

Conference Paper

Effectiveness of Household Landslide Preparedness Education on the Preparedness Capacity of Families

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Disasters are events that threaten and disrupt people's lives and livelihoods due to natural and/or non-natural factors as well as human factors that cause human casualties, environmental damage, property losses, and psychological. The implementation of disaster preparedness has not been carried out comprehensively and continuously throughout Indonesia. This study aimed to determine the effectiveness of landslide preparedness education interventions in increasing the landslide preparedness capacity of households in the Sukabumi Regency. The minimum sample was 118 for each intervention and control group. Random sampling was used for sampling technique. Data analysis was done using an independent t-test. The results of the study mean that the difference in knowledge scores showed a significant difference between the intervention group and the control group ($F = 23.41$, p -value = 0.000). In addition, the average difference in household preparedness scores for landslides showed a significant difference between the intervention and control groups ($F = 190.08$, p -value = 0.000). After the intervention, the intervention group's household disaster preparedness improved significantly. Meanwhile, no significant increase was observed in the control group's household disaster preparedness score after the intervention. Household disaster preparedness training may have an impact on the knowledge, attitudes, and behavior of individuals and families. Trainings such as online and simulation using live or recorded demonstrations should be developed and evaluated for their effectiveness.

Keywords: household landslide preparedness, education, preparedness capacity

1. Introduction

Disasters are events or series of events that threaten and disrupt the life and live community and livelihoods caused by actors and/or non-natural factors as well as human factors causing human casualties, environmental damage, and property loss. objects, and psychological impacts[1]. This definition is supported by the Center for Research on

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Published 4 August 2023

Publishing services provided by Knowledge E

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Selection and Peer-review under the responsibility of the ICHSSE Conference Committee.

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the Epidemiology of Disasters[2], which described disasters as events that cannot be avoided by humans and disasters as a global problem that must be overcome because disasters have a very large impact on health, economy, politics, education, social, and infrastructure. According to data on the number of disaster events in the top 5 countries in the world in 2018, Indonesia was ranked 4th for 15 disaster events after the United States[3].

The impact of the disaster caused enormous losses to health, economy, agriculture, education, politics, and infrastructure and resulted in casualties. According to data reports from the United Nations Office For Disaster Risk Reduction (UNDRR) in 2018 [4], from several countries on 5 continents of the world, the death toll due to disasters from 81 countries reported 22,076 people died and 1,914 people were missing due to disaster. It is reported that nearly 741,000 people were declared sick or injured by the disaster, more than 80 percent in Africa. Nearly 7.8 million people have had their homes damaged or destroyed, about 69 percent of them in the Asia and Asia and the Pacific had their livelihoods disrupted or destroyed by the disaster and 74 percent of them in the Asia and Pacific region. Of the economic losses that were directly caused by the disaster from the 63 reporting countries, the largest economic losses were recorded in Europe and Central Asia at 93%. Nearly 74% of economic losses were in the agricultural sector and 18% in the damaged and destroyed infrastructure sector. Of the 50 countries, it was reported that a total of 401 health facilities, 4,755 educational facilities, and 1,458 other important infrastructure facilities were damaged or destroyed. Reporting countries recorded 14,501 basic service interruptions including education, health, and other essential services. Most of the infrastructure facilities destroyed were in the Americas and the Caribbean (35.6 percent) and Europe and Central Asia (28.6 %). However, most examples of service disruptions were in Africa (72.7 %) and Asia and Pacific (11.4 %) regions, [5].

According to the Indonesian Disaster Information Data (DIBI) for 2020, during the period 2010 to 2019, the trend of natural disasters in the last 10 years of natural disasters that occurred in Indonesia, the incidence of natural disasters, floods ranked first and second landslides. Since 2019 - 2020 1,454 natural disasters in Indonesia resulted in various damages, namely: 1,403 injured victims; submerged houses 111,496; heavily damaged houses 4,796; damage to health facilities 101; damage to places of worship 281; damage to educational facilities 383 [3].

The occurrence of natural disasters needs to be addressed, one of which involves the participation of the community (collective action sector) in disaster risk reduction preparedness. Community involvement in disaster prevention and management through community-based disaster preparedness capacities is very important to do, such as the results of research conducted in Japan, that an important element in community-based disaster prevention is knowledge and understanding of disasters as well as effective relationships and communication in local communities [6].

The results of a research according to regarding the capacity and capability of local government disaster risk reduction in Indonesia, show that community capacity building, funding, and networks generally score higher, [7]. Thus, there is a need for improvement in understanding hazards and risks, risk reduction activities, regulations, strategic planning, building development and control as well as disaster education and training for the community. Disaster emergency preparedness problems in households are not only in Indonesia but in Asian countries such as China, [8]. Lack of knowledge appears a major barrier to household readiness. Although training can be an effective measure for increasing knowledge, a more comprehensive strategy needs to be adopted to address the problems associated with a lack of motivation. The emergency response system must emphasize individual responsibilities as well as from government and professional workers, [9].

