

## Community Preparedness for Landslides Disasters in the Border Region

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### ABSTRACT

This research was carried out in the border area of Busungbiu Subdistrict, Buleleng Regency with the aim of: 1) describing community knowledge about landslide hazards in Busungbiu Subdistrict, 2) describing community preparedness for landslides in Busungbiu Sub-District, 3) analyzing the relationship between community knowledge about soil hazards landslides with community preparedness for landslides in Busungbiu District. Border region samples are determined by spatial representation considerations, subject samples are determined by random sampling technique, obtained 98 subject samples. Data is collected through the method of recording documents, which are equipped with observation methods, and questionnaire methods. The data obtained were analyzed descriptively qualitatively and quantitatively. The results showed that 1) community knowledge about the danger of landslides in Busungbiu Subdistrict was moderate. 2) community preparedness for landslides in Busungbiu Subdistrict categorized as unprepared and 3) there is a significant relationship between public knowledge about landslide hazards and community preparedness for landslides in Busungbiu Subdistrict

**KEYWORDS:** preparedness, knowledge, landslides

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### I. INTRODUCTION

The occurrence of major disasters experienced by Indonesia in 2004 caused the paradigm of disaster management to change from fatalistic responsive oriented to emergency disaster management in response to disasters, leading to proactive preparedness, disaster management carried out early through preparedness up to the stage of social recovery, which demanded the government and the community jointly carries out disaster risk reduction efforts (Raja et al., 2017). The definition of disaster risk reduction is an effort to reduce the likelihood of a disaster, minimize the impact that occurs in the event of a disaster, provide an early warning to the community about the possibility of a disaster, disaster mitigation through physical development and awareness and capacity to deal with disaster threats, and increase community preparedness in disaster (Poetro et al., 2014).

Preparedness is the actions taken by an organization of people, individuals and the government to be able to respond to disaster situations quickly and precisely with the preparation of disaster management plans, training and maintenance and provide short-term solutions to provide support for long-term recovery. According to Nick Carter (1991) in LIPI - UNESCO / ISDR, (2006: 5) preparedness is actions that allow governments, organizations, communities, communities and individuals to be able to respond to a disaster situation quickly and effectively.

Landslides are one of the geological disasters that often occur in Indonesia. The potential of landslides is very high, especially in the rainy season and areas that have very high rainfall, old rock conditions and have decayed, thick layers of soil tucked into impermeable layers and thick soil solum depth, and has a slope of more than 30o (Sudibyakto, 2011: 71). In addition, the occurrence of landslides is very possible because the territory of Indonesia is located at the meeting of the Eurasian Plate with the Indian and Australian Plates, the Philippine Plate, the Pacific Plate with Eurasia, the meeting of these plates makes Indonesia a tectonic and volcanic active region. Thus there will be frequent earthquakes and volcanic activity. Both of these activities will affect the process of landslides (Sutikno, 1994 in Mubeki and Alhasanah, 2008).

Landslide events are movements of land and rock mass or a combination of both, which often occur on natural slopes or non-natural slopes and are natural phenomena looking for new equilibrium which is caused by disturbances or influencing factors, causing a reduction in shear strength and increased shear stress land (Suryolelono, 2002 in Priyono et al., 2008). Landslides are movements of soil mass and rocks that descend or exit the slope due to disruption of soil stability or rock constituent slopes (BNPB, 2018). Whereas according to

Iswanto et al., (2009) landslides are the displacement of slope-forming material in the form of rocks, rags, soil, or mixed material, moving down or exiting the slope, where landslides often take casualties.

Bali is one of the provinces in Indonesia that is prone to landslides, the potential for landslides in Bali Province is 85,121.55 ha (Bali Bappeda and PPLH UNUD, 2006 in Saputra, 2016). Bali is a priority area with a risk of landslides. This is based on the results of the risk analysis identified several main areas that have risks and probabilities of landslides. One of the districts prone to disasters is Buleleng Regency (Bali Bappeda and PPLH UNUD, 2006 in Saputra, 2016). Buleleng Regency borders on Karangasem, Bangli, Badung, Tabanan and Jemberana districts. Having a unique topography in the south is a mountain range that extends from east to west, which divides Bali into the borders of North Bali and southern Bali. Rainfall in 2014 in Buleleng Regency was very high, reaching 1,033.9 mm (Department of Agriculture and Animal Husbandry, Buleleng Regency, 2014). This resulted in Buleleng Regency prone to landslides. These areas include Gerokgak, Sukasada, Busungbiu, and Tejakula Districts. (Bali Bappeda and PPLH UNUD, 2006 in Saputra, 2016)

