

ORIGINAL ARTICLE

The Effect of Tabletop Disaster Simulation of Flood on Community Readiness and Intentional Behavior in Musi Rawas, South Sumatera

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ABSTRACT

Introduction: As a country with a high risk of disaster, Indonesia must have sufficient resources and capacity to react to a disaster, including community preparedness and intentional behavior. However, the current status of community readiness and intentional behavior in the face of disasters is deficient. Therefore, there is a demand for a sustained effort to prepare the community. Education and simulation are both important components of this endeavor. Thus, the Tabletop Disaster Simulation method can be used to gradually increase community readiness. **Methods:** This quantitative study was conducted with a quasi-experimental approach. A total of 100 participants took part in this study, of which fifty participants were categorized into the experimental group and attended two Tabletop Disaster Simulation meetings with a flood model board, over two weeks. The remaining fifty participants were in the control group and received home visits as well as two educational meetings about flood disasters using leaflets. Both the experimental and control groups were subjected to pre-test and post-testing. The researcher developed a questionnaire to assess the readiness, deliberate the implementation, and conduct modifications from other studies. The Cronbach's alpha coefficients used were 0.82 (readiness) and 0.83 (intentional behavior). The paired t-test was used to assess the data statistically. **Result:** The experimental group showed higher readiness progress ($t = 6.687$, $p 0.001$) and intentional behavior progression ($t = 9.284$, $p 0.001$) than the control group. **Conclusion:** The results indicated that the Tabletop Disaster Simulation helped increase the Musi Rawas community's readiness and intentional behavior.

Keywords: Tabletop Simulation, Disaster Readiness, Intentional Behavior

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INTRODUCTION

Indonesia's tropical location places it in great danger of hydrometeorological disasters such as floods, flash floods, severe weather, and erosion, as well as forest and land fires. (1). According to the BNPB (2018), or Indonesia's National Disaster Management Agency (NDMA), most of the catastrophes in the nation are caused by floods, landslides, and tornadoes. (2).

The Musi Rawas Regency in South Sumatra is particularly vulnerable to natural disasters. According to the NDMA, floods, landslides, and forest fires occur every year. Four out of fourteen districts, mainly Muara Kelingi, Muara

Lakitan, Megang Sakti, and BTS Ulu, in particular, are extremely vulnerable to floods. (3).

The floods that occurred at Musi Rawas Regency were caused by the Musi and Kelingi rivers overflowing and inundating the homes of inhabitants who lived within the watershed. Flooding on a massive scale will obstruct all aspects of the lives of citizens, including governance, economics, and education. In 2021 Hundreds of houses were flooded by 1.5 meters and damaged dozens of houses (4). Therefore, unexpected flooding can result in fatalities. In light of these conditions, Indonesia must be alert and watchful in the case of a disaster.

Disaster preparedness in Indonesian communities must be improved, and the Indonesian government must do its part. However, several factors contribute to this barrier. These include cultural features and geographical

location. Other factors include disaster management knowledge and experience, as well as a community response to crisis events and conditions (5,6). As a result, actions to strengthen the community's catastrophe readiness must be properly considered.

Readiness is a crucial issue in disaster management, especially from a logistical standpoint and from the perspective of the community as the first responder in the event of emergency response (7). Preparation is also essential and includes community readiness when dealing with disasters throughout the emergency response phase. Therefore, preparation for disasters should be a major priority for everyone, especially in high-risk regions. Additionally, previous studies suggest that disaster preparedness training is essential for improving community readiness in catastrophe situations (8).

Public education and understanding of disaster risk reduction should be increased (9). Knowledge of disaster preparedness and mitigation is crucial for reducing the high risks connected with flood disasters and should be instilled in children at a young age (10–12). Readiness reflects a community's willingness to assist in the event of a crisis. It could be determined by behavioral intention to behave in a certain way (13,14). The possession of appropriate skills and information regarding disasters is one sign that a population is ready to respond to a disaster (15).

