized into 5 classes, namely Not Ready, Not Ready, Almost Ready, Ready, and Very Ready. The following are the results of the Knowledge Questionnaire from 100 Respondents.

Table 2. Knowledge Parameter Category Level

No	Index value	Parameter category	Frequency	Percentage
1.	80-100	Very ready	78	78
2.	65-79	Ready	20	20
3.	55-64	Almost ready	2	2
4.	40-54	Not ready	0	0
5.	0-39	So unprepared	0	0
Amount			100	100
Index value	84.78	Very ready		

From these indicators, it can be seen the level of public knowledge about the earthquake and tsunami disaster. For more details, the following is an analysis table of knowledge questions.

Table 3. Knowledge Level Indicator

No	indicator	Question no	Achievement score	Total score	percentage	Indicator category
1.	Knowledge about Earthquake and tsunami disasters	1,2,5	1334	1500	88.93	Very ready
2.	Knowledge about regional vulnerability to earthquake and tsunami disasters	3,4	840	1000	84	Very ready
3.	Knowledge about the causes of Earthquakes and tsunamis	9,10,13	1262	1500	84.12	Very ready
4.	Signs that a Tsunami will occur	11,12	834	1000	83.4	Very ready
5.	Knowledge about the impact of the Earthquake & Tsunami Disaster	7,8	843	1000	84.3	Very ready
6.	Attitudes and Concerns Towards Disaster Risk	6.14	822	1000	82.2	Very ready

### Data from Research Results at the Community Emergency Response Plan Level

Emergency response plans are community plans to deal with disasters, these plans include emergency response plans, evacuation plans, first aid, rescue, safety, and security, plans to fulfill basic needs, important facilities, as well as training and simulations to deal with them at any time. disaster. Community emergency response plan level data was obtained using a questionnaire with 19 statements distributed to 100 respondents. The results of the respondents' answers were then categorized into five criteria, namely; Very Ready, Ready, Almost Ready, Not Ready, and Not Ready. The following is a table of levels of community emergency response plans.

Table 4. Emergency Response Plan Parameter Category Level

No	Index value	Parameter category	Frequency	Percentage
1.	80-100	Very ready	40	40
2.	65-79	Ready	48	48
3.	55-64	Almost ready	12	12
4.	40-54	Not ready	0	0
5.	0-39	So unprepared	0	0
Amount			100	100
Index value	76.36	Ready		

The following is an analysis of the achievement scores for each emergency response plan indicator.

Table 5. Emergency Response Plan Level Indicators

No	Indicator	Question No	Achievement Score	Total Score	Percentage	Indicator Category
1.	Emergency Response Plan	15,16,22,24,33	2158	2500	86.32	Very ready
2.	Evacuation Plan	17,23,25,26,	1328	2000	66.4	Ready
3.	First aid and rescue	30,31,32	1153	1500	76.86	Ready
4.	Fulfillment of basic needs	27,28	682	1000	68.2	Ready
5.	Important facilities	21	426	500	85.2	Very ready
6.	Practice and simulation	18,19, 20, 29	1518	2000	75.9	Ready

### Research Results Data at Disaster Early Warning System Level

Disaster warning system parameters are an effort to warn of the occurrence of a disaster. Community Disaster Warning System data was obtained through a questionnaire distributed to 100 respondents consisting of 4 statements. Then the questionnaire results were categorized into five criteria, namely; Very Ready, Ready, Almost Ready, Less Ready, and Not Ready. The results of the questionnaire can be seen in the following table.

Table 6. Disaster Early Warning System Parameter Category Level

No	Index Value	Parameter Category	Frequency	Percentage
1.	80-100	Very ready	70	70
2.	65-79	Ready	23	23
3.	55-64	Almost ready	3	3
4.	40-54	Not ready	4	4
5.	0-39	So unprepared	0	0
Amount			100	100
Index value	81.2	Very ready		

The following is an analysis of the achievement scores for each indicator.

Table 7. Disaster Early Warning System Parameter Category Level

No	indicator	Question No	Achievement Score	Total Score	Percentage	Indicator Category
1.	Understand early warning systems in the form of traditional and modern technology	36.34	819	1000	81.9	Very ready
2.	Have the skills to use modern communication tools	25.37	805	1000	85	Very ready

### Research Result Data on Community Resource Mobilization Levels

Data on Community Resource Mobilization was obtained through a questionnaire distributed to 100 respondents. The questionnaire consists of six statements whose results are categorized into five criteria, namely very ready, ready, almost ready, less ready, and not ready. The following is a table of research results.

Table 8. Resource Mobilization Parameter Category Level

No	Index Value	Parameter Category	Frequency	Percentage
1.	80-100	Very ready	60	60
2.	65-79	Ready	28	28
3.	55-64	Almost ready	9	9
4.	40-54	Not ready	3	3
5.	0-39	So unprepared	0	0
Amount			100	100
Index value		80.97	Very ready	

The following is an analysis of questions in measuring human resource mobilization.

