

# Rahayu Rahayu<sup>1</sup>, Azizah Earthquake Preparedness Among Khoiriyati<sup>1</sup> Nursing Students

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## Abstract

**Background:** Nursing science students are prospective nurses who have an important role in disaster management, including disaster mitigation, disaster response, and post-disaster rehabilitation.

**Objective:** This study aimed to investigate the earthquake disaster preparedness in nursing science students of Universitas Muhammadiyah Yogyakarta.

**Method:** This study was a non-experimental study utilizing the quantitative method and descriptive survey design. The population of this study was active students of Nursing Study Program at Universitas Muhammadiyah Yogyakarta with a sample of 217 respondents. The sample was obtained using a proportional convenience sampling technique. The data were obtained through an instrument in the form of a valid and reliable earthquake preparedness questionnaire. The obtained data were then analyzed by using descriptive statistical analysis.

**Results:** The findings of this study indicated that the level of students' earthquake preparedness was still in the low category. The findings on the parameters supported it. Students' knowledge and attitude towards an earthquake risk were in the high category while the emergency response plan parameter was included in the low category. The disaster warning system parameter was in the good category. At last, the resource mobilization parameter obtained was in a low category.

**Conclusion:** Thus, it was concluded that the level of earthquake preparedness of Nursing Science students of Universitas Muhammadiyah Yogyakarta was in a low category. These findings explained the urge for disaster preparedness for students in the Nursing Science Study Program. Accordingly, routine training in earthquake disaster management is needed to improve students' disaster preparedness.

**Keywords:** earthquake; disaster preparedness; nursing students

## INTRODUCTION

Yogyakarta is located in the area where the Australian plate and Eurasian plate have faults and basins, which makes it easy to experience plate shifts that can cause an earthquake (Prasetyo, 2016). People, especially those in disaster-prone areas like Yogyakarta, are required to prepare themselves to face disasters. One of the efforts is by increasing earthquake preparedness in the community. Preparedness has four components used as

parameters in evaluating earthquake preparedness. These components are knowledge and attitude about earthquake risks, emergency response plans, disaster warning systems, and resource mobilization (Rahmawati, 2016).

Preparedness is an obligation for every community, including the school community. Yogyakarta is known as the city of education. It is expected to be able to build awareness of disaster preparedness

starting from elementary school to university level through the world of education in Yogyakarta. Especially for nursing science students who are prospective nurses, they have an important role in disaster management, including disaster mitigation, disaster response, and post-disaster rehabilitation.

Therefore, researchers conducted a study to measure the level of disaster preparedness in nursing science students to create prospective nurses who are ready to face disasters. The results of a preliminary study conducted by researchers to ten students of the Nursing Study Program at the Universitas Muhammadiyah Yogyakarta showed that seven of them said they did not yet know about what preparations to take in the incident of an earthquake. Based on this phenomenon, researchers were interested in investigating "the Level of Earthquake Preparedness in Students of Nursing Study Program at Universitas Muhammadiyah Yogyakarta."

#### **METHOD**

This study used a quantitative method with a descriptive survey research design. The study was conducted at the Nursing Study Program of Universitas Muhammadiyah Yogyakarta from February to June 2017. The subjects involved in this study were active students of Nursing Study Program of Universitas Muhammadiyah Yogyakarta, 2013-2016, with a total of 468 students. Solvin's formula was used in sampling obtaining a sample of 216 respondents. The sampling technique used was the proportional convenience sampling technique.

The data were collected by using an earthquake preparedness questionnaire which had been tested for its validity with  $r$  count of 0.395-0.851 and its reliability with  $r$  of 0.95. The questionnaire was then distributed to nursing science students. Additionally, this study had been declared to have passed an ethical test by the research ethics committee of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, with ethical number 195/EP-FKIK-UMY/III/2017. The data were then analyzed using a descriptive statistical technique to calculate the preparedness index for each respondent, the preparedness index for each parameter, and the overall preparedness index for each student of Nursing Study Program of

Universitas Muhammadiyah Yogyakarta. The earthquake preparedness index was calculated based on the weighted value of each parameter. Data processing was done using a matrix of the number of questions of each earthquake preparedness parameters for students.