Previous research has found that traditional disaster simulation methods such as group discussions produce poor results when used for disaster education (16). Therefore, many efforts have been made in the field of disaster education to develop effective learning mediums, such as Tabletop Disaster Simulation (TDS). This model may be used to assess the various elements connected to disaster preparedness and management (17). Training sessions and drills, as an effective learning strategy, help people to enhance their disaster preparedness knowledge and abilities (18).

The tabletop exercise is classified as a discussion-type drill that has achieved major success in assessment and performance measurements for key activities and roles, including participants, policies, and procedures (19). TDS is a room-based simulation designed to measure disaster preparedness by analyzing a community's problem-solving reactions in the presence of a crisis (20). According to a previous study, through this experience, participants can enhance their knowledge, confidence, and awareness of their roles and responsibilities per the instructions discussed during the Tabletop Simulation. (21). Furthermore, past studies have shown that when people participated in TDS training, their knowledge and attitudes regarding disaster management improved (2,22,23). Moreover, TDS' have also been found to be well-received, cost-efficient, effective as a technique of

disaster education, and can help ensure that participants retain information (19).

The objective of this study was to investigate the influence of the Tabletop Disaster Simulation on the community's readiness and intentional behavior in response to a flood disaster in Musi Rawas Regency.

MATERIALS AND METHODS

Study design

A quasi-experimental study design with two groups of participants from the Musi Rawas Regency was prepared. Pre-and post-testing was conducted to determine the influence of the TDS.

Setting and sample

The subjects of this study were residents of the Muara Kelingi and Muara Lakitan regency, from the region of Musi Rawas in South Sumatera, a commonly known flood-prone area. Cluster random sampling was conducted in areas in the two districts that were highly impacted by flooding. This study enrolled a total of one hundred respondents, fifty of whom were assigned to the treatment group and fifty to the control group (Figure 1). Respondents have to be over the age of 17 and live in flood-prone areas to be included. Individuals with physical disabilities and above 40 years old were excluded from this study. Respondents who did not complete the study were also excluded.

Ethical considerations

This study followed the Declaration of Helsinki's guidelines. The ethics committee of STIKES Dr. Soebandi Jember approved the study with the number 227/SDS/TL/XI/2019. After obtaining information about the study and their right to participate or not participate, all participants were asked to complete an informed consent form and sign it willingly. The researcher further informed them that their privacy and personal information will remain protected.

Instruments

Readiness

A questionnaire was used to ascertain the level of preparedness for responding to a hurricane disaster. The Attitude on Tabletop Exercise (SATE) questionnaire used in Husna's study was adapted for this research (24). It consisted of 10 items on a Likert scale with 4-point answers ranging from "disagree", "uncertain", "agree", and "strongly agree". The questionnaire included the following indicators: (1) knowledge of flood disaster preparedness, (2) attitude toward flood disaster preparedness, (3) policies and guidelines, (4) emergency flood disaster plans, (5) flood disaster warning system, and (6) how to seek assistance. The Cronbach's alpha, as a measure of reliability, was 0.85, as obtained from the SATE questionnaire.

Intentional Behavior

The questionnaire was designed based on Ajzen's Theory of Planned Behavior (TPB) and its application to behavior intention (13). It was created to assess the community members' readiness to respond to a flood disaster. Three major aspects influence the development of TPB: attitude toward the behavior, subjective norm, and self-efficacy (24). The questionnaire used a 10-point scale that ranges from low (1) to high (10) that the respondents can choose from. For each category: (a) the participants' would provide estimates of their own social networks' use of social networking e.g., the participant, their relatives' use, and their friends' usage; (b) estimates of how much they helped their peers/relatives use social networks (Help); (c) their attitudes about the use of social media (Attitude); (d) their perception of the importance of others' beliefs that he or she should or should not perform the behavior (Subjective Norms); (e) their perceived ease or difficulty of performing a particular behavior (Perceived Behavioral Control); (f) their intention to use social networks in the future (Intention), and (g) their reported behavior related to the use of social media (Behavior). The following indicators were included in the questionnaire: (1) taking action to minimize the consequences of a flood, (2) reporting the signs of a flood, (3) taking action when a flood comes, (4) willingness to assist strangers, and (5) willingness to assist people of the opposite sex. The Cronbach's alpha as a measure of reliability, was 0.83, as obtained from Ajzen's Theory of Planned Behavior (TPB).