On January 1, 2019, according to information from the Regional Disaster Management Agency (BPBD) of Sukabumi Regency, one of the areas in Sukabumi Regency, namely Sirnaresmi Village, Cisolok District, a landslide natural disaster occurred. As a result of the disaster, 32 people died and 1 person was missing and dozens of others were injured. Also, around 30 houses were buried by landslides which resulted in infrastructure damage, loss of assets, and post-disaster psychological burdens [10]. Sirnaresmi Village is an area located in a highland area with an altitude of 620-1,200 m above sea level, and most of it is agricultural land and rice fields. Sirnaresmi Village is a traditional village that consists of three Kasepuhan namely Ciptagelar, Ciptamulya, and Sirnaresmi. Of the three-place of customs, they are divided into 7 villages / RW with 1655 family heads, the average primary school education (72%), and farmer occupation (80%). The impact of the landslide natural disaster shows that Sirnaresmi Village has not been able to optimally manage disaster risk preparedness in the area, one of which is education, knowledge about disasters, and awareness of disaster prevention. Even though this is

very important to do in disaster-prone areas where at any time and at any time landslides can occur.

Research on disaster preparedness education in general communities in Indonesia and particularly Sukabumi Regency is very rarely carried out, due to the large number that must be considered such as the conditions and place of research, the cost, and time of research. Factors that people in Sukabumi Indonesia do not understand natural disaster preparedness not well understood called for further exploration and investigation. The overall objective of this study is to implement and evaluate the effectiveness of household landslide disaster preparedness educational interventions before and after increasing the capacity of landslide preparedness households in Sinaresmi, Sukabumi Regency.

2. Metode

2.1. Study Desain

This research study is experimental, with a randomized controlled trial that aims to evaluate the effectiveness of household landslide disaster preparedness educational interventions before and after increasing the capacity of landslide preparedness in families.

The intervention group provided a comprehensive training session including 7 days of training. The Control group provided information not associated with disaster preparedness such as disaster data, landslide information and how to do it, flood information, and information through leaflets and modules. Assessment of knowledge, attitudes, and household disaster preparedness conducted before and after the intervention.

2.2. Sample

For the experimental study, the sample size was calculated using G-Power Software Version 3.1.6 using the t-test with the assumption $\alpha = 0.05$, effect size=0.50. The estimation for the minimum sample, assuming an attrition rate of 15 %, so the total minimal sample will be recruited is 118 for both groups. Ass for the sample taken a total of 320 respondents in the baseline data collection. At enrollment, approximately 300 respondents participated and about 20 of the participants refused to participate (6.25%), resulting in a response rate of 93.75% at baseline.

2.3. Instrument

The instrument used is to use a questionnaire after the respondent is given an intervention using a learning module. The content of the questionnaire consists of demographic data questions. Knowledge levels related to preparedness for landslide disasters were assessed, each containing four question items. The item scores for each type of emergency event were added, generating a summed score ranging from 0 to 4. Nine question items measure individual attitudes toward emergency events. The respondents were asked to rate their attitudes from 1 to 5, with a higher score indicating a higher level of interest/attention. The landslide disaster preparedness instrument consists of 53 questions with 5 domains which are included in the structure and process indicators. The form for this instrument is a binary scale with options of 1 to 3, one indicates yes, 0 = no, and 2 = don't know. If the answer was 0 and 2 will be calculated as no "1". All the questions were summed up and high scores indicate higher preparedness.

2.4. Data collection procedure

In the intervention group, a community-based first aid training program was held at the community center place for 3 days and 10 days of fieldwork. Every day is taken time around 3 hours for providing material and discussion. We also provided material such as modules. RA performs a posttest assessment after intervention for the intervention group and after baseline assessment for the control group. A training manual for Research Assistants (RA) is produced before the research is started. For the recruitment of subjects, participants who meet the criteria for inclusion are selected from the community leader. RA invited potential participants and explain the purpose of the study, and the procedure for collecting data and protecting their rights, e.g., respecting their autonomy and protecting their privacy in a quiet room. If they agree, an informed consent document must be signed. RA then performs a pre-test assessment of demographic characteristics and variable outcomes.

2.5. Data Analysis

This research study is experimental, with randomized controlled trial that aims to evaluate the effectiveness of household preparedness disaster training programs on knowledge, attitudes, and household disaster preparedness. RCTs are the best type of study

for determining whether there is a causal relationship between intervention and effect, consisting of intervention and control group, randomization, and blindness [11]. This study used RCT to prevent the skewing or deliberate manipulation of results and randomization removes bias and truly allows for a direct comparison between two groups in a trial, providing a real representation of how the intervention will react with the wider population after distribution. In this study, neither participants nor researchers were masked in group selection and outcome measurement.

