

## Community-Based Disaster Risk Management The Case of flooding in Tebing Tinggi City, North Sumatera, Indonesia

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### 1. Introduction

Flood is one of the most damaging disasters in Indonesia. More than a half of natural disaster events in Indonesia are floods<sup>1)</sup>. This study located in Tebing Tinggi City which has been suffering with flood regularly. In 2001, the city had the severest damage because of flood disaster. It was reported that, two third of Tebing Tinggi City was inundated by flood disaster which caused many damages of private and public facilities. Figure 1 shows that Tebing Tinggi City has high rainfall intensity which potentially can increase water discharge of Sei Padang River, the main river in Tebing Tinggi City. as shown in Figure 1, the rainfall intensity is very high in rainy season that usually occurred from September to December. More than 350 mm/month has been observed in this season, though the intensity of rainfall in this season seems different depending on the year. The catchment areas on upstream are very small therefore a great amount of water flows to the downstream directly. Meanwhile the capacity of the river on the downstream area is not sufficient enough and these situations caused floods. Landuse at the riverbank has been changed to settlement and it worsens the flood impact. In addition, the insufficient of infrastructures caused impact of flood becomes even worse. Though this area has been suffering flood every year, the community still live in this area. The purpose of this research aim to identify factors that influenced people willingness to move from flood prone area in Tebing Tinggi City.

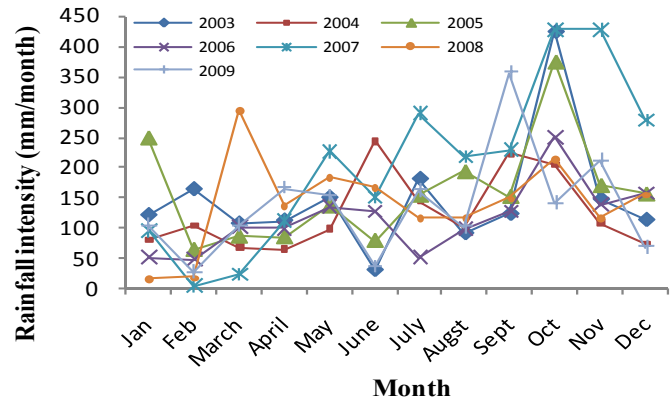


Figure 1. Rainfall intensity in Tebing Tinggi City

### 2. Study Location and Respondent

Figure-2 shows the location of Badak Bejuang and Bandar Utama Villages in Tebing Tinggi City. Those villages are selected as study location because the flood has been seen frequently in these areas. These areas also have high population density and people tend to live near the river. Figure-3 shows hazard map based on information from community and the leader in study location due to the spatial data related to flood was not available in Tebing Tinggi City. Area of Bandar Utama village is about 98 Ha that consist of 4.2 Ha of moor, build up area 90.5 Ha and other 33 Ha. The population in Bandar Utama village is 6,058 inhabitants (1,368 households). While Badak Bejuang village has area of 43.3 Ha with the land use consisting of build up area 42.3 Ha and others 1 Ha. Badak Bejuang village population is 4,285 people (968 households).<sup>1)</sup>

The respondents were determined by using purposive sampling techniques to resident who affected flood disaster in 2009. There were 243 residents from Bandar Utama village and Badak Bejuang village who affected flood disaster. The minimum number of respondent can be obtained from Slovin equation  $n = \frac{N}{1 + Ne^2}$ , where  $n$  = number of sample,  $N$  = number of population and  $e$  = standard error 10%. Therefore, 70 respondents is the minimum number of respondent, meanwhile this study using 76 respondents from both areas. As there are two villages affected by flood, 76 samples should be administered proportional at both village. The number of respondent was 44 people in Bandar Utama Village and 32 people in Badak Bejuang Village. Table-1 the personal

