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CHILDREN'S PREPAREDNESS FOR EARTHQUAKE AND TSUNAMI DISASTERS

Istinengtiyas Tirta Suminar*, Diah Nur Anisa, Hamudi Prasestiyo

Nursing Department of Faculty of Health Science, Universitas Aisyiyah Yogyakarta; Center of Woman, Family, and Disaster Studies
*Email: istinengtyas.ts@unisayogya.ac.id

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Abstract

Objective: This study aimed to assess the level of disaster preparedness among elementary school students in facing earthquake and tsunami risks at SD Muhammadiyah Mertosanan Kulon, Banguntapan, Bantul.

Methods: A quantitative descriptive research design was employed, involving 80 students from Grades 4 and 5, selected through total sampling. Data were collected using a validated questionnaire developed by the Indonesian Institute of Sciences (LIPI), consisting of 31 items related to disaster preparedness indicators: knowledge, emergency planning, early warning systems, and resource mobilization. Data analysis was conducted using univariate descriptive statistics.

Results: The results indicated that the majority of respondents were categorized as "Prepared" (82.5%), followed by "Almost Prepared" (10%), and "Very Prepared" (7.5%). None of the students were in the "Not Prepared" category overall. However, for the resource mobilization indicator, preparedness levels were split, with 30% categorized as "Very Prepared" and 30% as "Not Prepared." These findings highlight a need for targeted training in disaster management skills, particularly in the efficient use of resources during emergencies.

Keywords: children; disaster education; earthquake; elementary school; Indonesia; preparedness; tsunami;

INTRODUCTION

Indonesia is geographically located at the intersection of four major tectonic plates: the Australasian Plate, Pacific Plate, Eurasian Plate, and the Philippine Plate. This condition makes Indonesia highly prone to geological hazards. The country also has 5,590 river basins and 129 active volcanoes, which increases the risk of natural disasters such as earthquakes, tsunamis, volcanic eruptions, and landslides (Dinas Ketahanan Pangan Provinsi Jawa Tengah, 2017).

Indonesia's climate is heavily influenced by its geographical location, spanning from the Pacific Ocean to the Indian Ocean. It experiences three main climate patterns: monsoonal, equatorial, and localized systems, all contributing to increased rainfall. These climatic conditions also raise the risk of various disasters such as floods, flash floods, tornadoes, extreme weather, high waves, coastal abrasion, and forest fires (Dinas Ketahanan Pangan Provinsi Jawa Tengah, 2017). According to Law No. 24 of 2007 on Disaster Management, preparedness refers to a series of activities aimed at anticipating disasters through organized and effective action (Riska & Yulianti, 2023).

Everyone is at risk of potential disaster impacts. Therefore, shared roles and responsibilities across all societal levels are necessary to enhance preparedness, especially among children.

Children are a vulnerable group at high risk of disaster impacts. According to data from the National Disaster Management Agency (BNPB), in 2,000 disaster cases across Indonesia in 2016, the majority of victims were children and the elderly. Limited knowledge of disaster mitigation makes children unprepared to face emergencies. Those who survive may experience trauma and psychological distress. As disasters can occur at any time, children must be prepared to face them (Humsona et al., 2019).

Statistics show that approximately 66 million children worldwide are affected by disasters annually. When children have adequate knowledge about disasters, a nation can develop a disaster-resilient generation. Research in 2023 found that two elementary schools in East Java experienced tornadoes that damaged school buildings. No casualties occurred because these schools had already received effective disaster mitigation education (Qodir et al., 2023).

Children's ability to adapt during disasters depends on interconnected support systems, including family, school, community, and policy sectors. Multisystem resilience is crucial for reducing risk and enhancing disaster preparedness in both short- and long-term contexts (Masten, 2021).

Given this context, it is essential to improve disaster preparedness, especially for vulnerable groups such as children, by increasing knowledge and awareness. This can be achieved by understanding local hazards, early warning systems (evacuation routes and plans), participating in disaster mitigation training, and engaging in preparedness activities (Riska & Yulianti, 2023). SD Muhammadiyah Mertosanan, located in Potorono, Banguntapan, Bantul, Yogyakarta, about 40 km from the city center, is prone to earthquakes. The school was affected by the 2006 Yogyakarta earthquake, which resulted in the highest casualties in Bantul Regency. This study aims to assess the preparedness level of students at SD Muhammadiyah Mertosanan in facing earthquake and tsunami disasters.

METHODS

This study used a quantitative descriptive design to assess the preparedness level of elementary school students in facing disasters. The variable studied was the preparedness of elementary-aged children for disaster events. The research was conducted at SD Muhammadiyah Mertosanan Kulon, Bantul.

The population consisted of all Grade 4 and 5 students at SD Muhammadiyah Mertosanan Kulon, totaling 80 students. Sampling used a non-probability total sampling method. Participants met the inclusion criteria: the ability to read and write well and willingness to participate as respondents. Exclusion criteria included students who were sick or absent during data collection.

The research instrument was a questionnaire with 31 items assessing disaster preparedness in the context of earthquakes and tsunamis. The questionnaire was adapted from the Indonesian Institute of Sciences (LIPI) and previously used in studies on community preparedness for earthquake and tsunami disasters. Preparedness

levels were categorized as follows: Very Prepared (71.5–95.3), Prepared (47.6–71.4), Almost Prepared (23.9–47.5), and Not Prepared (0–23.8). Data were analyzed using univariate analysis to determine the proportion or percentage for each variable. This study received ethical clearance from the Ethics Committee of Universitas 'Aisyiyah Yogyakarta on February 15, 2024, with reference number 3451/KEP-UNISA/II/2024.