#### **RESULTS**

##### **Data on demographic characteristics of respondents**

In the Table 1 serving the data from the class of 2013, the majority of respondents were 35 female students or 37.5% and 56 students or 100% of the total respondents had an age range of 21-23 years old (young adult 43 students or 76.8% of the total respondents did not join the disaster response organization and the majority of respondents which were 46 students or 92.1% of the total respondents had no experience of volunteering. Meanwhile, the majority of respondents, 47 students or 83.9% of the total respondents, had experienced an earthquake.

In Table 1 presents the data from the class of 2014, most of the students, 33 students or 62.3% of the total respondents, were female and the majority of respondents, 50 students or 62.3% of the total respondents, had an age range of 21-23 years old (young adults). Data on the activity of participating in the organization indicated that 35 students or 66% of the respondents from the class of 2014 did not join the disaster organization. Additionally, the majority of respondents, 47 students or 88.7% of them, had no experience of volunteering even though 75.5% or 45 students had experienced an earthquake.

Table 1 showed the data from the class of 2015. Most of the students, 45 students or 86.5% of the total respondents, were female, and the majority of respondents, 36 students or 69.2% of the total respondents, had an age range of 17-20 years old (late adolescence). In the data of joining an organization, it showed that students from the class of 2015, 36 students or 69.2% of the total respondents, did not join the organization, and most

of them, 45 students or 86.5% had no experience of volunteering. Moreover, most of the respondents, 42 students or 80.8% had experienced an earthquake.

**Table 1 Respondent characteristic data**

Demographic Data	2013		2014		2015		2016	
	f	%	f	%	f	%	f	%
Gender								
Male	21	37,5	20	37,7	7	13,5	10	17,9
Female	35	62,5	33	62,3	45	86,5	46	82,1
<b>Total</b>	<b>56</b>	<b>100</b>	<b>53</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>56</b>	<b>100</b>
Age								
Late adolescence (17-20 y.o)	-	-	3	5,7	36	69,2	55	98,2
Young adult (21-23 y.o)	56	100	50	94,3	16	30,8	1	1,8
<b>Total</b>	<b>56</b>	<b>100</b>	<b>53</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>56</b>	<b>100</b>
Participating in a disaster response organization								
Yes	13	23,2	18	34,0	16	30,8	13	23,2
No	43	76,8	35	66,0	36	69,2	43	76,8
<b>Total</b>	<b>56</b>	<b>100</b>	<b>53</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>56</b>	<b>100</b>
Having the volunteering experience								
Yes	10	17,9	6	11,3	7	13,5	7	12,5
No	46	82,1	47	88,7	45	86,5	49	87,5
<b>Total</b>	<b>56</b>	<b>100</b>	<b>53</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>56</b>	<b>100</b>
Having an earthquake experience								
Yes	47	83,9	40	75,5	42	80,8	39	69,6
No	9	16,1	13	24,5	10	19,2	17	30,4
<b>Total</b>	<b>56</b>	<b>100</b>	<b>53</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>56</b>	<b>100</b>

(source: primary data 2017)

### Preparedness level for students from the class of 2013-2016

The results of data analysis using descriptive statistics indicated that the preparedness level of students from each class was as follows:

**Table 2 preparedness level distribution among students**

Class of		Indicators									
		Knowledge of earthquake		Emergency response plan		Disaster warning system		Resource mobilization		Overall preparedness	
		F	%	F	%	f	%	f	%	F	%
<b>2013</b>	High	39	69,6	9	16,1	22	39,3	35	62,5	7	12,5
	Fair	13	23,2	9	16,1	22	39,3	16	28,6	25	44,6
	Low	4	7,1	38	67,9	12	21,4	5	8,9	24	42,9
	<b>Total</b>	<b>56</b>	<b>100</b>	<b>56</b>	<b>100</b>	<b>56</b>	<b>100</b>	<b>56</b>	<b>100</b>	<b>56</b>	<b>100</b>
<b>2014</b>	High	<b>41</b>	<b>77,4</b>	9	17,0	23	43,4	18	34,0	8	15,1
	Fair	5	9,4	8	15,1	20	37,7	7	13,2	14	26,4
	Low	7	13,2	36	67,9	10	18,9	28	52,8	31	58,5
	<b>Total</b>	<b>53</b>	<b>100</b>	<b>53</b>	<b>100</b>	<b>53</b>	<b>100</b>	<b>53</b>	<b>100</b>	<b>53</b>	<b>100</b>
<b>2015</b>	High	25	48,1	8	15,4	14	26,9	8	15,4	5	9,6
	Fair	22	42,3	9	17,3	23	44,2	7	13,5	10	19,2
	Low	5	9,6	35	67,3	15	28,8	<b>37</b>	<b>71,2</b>	37	71,2
	<b>Total</b>	<b>52</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>52</b>	<b>100</b>	<b>52</b>	<b>100</b>
<b>2016</b>	High	28	50,0	7	12,5	11	19,6	12	21,4	4	7,1
	Fair	19	33,9	10	17,9	<b>28</b>	<b>50,0</b>	7	12,5	5	8,9
	Low	9	16,1	<b>39</b>	<b>69,6</b>	17	30,4	<b>37</b>	<b>66,1</b>	<b>47</b>	<b>83,9</b>
	<b>Total</b>	<b>56</b>	<b>100</b>	<b>56</b>	<b>100</b>	<b>56</b>	<b>100</b>	<b>56</b>	<b>100</b>	<b>56</b>	<b>100</b>

(Source : primary data (2017))

Table 1 showed the data from the class of 2016. Most of the students, 46 students or 17.9% of the total respondents were female and the majority of respondents, 55 students or 98.2% of the total respondents, had an age range of 17-20 years old (late adolescence). As many as 43 students or 76.8% of the total respondents did not join the organization and the majority of respondents, 87.5% of the total respondents, had no experience of volunteering. Furthermore, the majority of the respondents, 39 students or 69.4% of them, had experienced an earthquake.

Based on Table 2, it can be seen that the parameters of knowledge and attitudes towards earthquake risk had a high-level of preparedness category. To be specific, the class of 2014 had the highest level of preparedness compared to other classes, as many as 41 students or 77.4% of the total respondents. Emergency response plan parameters had a low-level preparedness category, especially from the class of 2016 with 39 students or 69.6% of the total respondents. The disaster warning system had a level of preparedness in the good category. The class of 2016 had the highest category in this parameter compared to other classes with 28 students or 50% of the total respondents.

The resource mobilization parameter had a low level of preparedness. Among the class of 2013-2015, the class of 2015 and 2016 had the lowest level of preparedness. There were 37 students or 71.2% of the total respondents in the class of 2015 and 37 students or 66.1% of the total respondents in the class of 2016 who obtained a low level of preparedness.

According to the results of data analysis on each parameter using preparedness index formula, the results of earthquake preparedness for nursing science students at Universitas Muhammadiyah Yogyakarta can be concluded to be in a low level of preparedness. The class of 2016 had the lowest

preparedness level among others with 47 students or 83.9% of the total respondents.

## **DISCUSSIONS**

### **A. Knowledge and attitude towards disaster risk**

The analysis from Table 2 indicates that the parameters of knowledge and attitude towards disaster risk were in high category, especially in the class of 2014 with 41 students or 77.4% of the total respondents. Most of the students in the class of 2014 were activists of disaster response organizations. According to a study conducted by Masyudi & Rizki (2016), disaster organizations have training programs to deal with disasters. Thus, individuals who are active in disaster response organizations have more opportunities to gain knowledge in dealing with disasters.