Busungbiu Subdistrict has an area of 19,662 hectares, based on the population projection of 2018 the population of Busungbiu Subdistrict is 39,712 people with 19,748 male souls and 19,964 female souls (BPS Busungbiu District, 2018). Based on data from the Department of Agriculture and Animal Husbandry, Buleleng Regency 2018, the average rainfall from 2009 - 2018 is 232.2 mm. Besides that, Busungbiu District also has a slope of 2540% with an area of 7,080.00 ha (BPS Regency of Buleleng, 2018). This caused the Busungbiu District to be prone to landslides. Already 51 incidents of landslides have occurred in Busungbiu Subdistrict and the data shows an increasing trend of landslides from 2013-2018. Only 2015 experienced a decline but continued to increase until 2017. BPBD of Buleleng Regency stated that the data could increase because the community reporting in Busungbiu District was very lacking during the Disaster.

Based on the above, the research questions are formulated as follows: (1) What is the community's knowledge of landslides in Busungbiu District? (2) What is the level of community preparedness for landslides in Busungbiu District? (3) What is the relationship between public knowledge about landslide hazards and community preparedness for landslides in Busungbiu District? In accordance with the formulation of the problem formulated, the objectives in this study are to (1) Describe the community's knowledge about the land disaster in the conglomerate in Busungbiu District. (2) Describe the level of community preparedness against landslides in Busungbiu District. (3) Analyzing the relationship between public knowledge about the danger of landslides with community preparedness for landslides in Busungbiu District.

To answer these questions, the concept of landslides is used (Wesnawa and Christiawan, 2017), one type of rock or rock mass movement, as well as a mixture of both, down or out of the slope due to disruption of soil stability or slope constituent rocks. Landslides are a term used to describe forms and processes that involve the movement of land, rocks or debris downward or out of the hillsides. Based on movement, landslides can be classified into creeps, slides, debris and flow. community knowledge (Wijana et al. 2018) and community preparedness for disasters. Preparedness is carried out to ensure fast and appropriate efforts in dealing with disaster events. Law 24/2007 Preparedness as intended, is carried out through: preparation and testing of emergency disaster management plans; organizing, installing and testing early warning systems; supply and preparation of supply goods to fulfill basic needs; organizing, counseling, training, and rehearsing emergency response mechanisms; preparation of evacuation sites; preparation of accurate data, information, and updating of disaster emergency response procedures; and the provision and preparation of materials, goods and equipment to fulfill the recovery of infrastructure and facilities. There are 9 activities in the preparedness phase: Risk assessment, Mobilization of Resources, Education and Training, Coordination, Response mechanism Early warning Management Information, and Simulation.

## **II. RESEARCH METHODS**

This research was conducted in the border area of Busungbiu District, Buleleng Regency, using a quantitative descriptive research design. This design is used with regard to the purpose of the research, namely to describe the conditions in the field based on the findings obtained. Statistical analysis was used to determine the relationship between people's knowledge about the danger of landslides and the level of community preparedness against landslides.

Regional samples were determined by considering the distribution of the regions represented spatially, so that the villages of Kekeran, Subuk, Tinggar Sari and Sepang Kelod were obtained. The research subjects were determined by random sampling technique obtained by 98 respondents

Primary data collected are (1) community knowledge about landslide hazards and (2) community preparedness for landslides, while secondary data is obtained from recording documents regarding physiographic and demographic conditions in the study area. The object of this study was community preparedness for landslides, while the subjects of the study were the head of the family as the representative of each household in the community.

Data were analyzed by qualitative and quantitative descriptive analysis with Product Moment correlation analysis (Sugiyono, 2010: 228). The error rate is set at 5%. Data analysis was aided by SPSS for Windows version 17.0 software

### III. RESULT

#### Community Knowledge About Landslide Disaster

Data related to public knowledge about the dangers of landslides in Busungbiu District were analyzed by qualitative descriptive analysis. Data collection uses a questionnaire consisting of 6 questions related to public knowledge about the dangers of landslides. Each question has a score that ranges from 1 to 3, so the lowest score to be obtained is 6 and the highest score of 18 is obtained from 96 respondents. Furthermore, a range according to Arikunto, 2006 (with improvement) will be used regarding the classification of community knowledge of landslide hazards in Busungbiu District as follows: (a) Low = 6-10, (b) Medium = 11-15, and (c) 16-20.