Tabletop Disaster Education Media

Two media, namely leaflets and Tabletop Disaster Simulation models, were used in this study. The leaflet was created by the authors of this study and contained information on (1) flood disaster knowledge, (2) attitude toward flood disaster readiness, (3) policies and guidelines, (4) emergency flood disaster plans, (5) flood disaster warning system, and (6) knowing how to seek assistance. During the study, the leaflet's content was changed so that the information gained by the two groups was identical. The second tool used was a Tabletop Disaster Simulation model, which is a 2 4 2 m board with a Styrofoam-shaped tiny version of their hamlet above it. The duration of the simulation is 60 minutes and this included the preparation, rehearsal, and simulation stages.

Data collection

The data collection process occurred between 03 November 2019 and 24 November 2019 with the distribution of a standardized questionnaire. All participants were informed about the study's purpose and stages and were requested to sign an informed consent form. The first meeting consisted of distributing educational materials via pamphlet and was followed by a tabletop disaster simulation. The second meeting consisted entirely of a tabletop disaster simulation. The technical intervention took place over the course of

two weeks in two sessions. The control group received verbal instructions about floods during the first meeting. During the second meeting, the control group received verbal education regarding flood simulations as well. Additionally, both groups underwent pre-and post-testing.

Data analysis

Data analysis was conducted using the SPSS 25 software (IBM Incorporation, Chicago, IL, USA). The frequency and percentage distributions of the respondents in the treatment and control groups were used to examine their characteristics. The homogeneity test and Levene's test were used to analyze the variables and characteristics in this study. Additionally, the Kolmogorov-Smirnov test was used to determine the normality of a variable in a study. Meanwhile, the instruments' dependability (readiness and intentional behavior) was determined using Cronbach's alpha. The efficiency of tabletop disaster simulation was determined using Paired and Independent t-Tests. The threshold for significance was set at p 0.05.

RESULT

According to Table 1, 90% of the respondents had a high school education or less. Additionally, Table 1 indicates that 63% of participants were under the age of 40. Table II shows an increase in readiness and intentional behavior before and after the TDS. Moreover, both the intervention and control groups had a statistically significant $p < 0.001$, but the readiness and intentional behavior in the experimental group showed a greater increase in values than the control group.

Table 1. Respondent Characteristic (n = 100)

Respondent	Exp		Con		Total	
	%	n	%	n	%	n
Age						
	21-30 y.o	6	12	10	20	16
	31-40 y.o	23	46	24	48	47
	41-50 y.o	17	34	13	26	30
	51-60 y.o	4	8	3	6	7
Gender						
	Male	19	38	25	50	44
	Female	31	62	25	50	56
Education						
	Elementary School	1	2	12	24	13
	Middle School	14	28	28	56	42
	High School	28	56	7	14	35
	Diploma	6	12	2	4	8
	Bachelor	1	2	1	2	2

The independent t-test readiness results showed a significance of p 0.001, where the experimental group obtained 48.27 and the control group obtained 38.80. The results from the independent t-test showed that the intentional behavior variable showed a significance of p 0.001, where the experimental group obtained 12.98 and the control group obtained 7.52.