Table 1 showed that 75% of the total respondents in the class of 2014 had experienced an earthquake disaster. The more often a person is exposed to disasters, the more knowledge and attitudes he has towards a disaster. Respondents who had experienced earthquakes had a high level of preparedness in knowledge and attitudes towards disaster risk. Disasters experience or events that had been experienced by individuals can stimulate individuals to understand the process of dealing with disasters. Therefore, it can affect the process of disaster preparedness, especially on knowledge and attitude to face disaster risk (Becker et al., 2017).

### **B. Emergency response plan**

The emergency response plan in this study included organizing evacuations such as determining evacuation assembly points and communication related to disaster management institutions. Based on Table 2, the results of the emergency response plan preparedness level for the nursing science students of Universitas Muhammadiyah Yogyakarta were in a low category. The class of 2016 had the lowest level of emergency preparedness plan among others where 69.6% of

the total respondents in the class of 2016 had a low level of preparedness parameter. It indicates that organizing evacuations such as determining evacuation and communication assembly points relating to disaster management institutions had not been going well at the Nursing Study Program of Universitas Muhammadiyah Yogyakarta.

A study by Nakao, Kawasaki & Ohnisiaa (2019) concluded that the lack of community preparedness was due to the lack of available evacuation facilities such as evacuation sites or assembly points and inadequate collaboration between evacuation systems. Based on the observations of the researchers at the Nursing Study Program, lecture building did not have an assembly point location. Meanwhile, according to a previous study by Nuraini (2018), assembly point in public facilities such as schools are very important. The assembly point is useful for evacuating students and teachers to a safe place during an earthquake.

### C. Disaster warning system

Disaster warning system parameters in this study had two indicators, namely knowing the source of disaster warning information in the learning environment and knowing both traditional and modern equipment that can be used for warning when a disaster occurs. Table 2 showed that most nursing science students at Universitas Muhammadiyah Yogyakarta had a good category of preparedness in the disaster warning system, especially in the class of 2015. Among the other classes, the class of 2015 had the most students or 50% of the total respondents, who had a good category of preparedness level. It indicates that students have sufficient understanding of disaster warning and understand the equipment that can be used as a warning sign of disaster.

The preparedness level in the disaster warning system can be influenced by culture or local wisdom of the surrounding community. The community around the research site has used clams and rang the bell/siren as a disaster warning system.

Indonesian have been implementing disaster warning systems using sirens, slit drums (*kentongan*), and other means of delivering information or warnings when an earthquake disaster occurs (Hidayat & Andi, 2017). The culture makes students understand or learn related to the existing disaster warning system in the environment around them. Also, a study conducted by Herminingrum & Esti (2016) concluded that local wisdom has an important role in mitigation, especially for the disaster warning system.

Local wisdom can be applied as an effective instrument in disaster risk reduction in a community (Zulfadrim et al., 2018). Therefore, through the culture that exists in Indonesian society, students can understand the existing disaster warning system in the surrounding environment. Additionally, they also get to know the equipment that can be used as a disaster warning system.

### D. Resource mobilization

The parameter of resource mobilization capability used in this study was measured using indicators of participation in disaster-related training, seminars, or meetings. Table 2 presented the finding of resource mobilization preparedness level for students of nursing science students at Universitas Muhammadiyah Yogyakarta. The findings showed that the students were in a low category, especially in the class of 2016 and class of 2015. They had the lowest level of preparedness among others. It indicates the low participation of students in conducting disaster management training. This finding is in line with a study by Wulansari, Darumurti, & Eldo (2017) which stated that people with low interest in participating in disaster management training have low disaster management skills causing low human resources in the community. Disaster management training for communities is one of the significant ways to improve resilience and the quality of community human resources in dealing with a disaster (Carone, 2019)

#### **E. Students' preparedness level in facing an earthquake**

Table 2 presented the analysis on the measurement of nursing science students' level of earthquake disaster preparedness through four parameters, namely knowledge and attitude, emergency response plans, disaster warning system, and the ability to mobilize resources and the results of the preparedness level to face disasters. Nursing science students of Universitas Muhammadiyah Yogyakarta were categorized in the low level, especially those in the class of 2016, which had the lowest level of preparedness among others.