The results of the study on public knowledge about the dangers of landslides in Busungbiu District can be seen in Table 1 below

**Table 1.** Community Knowledge About Landslide Hazards in Busungbiu District

No	Desa	N	category			Total
		Percentage (%)	Low	Medium	High	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Kekeran	N	8	17	2	27
		Percentage (%)	29,63	62,97	7,40	100
2	Subuk	N	6	6	0	12
		Percentage (%)	50	50	0,00	100
3	Tinggarsari	N	9	20	1	30
		Percentage (%)	30	66,67	3,33	100
4	Sepang Kelod	N	10	15	2	27
		Percentage (%)	37,05	55,55	7,40	100
<b>TOTAL</b>		<b>N</b>	<b>33</b>	<b>58</b>	<b>5</b>	<b>96</b>
		<b>Percentage (%)</b>	<b>34,38</b>	<b>60,42</b>	<b>5,20</b>	<b>100</b>

Source: Primary data analysis, 2019

Based on Table 1, it can be seen that public knowledge about landslide hazards is generally categorized as low at 3.4%, medium categorized by 60.42%, categorized as high at 5.20%. The public's knowledge about the danger of landslides in Kekeran Village is categorized as low by 29.63%, medium categorized by 62.97% and categorized as high by 7.40%, with a total sample of 27 respondents. Public knowledge about the dangers of landslides in Subuk Village is categorized as low by 50% and is categorized as moderate as 50% with a total sample of 12 respondents. Public knowledge about the danger of landslides in Tinggarsari Village is categorized as low as much as 30%, moderate categorized as much as 66.67% and categorized as high by 3.33% with a total sample of 30 respondents. The community's knowledge of the danger of landslides in Sepang Kelod Village is categorized as low as 37.05%, categorized as moderate as 55.55% and categorized as high as 7.40% with a total sample of 27 respondents. Overall, the community's knowledge about the danger of landslides in Busungbiu District is categorized as moderate as many as 58 respondents or 60.42%. The difference in knowledge about the danger of landslides in each village is caused by differences in the level of education in each village which is a sample of research and also limited access to education because as a large area there is in the border area.

#### Community Preparedness for Landslides Disasters

Community preparedness data in the face of landslides with a range according to UNESCO MPBI, 2007 (with repairs). The results of research on community preparedness in the face of landslides in Busungbiu sub-district can be seen in Table 2 below

**Table 2** Results of Community Preparedness for Landslides Disasters in Busungbiu District

No	Desa	N							Total ready
		Category	Percentage	unpre	unprep	Sufficie	read	very pared	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
1	Kekeran	N	7	13	6	0	1	27	100
		Percentage (%)	25,93	48,14	22,22	0,00	3,71		
2	Subuk	N	3	7	1	1	0	12	
		Percentage (%)	25	58,34	8,33	8,33	0,00		
3	Tinggarsari	N	5	16	8	1	0	30	
		Percentage (%)	16,66	53,34	26,67	3,33	0,00		
4	Sepang Kelod	N	0	23	3	1	0	27	
		Percentage (%)	0,00	85,19	11,11	3,70	0,00		
<b>TOTAL</b>		<b>N</b>	<b>15</b>	<b>59</b>	<b>18</b>	<b>3</b>	<b>1</b>	<b>96</b>	
		<b>Percentage (%)</b>	<b>15,63</b>	<b>61,45</b>	<b>18,76</b>	<b>3,12</b>	<b>1,04</b>	<b>100</b>	

Source: Primary data analysis, 2019

Based on Table 2, it can be seen that public preparedness for landslides is categorized as unprepared by 15.63%, categorized as unprepared by 61.45%, categorized as sufficient at 18.76%, categorized as ready at 3.12%, categorized as very ready at 1, 04%. Community preparedness for landslides in Kekeran Village is categorized as unprepared by 25.93%, categorized as unprepared by 48.14%, categorized as adequately prepared by 22.22% and categorized as very ready at 3.71% obtained from 27 respondents . Community preparedness for landslides in Subuk Village is categorized as unprepared by 25%, categorized as unprepared by 58.34%, categorized as quite prepared at 8.33% and categorized as ready by 8.33% from 12 respondents. Community preparedness for landslides in Tinggarsari Village is categorized as unprepared by 16.66%, categorized as unprepared 53.34%, categorized as adequately prepared by 26.67% and categorized as ready by 3.33% obtained from 30 respondents. Community preparedness for landslides in Sepang Kelod Village which is categorized as unprepared by 85.19%, categorized as quite ready at 11.11% and categorized as ready by 3.70% obtained from 27 respondents. In general, community preparedness for landslides in Busungbiu Subdistrict is categorized as unprepared, namely 59 respondents or 61.45%. The number of categorized people is not ready because the community has not prepared equipment or needs if at any time there is a landslide disaster, besides that it is also caused by the knowledge of landslide disasters in Busungbiu Subdistrict still categorized as being. Relationship Between Community Knowledge About Landslide Hazards With Community Preparedness For Landslides Disasters

Data on the relationship between public knowledge about landslide hazards and community preparedness for landslides in Busungbiu sub-district from the results of Product Moment correlation analysis, calculation results using SPSS for windows version 17.0 and Microsoft Office Excel 2007 software obtained from the results of correlation coefficients as listed in Table 3 as follows.

