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Disaster knowledge, preparedness, and risk reduction: a comparative study of education and health students

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Abstract
Positioned as liaisons, future teachers and nurses turn disaster theory into community practice. This study aims to compare the knowledge level, preparedness, and disaster risk reduction between education students and health students.. The research approach uses quantitative methods with surveys as a data collection technique. The sample consisted of 84 students of the Social Studies Education Study Program of UIN Maulana Malik Ibrahim Malang and 93 students of the Nursing Study Program of Kepanjen University who were selected using the Slovin formula with an error rate of 5%. The research instruments included a four-point Likert scale questionnaire to measure disaster preparedness and risk reduction, as well as a multiple-choice test to assess disaster knowledge. The data was analyzed using percentage descriptive statistics. The results of the study showed differences between the two groups. Education students obtained the highest average scores in the aspect of disaster knowledge, while health students excelled in the aspects of disaster preparedness and risk reduction. These findings indicate that education students are superior in mastering theoretical concepts of disasters, while health students have better preparedness and practical skills in handling disaster situations because health students are more focused on practice than education students who are more theoretical. The next study is suggested to review differences based on gender and add variables of field experience and educational institution support in improving students' disaster preparedness.

Keywords:
Disaster Knowledge; Disaster Preparedness; Disaster Risk Reduction; Education Students; Health Students

A. INTRODUCTION

Globally, Indonesia is considered one of the countries most vulnerable to natural hazards. Indonesia's geological vulnerability to earthquakes and volcanoes is a direct result of its position at the intersection of three of the Earth's major tectonic plates (Isnaeni et al., 2022; Sutrisno et al., 2022). In addition, Indonesia's location in the tropics with high rainfall, high humidity, and extreme weather patterns increases the risk of hydrometeorological disasters, such as floods, landslides, tropical storms, and river avalanches (Aeni & Khoirul Anwar, 2024; Hendrawan et al., 2025; Putri et al., 2021). The diversity of landscapes ranging from coastal lowlands to high mountains also affects the vulnerability of each region specifically, so each region has different risk characteristics. This condition confirms that Indonesia faces the dual challenge of high geological and hydrometeorological disaster risk so that it requires a comprehensive mitigation and preparedness approach.

Although disaster vulnerability in Indonesia has been widely known through various geological, climatological, and historical studies, the level of community preparedness is still very low. This is supported by research Rayawan et al. (2021), Ma'muri et al. (2025), and Gan et al. (2021) which explains that there are still many individuals and communities who do not have an adequate understanding of disaster mitigation measures, evacuation procedures, and disaster risk reduction strategies. Public knowledge tends to be limited to personal experiences, local practices, or local traditions, so when disasters occur, the response is often not optimal (Koopman, 2023). This condition may produce further social, economic, and psychological losses, especially for the people who live in rural or illiterate areas.

Lack of sparse disaster mitigation education and training directly contributes to reduced low disaster risk reduction in the community. Preparedness actions or emergency planning, such as household evacuation plans, disaster drills, or local infrastructure enhancement, have not been implemented in most communities (Hermawan et al., 2024; Shmueli et al., 2021; Sufri et al., 2020). As a result, people are still exposed to property damage, economic loss, and mental trauma. Therefore, effective and sustainable disaster risk reduction education is a pressing requirement to enhance community capacity in actively caring for disaster risks.

Apart from that, disaster mitigation process in Indonesia is still centered on certain stakeholders such as the government, disaster management bodies, and social organizations with certain capacities (Hermawan et al., 2024; Putra & Matsuyuki, 2020; Rahmafitria et al., 2021; Sarjito, 2023). Disaster mitigation training and education programs for the public are still irregular, unsustainable, and barely reach the most vulnerable small villages or communities (Achmad, 2023; Fuady et al., 2021; Triyanti et al., 2022). Most citizens thus do not have appropriate practical skills to handle emergency cases, and access to disaster mitigation information is significantly limited. It is an indication of a mismatch between the great risk of disasters and the capacity of communities to recover and minimize their impacts efficiently.

As of 2023, according to the National Disaster Management Agency (BNPB) data, while 5,400 disasters did occur, very few communities have evacuation procedures or conduct disaster drills (Tripa, 2024). Research by Dewi & Kurniawan (2025) and Ruslanjari et al. (2023) revealed that the level of public knowledge related to hydrometeorological disaster mitigation only reaches 40-50%, while the understanding of geological disasters is lower, around 25-30%. Other research also shows that disaster mitigation education programs carried out by the government or non-governmental institutions have not reached all villages, so the gap in information and skills is still high (Hoffmann & Blecha, 2020; Husna et al., 2021; Kusumastuti et al., 2021). These empirical findings confirm the need for a more systematic and community-based educational approach, so that people not only have theoretical knowledge, but also are able to implement real risk mitigation and reduction measures, so that the level of vulnerability to disasters can be significantly reduced.