Table 9. Resource Mobilization Level Indicators

No	Indicator	Question No	Achievement Score	Total Score	Percentage	Indicator Category
1.	Have savings for emergencies or have insurance	39,42,41	1212	1500	80.8	Very ready
2.	Availability of a social network (family/relatives/friends) who are ready to help during a disaster emergency	38,40,43	1339	1500	89.26	Very ready

### Data on Community Preparedness Level Results in Facing Earthquake and Tsunami Disasters

Community Preparedness Data was obtained through the sum of Knowledge Questionnaires, Attitude Questionnaires, Emergency Response Plan Questionnaires, Early Warning System Questionnaires, and Community Resource Mobilization Questionnaires. From the

questionnaires, the questionnaires were then categorized into five community preparedness criteria, namely very ready, ready, almost ready, less ready, and not ready, which were distributed to 100 respondents. The following are the results of the calculation of the Community Preparedness Questionnaire.

Table 10. Community Preparedness Value

Level of Preparedness	Parameter	Score	Category
	Knowledge & attitude	84.78	Very ready
	Emergency Response Plan	76.57	Ready
	Disaster Warning System	81.2	Very ready
	Resource Mobilization	78.36	Very ready
	Preparedness Index	80.97	Very ready

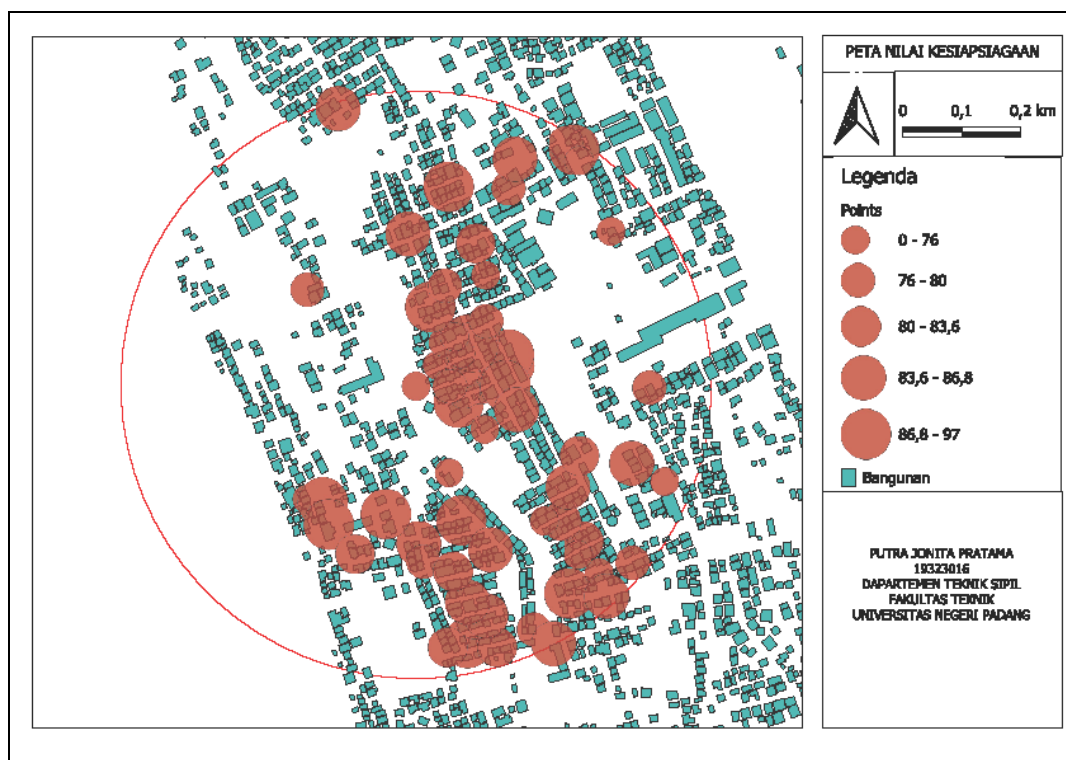


Figure 2. Map of Community Preparedness Levels

Based on research conducted in the community around the Nurul Haq Shelter by relevant research, the community is generally ready to face the threat of earthquakes and tsunamis because the level of knowledge of residents regarding earthquakes and tsunamis is already high. Emergency response plans are still below the level of knowledge but can be improved by carrying out disaster simulations. By relevant research, the level of the disaster early warning system is in the very ready category, this is due to advances in technology and is supported by applications and social media that provide information if a disaster occurs.

## CONCLUSION

The level of community preparedness in facing earthquake and tsunami disasters in the area around the BNPB Nurul Haq Mosque Shelter is included in the very prepared category, namely with an index of 80.97. In general, the conclusion is that the community around the shelter understands and is ready to face the threat of earthquakes and tsunamis.



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