**Table 3** Summary of Results of Analysis of Correlations Between Knowledge Variables (X) and Preparedness (Y)

		Correlations	
		Pengetahuan	Kesiapsiagaan
Pengetahuan	Pearson Correlation	1	.705**
	Sig. (2-tailed)		.000
	N	96	96
Kesiapsiagaan	Pearson	.705**	1

	Correlation	
	Sig. (2-tailed)	.000
	N	96

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Based on Table 3 it can be seen that the correlation coefficient is 0.705. Whether or not there is a correlation between people's knowledge about landslide hazards and community preparedness there are landslides will be proven by correcting variables quantitatively. The hypothesis made states that knowledge influences preparedness actions, so that the higher the public's knowledge about the danger of landslides, the higher the community's preparedness for landslides. Before testing the hypothesis, what was proposed in this study was formulated as follows.

Ho: Public knowledge about the dangers of landslides has a negative relationship to community preparedness for landslides in Busungbiu District.

Ha: Public knowledge about the dangers of landslides has a positive relationship to community preparedness for landslides in Busungbiu District.

The correlation coefficient results are significant or not, it will be compared with r table with a certain level of error. Paying attention to the Product Moment table with an error rate of 5% (95% confidence level) and N = 96, the price of table 1 is 0.199. It turns out that the price of r count (0.705) is greater than r table 1 (0.199) so that Ho is rejected and Ha is accepted. So that public knowledge about the dangers of landslides has a positive relationship with community preparedness for landslides in Busungbiu District.

Providing interpretation of the correlation coefficients found is large or small, then it can be guided by the guidelines for interpretation of correlation according to Sugiono, (2010: 231) can be seen in Table 4 as follows

Table 4 Guidelines for Interpretation of the Correlation Coefficient

No	Interval Koefisien	Tingkat Hubungan
(1)	(2)	(3)
1	0,20 – 0,399	Rendah
2	0,40 – 599	Sedang
3	0,60 – 0,799	Kuat
4	0,80 – 1,000	Sangat Kuat

Source : Sugiono, 2010: 231

Based on Table 4, the level of relationship between community knowledge about landslide hazards and community preparedness for landslides is strong (0.705).

#### IV. DISCUSSION

##### Community Knowledge About Landslide Hazards

Knowledge is the whole thoughts, ideas, concepts, and understandings that humans have and this happens after people do sensing a particular object. Knowledge is mostly obtained through the eyes of the ear which is then recalled as a material or stimulus that was received previously. Knowledge of the dangers of landslides is an understanding that humans have about a situation that has the potential for landslides in an area. The indicator used to measure the level of public knowledge about the dangers of landslides is an assessment that includes basic knowledge of landslide hazards and assessments that include knowledge of facilities and infrastructure related to landslide hazards.

Based on the results of this study, public knowledge about the danger of landslides in Busungbiu Subdistrict is categorized as being as many as 57 respondents (59.37%). The results of this study are in line with those conducted by Setyawati (2014) who examined the relationship between knowledge with earthquake disaster preparedness in class XI IPS students of SMAN 1 Cawas, Klaten Regency. The results of the study showed that most respondents had moderate rates of 30 respondents (45.5%) out of a total of 66 respondents. Community knowledge about the dangers of landslides in Busungbiu Subdistrict in each village has the same category, which is mostly categorized as medium. When viewed from the average score obtained, each village

varies considerably. The highest average score is Sepang Kelod Village. Based on the characteristics of respondents it is known that the level of education affects the knowledge of the community in the research area.

The low level of public knowledge about facilities and infrastructure related to landslide hazards is influenced by the lack of counseling or socialization of disasters carried out by the government, so that people tend to still not understand the functions and importance of these facilities and infrastructure. The availability of facilities and infrastructure is one of the efforts to increase community preparedness in areas prone to landslides. The results of the Susanti et al. (2014) study of the relationship of policy, facilities and infrastructure with the preparedness of the Banda Aceh disaster preparedness school community showed that facilities and infrastructure that support preparedness in disaster risk reduction programs in disaster preparedness schools have a relationship with the school community's preparedness level. , so that knowledge of facilities and infrastructure related to hazards is important to improve community preparedness for disasters.