In this context, prospective students of the teacher and nursing study program have a strategic role as disaster mitigation education agents, because they are in a position of liaison between academic knowledge obtained through higher education and real practice in the community. This positions them well as brokers who can interpret disaster mitigation theory into practice that can be undertaken at the school and community level. Student teachers, specifically prospective social studies teachers, have a role in providing disaster mitigation literacy to students from an early age, promoting awareness of hazards, and teaching basic skills in disaster management, from evacuation drills to disaster simulation (Bakhriansyah et al., 2025; Faizin et al., 2025). Through an integrated approach that engages the minds, attitudes, and physical skills of students, this educational experience encourages the internalization of a culture of readiness so that they become agents of change in their immediate locality.

Meanwhile, health students as future primary health workers have a specific role to support disaster mitigation through public health education, first aid, health management in emergencies, and early psychological recovery (Kartika, 2021; Susilo et al., 2025). t is important that these two groups of students are engaged in the process of developing a comprehensive disaster preparedness culture, as they are able to disseminate disaster mitigation information

systematically both in the school environment and in the broader community. According to research, there are disparities in the ability of students, including the absence of formal training, field practice, and availability of disaster mitigation literature (Kamaruddin, 2025; Saepudin et al., 2025). This inequality underscores the need for more structured and sustained education interventions so that students can play their optimum role as effective disaster mitigation education agents, build community resilience, and reduce actual disaster risk.

Several studies have shown that academic background affects students' capacity to deal with disasters. Research by Jafar (2024) and Hadi et al. (2019) Explained that students with a focus on geography and environmental aspects have a higher level of preparedness and knowledge of disaster mitigation, especially in risk identification and evacuation planning. On the contrary, the results of the research by Pratama & Setiawan (2025) It shows that students who focus more on social education and humanities excel in their ability to deliver disaster mitigation education through contextual approaches and project-based learning, although their technical understanding of emergency response procedures is still limited. Although these differences have been studied, there is still little research that directly compares the two groups in terms of disaster knowledge, disaster risk reduction, and disaster preparedness in prospective social studies and health teachers. Therefore, this study aims to analyze the comparison of the percentage of social studies teacher students and health students related to disaster preparedness, disaster risk reduction, and disaster knowledge.

B. METHODS

This study employs a quantitative research methodology, utilizing a survey for data collection. The research sample was divided into two groups, namely students of the Social Science Education Study Program of the State Islamic University of Maulana Malik Ibrahim Malang and students of the Nursing Study Program of Kepanjen University. The selection of the location was carried out purposively by considering the Greater Malang area as an area relevant to the context of disaster research. The research subjects included 141 social studies education students of Islamic University of Maulana Malik Ibrahim Malang who were taking the Disaster Geography course and 160 Nursing students of Kepanjen University who were taking the Emergency course. The determination of the number of samples was carried out using the Slovin formula with an error rate of 5%, so that 84 respondents from the Social Studies Education Study Program and 93 respondents from the Nursing Study Program were obtained, with a total of 177 students.

The data of this study was collected through two instruments, namely a four-point Likert scale questionnaire (1 = strongly disagree to 4 = strongly agree) for the variables of disaster preparedness and disaster risk reduction. Multiple-choice test for disaster knowledge variables. The disaster preparedness questionnaire instrument uses indicators of (1) knowledge and attitudes towards disaster risk, (2) family policies or guidelines, (3) emergency planning, (4) early warning system, and (5) resource mobilization (Hasna et al., 2023). The disaster risk reduction instrument uses indicators of (1) participation in training, (2) knowledge of vulnerable areas, (3) awareness of the importance of disaster-resistant infrastructure, (4) projection of disaster events, (5) knowledge of evacuation routes, and (6) involvement in disaster simulation (Syaifulloh et al., 2023). Meanwhile, the disaster knowledge test instrument includes indicators (1) definition and type of disaster, (2) causes and impacts, (3) mitigation strategies, (4) emergency preparedness and response plans, and (5) policies and resource mobilization (Aprilia 2018). Each instrument has gone through a validity and reliability test process. The results of the validity and reliability test of the questions can be seen in Table 1 and Table 2.