For the experimental study, the sample size was calculated using G-Power Software Version 3.1.6 using the t-test with the assumption $\alpha = 0.05$, effect size=0.50 (medium effect size by Cohen et al 1995), power level=0.80, 2 numbers of groups. The estimation for the minimum sample was 51 for each group, and assuming an attrition rate of 15 %, so the total minimal sample will be recruited is 118 for both groups. In the intervention group, a community-based first aid training program was held at the community center place for 3 days and 10 days of fieldwork. Every day is taken time around 3 hours for providing material and discussion. We also provided material such as a booklet. RA performs a posttest assessment after intervention for the intervention group and after baseline assessment for the control group.

3. Result

3.1. Study Flow

A total of 320 respondents were in the baseline data collection, as shown in Figure ??1. At enrollment, approximately 300 respondents participated and about 20 of the participants refused to participate (6.25%), resulting in a response rate of 93.75% at baseline (Figure ??1).

3.2. Demographic characteristics

Table 1. Shows a demographic comparison between the intervention and control groups. There were no significant differences between the intervention and comparison conditions on age, gender, education level, marital status, employment status, and attaining training for disaster ($p > 0.05$).

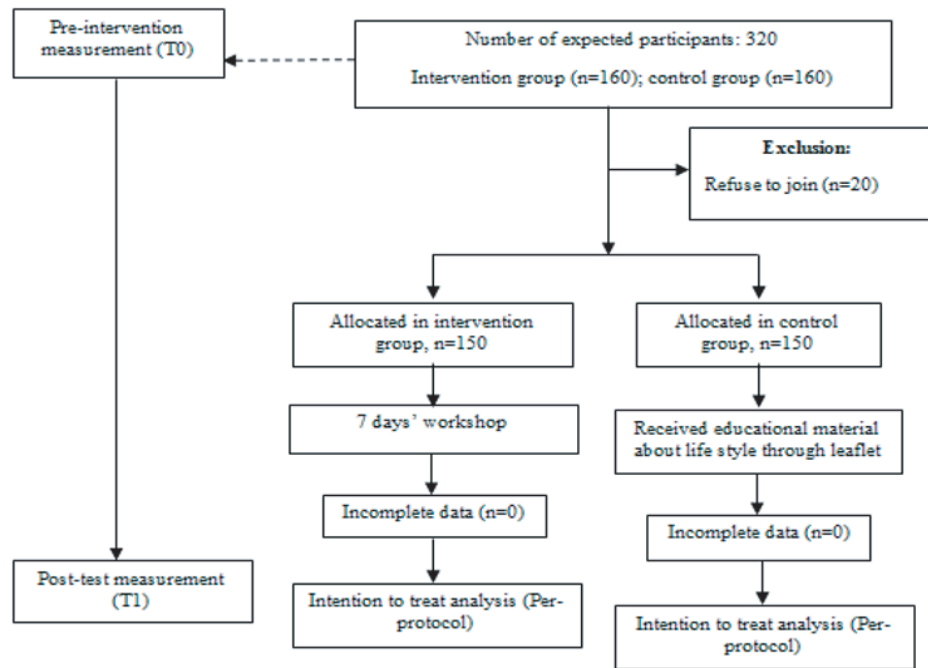


Figure 1: Study flow diagram.

TABLE 1: Demographic comparison between intervention and control group (n=300).

Variables	Intervention group	Control group	r or t or F	p-value
	n=150 (%)	n=150 (%)		
Age, year (Mean ± SD)	30.15±5.31	31.71±9.25	0.537	0.342
Gender				
Male	89 (59.3)	80 (53.3)	0.261	0.256
Female	61 (40.7)	70 (46.7)		
Marital status				
Married	100 (66.7)	95 (63.3)	1.274	0.185
Single/Divorce/Widow	50 (33.3)	55 (36.7)		
Education level				
Below junior high school	75 (50)	80 (53.3)	0.376	0.205
Senior high school	50 (33.3)	38 (25.3)		
University	25 (16.7)	32 (21.3)		
Working status				
Employed	120 (80)	112 (74.7)	1.670	0.252
Unemployed	30 (20)	38 (25.3)		
Attaining training in disaster				
Yes	25 (16.7)	28 (18.7)	0.275	0.243
No	125 (83.3)	81.3		

3.3. Difference of knowledge before and after intervention in both groups

Table 2 shows the difference in knowledge before and after intervention in both groups. In the intervention group, the knowledge score significantly increased from 5.32 ± 1.13 before intervention to 8.15 ± 1.63 after one intervention, with the t being 7.23, and p-value=0.001. While in the control group, no significant increased score of knowledge before intervention and after one-month intervention (5.02 ± 0.75 vs. 5.37 ± 1.72 , p-value=0.562, respectively).