#### Community Preparedness for Landslides Disasters

Preparedness is an action taken to reduce the negative impact of a disaster through organizing as well as quick and effective steps. The indicators used to measure the level of community preparedness in facing landslides in Busungbiu District are family policies, contingency plans, disaster warning systems and resource mobility. Based on the results of the general research, community preparedness for landslides in Busungbiu Subdistrict is categorized as less prepared, namely as many as 63 respondents (65.62%). Mengwi. The results of the study showed that the majority of respondents were categorized as unprepared for 36 respondents (49.32%) from a total of 73 respondents.

Community preparedness for landslides in Busungbiu Subdistrict in each village has the same category, namely the majority categorized as unprepared. Based on the average score obtained the highest score is in Kekeran Village, which is 29.44% while the lowest score is Tinggarsari Village which is 26.53%. Thus, it is necessary to increase community preparedness to reduce disaster risk, especially landslides. If seen from the indicators used in the research, the lowest result is on resource mobilization, the low mobilization of human resources in the research area is inseparable from the lack of counseling or socialization related to disasters. According to LIPI-UNESCO / ISDR (2006) the mobilization of available resources, both human resources (HR) and funding and important infrastructure for emergencies. Mobilization of resources is a potential that can support or otherwise become an obstacle in disaster preparedness. Although there has been a socialization from BPBD of Buleleng Regency but in the socialization carried out by the sub-district and only invited several community representatives from each village and gathered at the socialization site on disaster, this led to the ineffectiveness of the socialization carried out by BPBD in Buleleng Regency.

#### Relationship between Community Knowledge of Landslide Hazards and Community Preparedness for Landslides Disasters

Knowledge is an understanding that is owned about something while preparedness is actions taken to be able to respond to a situation. Public knowledge about the danger of landslides in Busungbiu District is generally categorized as being (59.37%). Community preparedness for landslides in Busungbiu District is generally categorized as unprepared (65.62%).

Based on the calculation of Table 3 obtained a correlation coefficient of 0.780. Furthermore, compared with r table with an error rate of 5% (95% confidence level) and N = 96, the price of r table is 0.199), so Ho is rejected and Ha is accepted. Regarding Ho's rejection and acceptance of Ha, it can be concluded that there is a relationship between people's knowledge about the danger of landslides and community preparedness for landslides in Busungbiu District. The level of the relationship is strong or 0.705.

The results of this study are in line with those carried out by Kurniawati and Suwito (2017) who examined the effect of disaster knowledge on disaster preparedness attitudes on students of Kanjuruhan University's Geography Education Study Program in Malang. The relationship between knowledge and preparedness behavior shows a strong and positive pattern of relationship, meaning that the more knowledge increases the higher the preparedness behavior. Knowledge is an important and key factor for preparedness. Knowledge possessed by the community can influence the community to be prepared and alert in dealing with disasters, especially for the community in Busungbiu Subdistrict, which has experienced 51 landslides in the last 5 years, so that it is necessary to increase community knowledge about landslide hazards such as socialization or counseling and training to improve community preparedness.

## V. SUMMARY AND CONCLUSIONS

Based on the findings in the discussions that have been conducted, the following can be concluded. (1) Public knowledge about the danger of landslides in Busungbiu District is generally categorized as low, which is as much as 34.38%. Whereas the medium range is 60.42% and the high range is 5.20%. (2) Public preparedness for landslides in Busungbiu Subdistrict is generally categorized as not yet ready, namely as much as 15.63%. Whereas in the unprepared range as much as 61.45%. The range is quite ready as much as 18.76%, the range is ready as much as 3.12% and the range is very ready as much as 1.04%. (3) There is a positive correlation or

relationship between community knowledge about landslide hazards and community preparedness for landslides in the District Busungbiu. The level of relationship between people's knowledge of landslides is strong (0.705).

Based on the results of the research that has been done, suggestions can be made as follows (1) For the community, it is necessary to increase community preparedness because it is an effort to reduce the impact if a disaster occurs. Increasing preparedness is carried out by actively following government programs related to disasters in the form of disaster-related socialization or counseling and training to improve preparedness. (2) For the Government, in order to increase socialization or counseling related to disasters in order to increase knowledge and public preparedness, landslides are one of the disasters that can occur suddenly, so as to reduce the impact the community needs to get training and related socialization to be more prepared in the face of disaster

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