Table II. Variable Value Results (n=100)

Variable	Group	Pretest	Post-test	Difference	t	p*	t	p**
		M ± SD	M ± SD	M ± SD				
Readiness	Exp	42.27 ± 7.078	90.53 ± 5.230	-48.27 ± 6.941	-49.173	.001	6.687	.001
	Con	42.80 ± 6.880	81.60 ± 5.958	-38.80 ± 7.216				
Intentional Behavior	Exp	34.40 ± 1.690	47.38 ± 2.709	-12.98 ± 3.377	-27.174	.001	9.284	.001
	Con	34.60 ± 1.564	42.12 ± 1.955	-7.52 ± 2.426				

*Paired t-Test **Independent t-Test

DISCUSSION

This study found that communities that received the simulation had an increased readiness. This is consistent with the theory that the Tabletop Disaster Simulation can enhance the community’s readiness to respond to disasters by bringing representatives from different organizations with varying roles and perspectives regarding specific disasters (25). Continuous training and disaster simulations can help enhance knowledge and preparedness for disasters (8,23). The Tabletop Disaster Simulation is a type of simulation that engages respondents and is more engaging than conventional simulations (2).

One aspect of the Tabletop Disaster Simulation that could be enhanced is knowledge. The understanding of disasters can increase by participating in the tabletop disaster exercise (26). Feri et al. (2020) reported that after receiving education and participating in room simulations using the Tabletop Disaster Simulation Model, participants gained a better understanding of how individuals respond to disasters (27).

The change in community readiness described above occurred as a result of education and training conducted using the Tabletop Disaster Simulation approach. The use of this simulation method based on field data has been shown to significantly increase community awareness and attitudes toward disaster response. Through moderated group conversations, the goal of the TDS is to increase preparation to manage a health disaster (28). According to Pate et al. (2016), following

the TDS treatment, the respondent’s preparedness significantly increased (21). Additionally, Sholihah et al. (2020) stated that students’ readiness increased following the TDS (2).

Furthermore, intentional behavior was found to have increased in the treatment group. This could be attributed to advancements in the participant’s understanding of the subject. According to Lu et al. (2016), knowledge is inextricably linked to behavioral intention (29). Werner and Grayzman (2011) also stated that one of the factors that influence purposeful conduct is knowledge (30). In other words, as an individual’s awareness of how to respond to disasters grows, their willingness to do so will also increase.

People’s willingness to participate in disaster response during the acute period is an indicator of positive purposeful conduct during a disaster. After a tabletop exercise, the participants’ desire to help in disaster response was found to have increased (21). This proves that studies that utilize this novel methodology could have a good effect on the attitudes of participants and that the method has a greater impact than traditional methods. A tabletop exercise is also a teaching tool that encourages student interaction. This is because numerous innovative ideas and experiments are considered and attempted during the simulation (31). In this case, interactive and collaborative methods were found to have a bigger impact than lecturing methods.

According to statistical studies, the TDS approach had a significant effect on the community’s readiness and deliberate conduct in response to flood disasters, with a value of p 0.001. Pate et al. (2016) reported that following Tabletop Simulation training, participants gained knowledge, confidence, and awareness of their roles and responsibilities during disaster events (21).

All respondents were members of civil society, the highest education level achieved was high school for 90% of the subjects. The Tabletop Simulation Model is very basic and straightforward to understand. Therefore, the model was well-received, low-cost, and effective as a method for disaster education and ensured that respondents retained information (19). As much as 63% of the responders were under the age of 40.

The primary purpose of this simulation was to examine the community’s capacity to deal with certain incidents, analyze individual groups’ ability and readiness to collaborate and respond to emergencies, and discuss the roles, duties and anticipated actions of various organizations. Past studies have shown that participants of the TDS would make an effort to respond to public health emergencies and disasters following the simulation (32).

A longer duration of data collection and a larger sample

size are required for a more accurate analysis. A longer duration of data collection and a larger sample size are required for a more accurate analysis. Additionally, the results obtained from this research area could not provide an overall picture of flood disaster events in other regions in Indonesia.

CONCLUSION

This study's findings suggest that Tabletop Disaster Simulation helped increased the Musi Rawas community's readiness and intentional behavior. Increased understanding translates into increased community readiness and intentional conduct. Therefore, simulation exercises utilizing the TDS approach should be further expanded and enhanced.

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