TABLE 2: Score difference of knowledge before and after intervention in both groups (n=300).

Variables	Pre-test Mean \pm SD	Post-test Mean \pm SD	Mean difference	t	p-value
Intervention group	5.32 ± 1.13	8.15 ± 1.63	2.83	7.23	0.001
Control group	5.02 ± 0.75	5.37 ± 1.72	0.35	0.89	0.562

Note: p-value obtained from paired t-test

3.4. Difference in attitude before and after intervention in both groups

Table 3 shows a comparison of attitude scores between the intervention and control groups. In the intervention group, the attitude score significantly increased from 20.12 ± 8.23 before the intervention to 29.32 ± 6.60 after the intervention, with the t-value being 19.32, and p-value=0.001. While in the control group, there was an increase in the score of attitudes before intervention and after intervention (21.34 ± 6.82 vs. 23.41 ± 8.83 , p-value=0.115, respectively).

TABLE 3: Difference of attitude score between pre and post-test in the intervention group (n=300).

Variables	T0 Mean \pm SD	T 1 Mean \pm SD	Mean difference	t	p-value
Intervention group	20.12 ± 8.23	29.32 ± 6.60	9.20	19.32	0.001
Control group	21.34 ± 6.82	23.41 ± 8.83	2.07	3.36	0.115

Note: p-value obtained from paired t-test

3.5. Difference in household preparedness disaster for landslide before and after intervention in both groups

Table 4 shows the comparison practices score between the intervention and control groups. In the intervention group, the household preparedness score significantly increased from 212.46 ± 4.23 before the intervention to 19.37 ± 5.04 after the intervention, with the t value being -value and p-value=0.001. While in the control group, no significant increase in the score of household preparedness before intervention and after intervention (13.07 ± 5.04 vs. 212.41 ± 6.83 , p-value=0.565, respectively).

TABLE 4: Difference of household preparedness disaster for landslide score between pre and post-test in the intervention group (n=300).

Variables	T0 Mean \pm SD	T 1 Mean \pm SD	Mean difference	t	p-value
Intervention group	12.46 \pm 4.23	19.37 \pm 5.04	6.91	23.21	0.001
Control group	13.07 \pm 5.04	12.41 \pm 6.83	-0.66	-1.93	0.565

Note: p-value obtained from paired t-test

4. Discussion

The results of this study indicated that the intervention and control groups' mean post-test knowledge scores increased significantly. Following the intervention, the control group's knowledge remained low, whereas the intervention group's knowledge increased. This study discovered that disaster preparedness training significantly improved participants' knowledge about disaster preparedness. There were significant effects of disaster preparedness training on helping behavior or the first-competence as demonstrated by three studies on first-aid training among lay people, [12].

This study discovered that household disaster preparedness training significantly improved household preparedness for landslide disasters. Consistent with [13] found that attitudes and behaviors improved significantly following training. This could be due to assessment points. According to Everly et al. [13], the effect of didactic lecture training on knowledge acquisition may be masked by the effects of simulation practices conducted in the afternoon session; that is, the knowledge acquired during the didactic lecture may be masked by the simulation practice. There was no statistically significant difference in the mean attitude scores between the groups before the intervention. Local government disaster management committees were deemed to have adequately

addressed community attitudes toward disaster preparedness. Natural disasters such as landslides have long been a source of concern for Indonesia, a developing nation with a unique political and geographic position, [14].

This study established that adequate household disaster preparedness can be improved through disaster preparedness training. Domestic disaster preparedness is a critical component of any subject when learning about a particular routine. The term "household disaster preparedness" in this study refers to the application of ideas and beliefs regarding disaster management, rather than actual performance. The study's findings indicate that disaster-related education and training are critical and effective in improving community members' knowledge, attitudes, and practices. A previous study discovered a strong correlation between disaster-related education/training and practice, indicating the critical role of training in ensuring that personnel is prepared and equipped to deal with disaster when it strikes. As a result of their experiences, personnel who had received disaster education or training and were actively involved in disaster response reported increased confidence and a better understanding of the importance of disaster management[15].

5. Conclusion

The intervention group's knowledge score increased significantly before and after the intervention. While there was no significant increase in the control group's knowledge scores. The intervention group's attitude score increased significantly before and after the intervention. While there was no increase in the attitude score of the intervention group. After the intervention, the intervention group's household disaster preparedness increased significantly. While there was no significant improvement in the control group's score of household disaster preparedness following the intervention.

6. Funding

The research was personally funded and supported by the educational institution where he worked, namely STIKes Sukabumi.

Acknowledgment

The author would like to thank colleagues - colleagues at work, research sites, and supervisors for their support and contribution to the research. The author would also like to thank the reviewers for providing valuable input and direction in completing this research paper.

7. Conflict of Interest

The authors have no interest to declare

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