Table 1. Variable Validity Test Results

No	Disaster Knowledge	Disaster Preparedness	Disaster Risk Reduction	R_{table} (N=32)	Decision
1.	0.578	0.794	0.611	0.3388	Valid
2.	0.558	0.726	0.482	0.3388	Valid
3.	0.506	0.767	0.491	0.3388	Valid
4.	0.479	0.664	0.673	0.3388	Valid
5.	0.429	0.614	0.461	0.3388	Valid
6.	0.440	0.561	0.492	0.3388	Valid
7.	0.477	0.599	0.366	0.3388	Valid
8.	0.542	0.729	0.611	0.3388	Valid
9.	0.383	0.424	0.358	0.3388	Valid
10.	0.613	0.596	0.442	0.3388	Valid
11.	0.739	0.579	0.684	0.3388	Valid
12.	0.813	0.699	0.437	0.3388	Valid
13.	0.510	0.655	0.628	0.3388	Valid
14.	0.569	0.747	0.594	0.3388	Valid
15.	0.596	0.643	0.595	0.3388	Valid
16.	0.339	0.690	0.620	0.3388	Valid
17.	0.589	0.486	0.565	0.3388	Valid
18.	0.752	0.740	0.573	0.3388	Valid
19.	0.343	0.696	0.522	0.3388	Valid
20.	0.702	0.771	0.558	0.3388	Valid
21.	0.362	0.669	0.653	0.3388	Valid
22.	0.585	0.721	0.491	0.3388	Valid
23.	0.364	0.438	0.524	0.3388	Valid
24.	0.601	0.658	0.662	0.3388	Valid
25.	0.752	0.762	0.384	0.3388	Valid
26.	-	-	0.455	0.3388	Valid
27.	-	-	0.413	0.3388	Valid
28.	-	-	0.465	0.3388	Valid
29.	-	-	0.328	0.3388	Valid
30.	-	-	0.404	0.3388	Valid

Source: Data Processed

Based on Table 1, the validity test results show that all items of the Disaster Preparedness (25 Statements) and Disaster Risk Containment (30 Statements) questionnaires were declared valid because the validity value exceeded the Table. Furthermore, the entire item of disaster knowledge questions (25 questions) was also declared valid.

Table 2. Variable Reliability Test Results

No.	Variables	Cronbach's Alpha
1.	Disaster Knowledge	0.896
2.	Disaster Preparedness	0.973
3.	Disaster Risk Reduction	0.903

Source: Data Processed

Furthermore, a reliability test was carried out to test questionnaires and questions periodically. Based on table 2, the reliability results for all variables are declared reliable because they have exceeded the minimum limit with a value of 0.7.

Furthermore, the data was analyzed using descriptive statistics in the form of percentages to make comparisons, with categorization referring to Kosasih (2017). The categories of disaster preparedness, disaster risk reduction, and disaster knowledge levels are very high, high, medium, low, and very low. The complete categorization criteria are presented in Table 3.

Table 3. Categorization of Variable Percentage Decisions

Interval	Category
85,01 – 100	Very High
75,01 – 85,00	High
65,01 – 75,00	Moderate
55,01– 65,00	Low
<55,00	Very Low

Source: Data Processed

C. RESULT & DISCUSSION

The results of the assessment analysis of education students and health students showed the average score and achievement category for each indicator measured. Based on the data obtained, it can be seen that there is a variation in achievement in each aspect assessed. Full details about the average scores, categories, and interpretation of the achievements of each indicator can be seen in the following table.

Table 4. Results of Disaster Knowledge Data Analysis

Indicators	Education Students	Category	Health Students	Category
Disaster mitigation	76.43	High	68.39	Moderate
Causes of disasters	75.71	High	52.04	Very Low
Emergency	68.10	Moderate	53.12	Very Low
Evacuation	66.67	Moderate	58.06	Low
Recovery	70.24	Moderate	58.49	Low
Average	**71.43**	**Moderate**	**58.02**	**Low**

Source: Data Processed

Based on Table 4, it can be seen that education students have higher achievements than health students in all disaster indicators. The average score of education students reached 71.43 in the moderate category, while health students obtained an average of 58.02 in the low category. These results show that the level of disaster literacy of education students is relatively better. Furthermore, it is presented with data analysis on the disaster preparedness variables in table 5.

Table 5. Results of Disaster Preparedness Data Analysis

Indicators	Education Students	Category	Health Students	Category
Knowledge and Attitude to Disaster Risk	76.49	High	78.92	High
Family Preparedness Policy or Guide	68.45	Moderate	74.52	Moderate
Plans for Emergencies	72.38	Moderate	73.55	Moderate
Disaster Warning System	72.86	Moderate	76.18	High
Resource Mobilization	68.57	Moderate	74.19	Moderate
Average	**71.75**	**Moderate**	**75.47**	**High**

Source: Data Processed

Based on Table 5, the results of the analysis show that health students have higher average achievements than education students in the aspect of disaster preparedness. The average score of health students reached 75.47 with the high category, while education students obtained an average of 71.75 with the medium category. These results indicate that health students show better disaster preparedness than education students. Furthermore, it is presented with data analysis on the variable of disaster risk reduction in table 6.