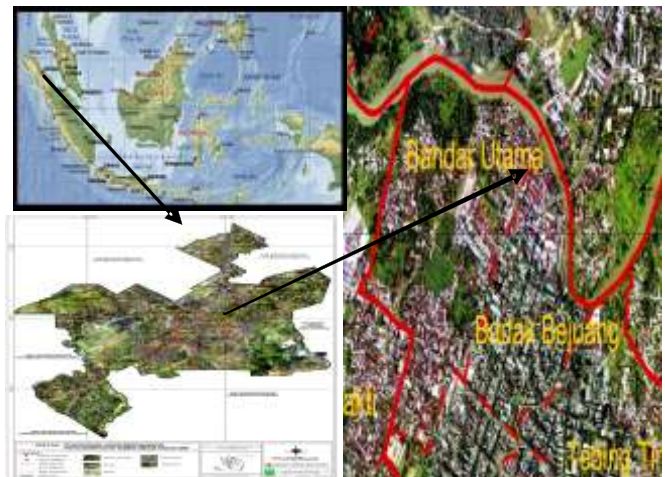


Figure 2. Study Location

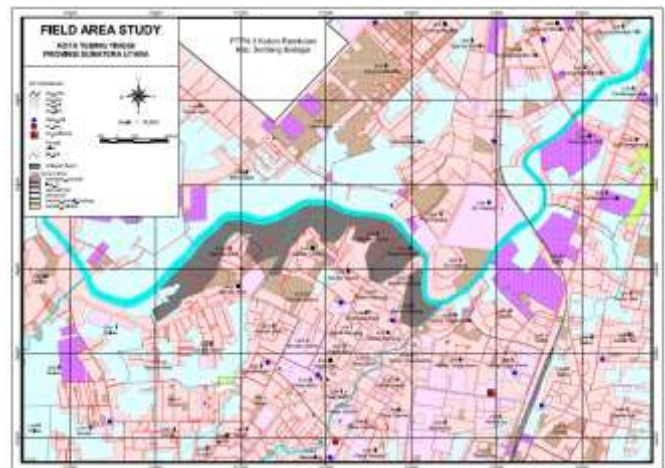


Figure 3. Hazard Map

attributes and residential conditions of the two villages respectively. It can be seen that the income of Badak Bejuang village better than Bandar Utama Village. Half of respondents in Bandar Utama villages live less than 10 m from river with low education level, and this condition exacerbated by low income level. In addition, 81,82% of income were below the regional minimum wage (UMR) of Tebing Tinggi City.

Table 1. Respondent's Attribute

Village	Number (%) / Village															
	Gender		Education			Income			Living Distance			Period of stay			Distance of relative's house	
	Male	female	Elementary	Junior High School	Senior High School	< 1 million	1-2 million	> 2 million	< 5 m	5-10 m	> 10 m	1-5 years	5-15 years	> 15 years	Near	Faraway
<b>Bandar Utama</b>	<b>66.91</b>	<b>34.09</b>	<b>47.73</b>	<b>25</b>	<b>27.27</b>	<b>81.82</b>	<b>15.91</b>	<b>2.27</b>	<b>6.82</b>	<b>43.18</b>	<b>50.00</b>	<b>47.73</b>	<b>38.63</b>	<b>13.64</b>	<b>81.82</b>	<b>18.28</b>
<b>Badak Bejuang</b>	<b>71.88</b>	<b>28.12</b>	<b>25.00</b>	<b>28.12</b>	<b>46.88</b>	<b>65.62</b>	<b>3.13</b>	<b>31.25</b>	<b>0.00</b>	<b>0.00</b>	<b>100</b>	<b>25.00</b>	<b>15.62</b>	<b>59.38</b>	<b>96.88</b>	<b>3.12</b>

### 3. Analysis and Result

In the survey, the questionnaire was distributed to 2 villages and asked to evaluate their conditions concerning the present residential environment according to flood disaster. The variables were income, distance of house from river, period of stay and distance of house with their relative. These variables were used as influence variable in statistical analysis. Chi-square is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories. This research identifies the relation between willingness to move from flood prone area and the influence variables. The analysis was conducted using the software SPSS 16.0.

Table-2 shows the result of chi-square analysis by using asymptotic significance/asympt-sig. Asymp-sig means that there is a significance relationship between variables and independent variable is less than to 0.05. "Income" and "willingness to move" in Badak Bejuang Village have significant relationships because the value of asymp-sig value less than 0.05. However in Bandar Utama Village does not have significant correlation. It is because most of inhabitants in Bandar Utama Village are poor and low education as shown in table-1, they do not have access to move another safer place. In both of the villages, the variables of "living distance from river" and "willingness to move" do not have significant relationships due to asymp-sig value more than 0.05. It is no correlation to variable "period of stay" and "willingness to move". It caused inhabitants in both village are familiar with the flood disaster. "Distance of relatives' house" has highly correlation to "willingness to move" in both villages. Most people did not want to leave their places because they persisted in their indigenous patterns. This is because, initially, low income does not need to be bothered about regaining or improving on their social, cultural, economic lifestyles prior to the disaster. They have common activities and relationships with relatives and the neighborhood.

Table 2 Result analysis

Variable/Village	Pearson Chi-Square value /village	
	Bandar Utama	BadakBejuang
Income	0.54	0.03
Living distance from river	0.16	0.82
Period of stay	0.19	0.55
Distance of relative's house	0.03	0.00

### 4. Conclusion

This study identified the influential factors that influence the decision of community in two villagers to remain stay in their area. In Bandar Utama villages the influence variable only one that is distance to the relatives house, meanwhile for BadakBejuang Village the influence variables are 2, they are distance to the relative house and income. It means that, in both villages distance of family's house is the most important factor that influencing the people still staying in the flood prone area. On the other hand living distance and period of stay have no correlation to the reason people still staying in the flood prone area..

### References ;

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