In this study, students' preparedness level was seen from a number factors such as training and simulation of disaster management for students to take part in, experiences of students volunteering in disasters, policies related to disaster to disaster preparedness programs, and infrastructure facilities that support the creation of a disaster preparedness community.

The first factor was the training and simulation of disaster management participated by students. The resource mobilization parameter achieved a low category. It indicates that students were less active in participating in the training and simulation of disaster management.

Training and simulation are very important. Even though students have a high level of knowledge and attitude towards disaster risk, they do not affect students' preparedness. This finding is in line with the research results of Adenekan, Balogun, & Inem (2016) stating that even though knowledge and attitude towards disaster risk are included in the high category, they will not be influential in increasing the disaster preparedness if they are not followed by adequate training or disaster simulation. Furthermore, previous studies by Watkins et al. (2019) and Tan et al. (2017) explain that training and simulations carried out routinely can improve one's skills as well as confidence in

dealing with disasters. Training can be optimal if it is followed by a simulation to test the community's readiness in dealing with disasters.

Previous studies by Xia et al. (2016) and Kaufman et al. (2017) explain that simulations can increase student preparedness because simulations can improve teamwork, problem-solving, and increase confidence in playing an active role in dealing with disasters. Additionally, simulations can also improve skills in carrying out the Incident Command System (ICS) on disasters. Thus, individuals will get a better understanding of how to coordinate in a disaster and be ready to face a disaster.

The second factor was the students' experience in disasters volunteering. It can be seen through the characteristics of respondent data in table 1. Most of the students, 49 students or 87.5% of the total respondents in the class of 2016, did not have the experience of volunteering in a disaster. Whereas, being a volunteer in a disaster can increase preparedness for students since volunteers are the first person to rescue a disaster victim. A study by Pedersen et al. (2016) explained that individuals who have experience becoming volunteers (Rescue Team) tend to have a good level of preparedness and have a good coping mechanism in dealing with post-disaster trauma. Hence, lack of experience in volunteering in a disaster can cause a low level of preparedness for students in facing an earthquake.

Students' low preparedness level is the absence of policies or Standard Operating Procedures (SOP) in dealing with disasters. The absence of policies and SOP can make students do not understand the procedures in dealing with disasters leading to a low level of students' preparedness.

Besides, in his study, Taufik (2016) also explained that school policy has an important role in a school located in a disaster-prone area. Through the implementation of school policy, it can instill

resilience or preparedness of students, teachers, and other stakeholders in dealing with disasters.

The last factor was the available disaster management facilities and infrastructure. Based on the observation, it was found that there was no evacuation route plan, evacuation assembly point, and disaster warning signs when a disaster occurs. Meanwhile, the facilities and infrastructure for disaster management in a community is a supporting factor for the creation of a community prepared for disaster.

The importance of facilities and infrastructures in a community is also explained in Takahashi's research (2016), which stated that complete school facilities and infrastructures could support the creation of a disaster preparedness community. In addition to being access to education, schools also function as social security for the community. It means that the school has a function as a shelter or evacuation place for people affected by the disaster. Thus, the availability of emergency management facilities and infrastructure is essential in a school.

## CONCLUSIONS

1. Most respondents have a high level of category preparedness for the parameters of knowledge and attitudes towards disaster risk.
2. Most respondents have a low level of preparedness category for emergency response plan parameters.
3. Most respondents have medium category preparedness for disaster warning system parameters.
4. Most respondents have a low level of preparedness category for resource mobilization parameters.
5. Most respondents have a low level of category preparedness in dealing with earthquake disasters.

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