Table 6. Results of Disaster Risk Reduction Data Analysis

Indicators	Education Students	Category	Health Students	Category
Participate in disaster-related training	65.30	Moderate	74.68	Moderate
Knowing disaster-prone areas	72.68	Moderate	75.43	High
Recognizing the importance of disaster-resilient infrastructure	77.44	High	78.23	High
Able to project future disaster events	76.01	High	76.61	High
Knowing the evacuation route	65.77	Moderate	74.68	Moderate
Participating in a disaster drill or simulation	70.83	Moderate	78.06	High
Average	**71.34**	**Moderate**	**76.28**	**High**

Source: Data Processed

Based on Table 6, the results of the analysis show that health students have a higher level of disaster risk reduction than social studies education students. The average score of health students reached 76.28 in the high category, while social studies education students obtained an average of 71.34 in the medium category. These results show that health students are better prepared and have better practical awareness in disaster risk reduction activities, while social studies education students need to be strengthened in field experience and direct participation in training and disaster simulations.

Based on the results of the above analysis, it shows that the difference in the level of preparedness and disaster risk reduction between education students and health students is influenced by several interrelated empirical factors. Scientific background and practical experience in disaster management, where health students tend to be more often involved in field activities, training, and disaster simulations that emphasize emergency response and rescue skills. These findings are in line with the studies carried out by Hawsawi et al. (2025), Ashcroft et al. (2021), Ghahremani et al. (2022), and Patel et al. (2023) that claims that the size of student engagement in disaster simulation and training has a tangible influence on the level of preparedness. Other articles by Guo et al. (2025) and Aslanoğlu et al. (2024) It also points out that health education systematically embeds awareness of mitigation and disaster management practices through field practice, resulting in operational preparedness enhancing.

In addition to that, Kim et al. (2022) and Shubayr & Dailah (2025) states that health students are more self-efficacious as they are used to undergoing training that demands precision and calmness. Perpiñá-Galvañ et al. (2021) also stated that the integration of disaster curriculum into health education is attributed to greater readiness and emergency response skills than other fields. Parallel findings by Bajow et al. (2022) and Li et al. (2022) It also proved that simulation training improves not just technical competencies in evacuating patients, but also interdisciplinary communication and crisis management. On the other hand, the superiority of education students in disaster knowledge is a characteristic of curriculum that is based on reflective, interdisciplinary, and conceptual teaching.

Education students are often prepared to understand disasters as complex social phenomena, including economic, cultural, and environmental dimensions (Gokmenoglu et al., 2023). Studies by Righi et al. (2021), Tasantab et al. (2021), and Hung et al. (2021) it was found that students with particular disaster curricula, such as health and nursing students, were more satisfactory in preparedness in practice, while education students excelled at studying fundamental disaster theories and concepts. This is supported by research conducted by Sugiyanto et al., 2024) and Didham & Ofei-Manu (2020) which shows that education students possess a greater theoretical understanding of disaster mitigation and adaptation because their learning style is more inclined towards conceptual and reflective studies.

Petraroli & Baars (2022) and Park (2020) also created that education students are able to more accurately explain the connection between knowledge about disasters and the socio-cultural environment of the community even though they are less versed in the technical

procedures in the field. The study of Karrow & DiGiuseppe (2020) even stated that education students were more theory-based disaster literate than non-education students, specifically with regard to understanding the causes of disasters and educational approaches to prevent them.

D. CONCLUSION

Based on data analysis, it can be concluded that there is a difference in achievement between education students and health students in three main aspects of disasters. In the aspect of disaster knowledge, education students had a higher average score with a score of 71.43 (moderate category) compared to health students with a score of 58.02 (low category), which shows their conceptual literacy is better. On the other hand, in the aspect of disaster preparedness, health students excelled with an average of 75.47 (high category) compared to education students of 71.75 (moderate category), indicating that their response and readiness abilities were stronger. Similar can be seen in the aspect of disaster risk reduction, where health students again show higher achievements with an average score of 76.28 (high category) compared to education students with an average score of 71.34 (moderate category). Overall, education students excel in theoretical mastery and conceptual understanding, while health students excel in disaster preparedness practices and field applications.

The suggestion for the next study is to conduct a comparison based on gender to find out the difference in the level of knowledge, preparedness, and disaster risk reduction between male and female students. In addition, subsequent research can also add other relevant variables, such as experience in dealing with disasters, participation in disaster training, and the role of educational institutions in improving students' disaster preparedness.

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