RESULTS

Characteristics of Respondents

Table 1 presents the demographic and informational characteristics of respondents in this study, which consisted of 80 elementary school students from SD Muhammadiyah Mertosanan, Bantul, Yogyakarta.

Table 1. Characteristics of Respondents (n= 80)

No	Respondent Characteristics	Frequency	Percentage (%)
1	Age		
	9 years	6	7.5
	10 years	42	52.5
	11 years	32	40.0
2	Gender		
	Male	36	45.0
	Female	44	55.0
3	Education Level		
	Grade 4	44	55.0
	Grade 5	36	45.0
4	Sources of Disaster Information		
	School	54	68.0
	Print & Electronic Media	68	85.0
	Print Media (newspapers, posters, books)	36	45.0
	Electronic Media (radio, TV, internet)	76	95.0

Source: Primary Data (2024)

Based on Table 1, most respondents were 10 years old (52.5%), female (55%), and enrolled in Grade 4 (55%). Nearly all respondents obtained disaster-related information from electronic media (95%) and combined print and electronic sources (85%).

Children's Preparedness for Earthquake and Tsunami Disasters

Table 2 illustrates the overall preparedness level of students in facing earthquake and tsunami disasters.

Table 2. Student Preparedness for Earthquake and Tsunami Disasters

No	Category	Frequency	Percentage (%)
1	Very Prepared	6	7.5
2	Prepared	66	82.5
3	Almost Prepared	8	10.0
4	Not Prepared	0	0.0
	Total	80	100

Source: Primary Data (2024)

As shown in Table 2, the majority of respondents were in the "Prepared" category (82.5%), while a small portion were "Almost Prepared" (10%) and "Very Prepared" (7.5%). No respondents were classified as "Not Prepared."

Children's Preparedness Based on Specific Indicators

Table 3 outlines the preparedness levels per indicator, covering four key aspects: knowledge, emergency planning, early warning systems, and resource mobilization.

Table 3. Preparedness Levels per Indicator for Earthquake and Tsunami Disasters

Indicator	Category	Frequency	Percentage (%)
1. Knowledge of Disasters	Very Prepared	18	22.5
	Prepared	52	65.0
	Almost Prepared	8	10.0
	Not Prepared	2	2.5
2. Disaster Response Planning	Very Prepared	22	27.5
	Prepared	44	55.0
	Almost Prepared	14	17.5
	Not Prepared	0	0.0
3. Early Warning Systems	Very Prepared	6	7.5
	Prepared	28	35.0
	Almost Prepared	36	45.0
	Not Prepared	10	12.5
4. Resource Mobilization	Very Prepared	24	30.0
	Prepared	14	17.5
	Almost Prepared	18	22.5
	Not Prepared	24	30.0
	Total Respondents	80	100

Source: Primary Data (2024)

Based on Table 3, most respondents demonstrated Preparedness in disaster knowledge (65%) and disaster planning (55%). In contrast, 45% were "Almost Prepared" in the early warning systems category, and resource mobilization showed polar results, with 30% being "Very Prepared" and 30% "Not Prepared."

DISCUSSION

Based on Table 2, the level of preparedness among students at SD Muhammadiyah Mertosanan Kulon for earthquake and tsunami disasters indicates that the majority of respondents were in the "Prepared" category (82.5%). This finding is consistent with previous research conducted at the Faculty of Nursing, Universitas Padjadjaran Garut Campus, where 66.9% of 356 respondents were at a moderate preparedness level for earthquakes. This outcome may be influenced by respondents' exposure to information related to disaster preparedness, as shown in Table 1 (Fitriyani et al., 2021).

A lack of information from media sources can impact students' readiness. Media plays a critical role in stimulating student preparedness (Yusniawati & Suantika, 2020). Information dissemination via media has a significant influence on disaster risk reduction. Integrating platforms such as the internet, television, and radio into school curricula can foster behavioral changes (Wedawatta et al., 2016). These media serve as powerful, accessible tools for distributing information, potentially encouraging students to engage in discussions (Suprajitno, 2017).

The study found that nearly all respondents had received disaster-related information from schools and both print and electronic media. Access to information is crucial for improving preparedness. As Marlyono & Pasya, (2016) emphasized, information significantly influences readiness. Once informed, individuals can take proactive steps

to prepare for disasters. This supports our findings, where nearly all respondents were classified as "Prepared" for earthquakes and tsunamis.

In terms of disaster knowledge indicators, most respondents were also in the "Prepared" category. Knowledge is fundamental to disaster preparedness. According to LIPI UNESCO/ISDR (Nada et al., 2022) understanding disaster preparedness is essential for all individuals as it underpins readiness, especially for earthquakes.

Disaster knowledge can be acquired through school-based education. Disaster education is vital in raising children's awareness (Mermer et al., 2018). As awareness increases, children may transfer this knowledge to adults, enhancing community preparedness (Sakurai et al., 2018). Disaster education for children can be implemented in schools, kindergartens, child welfare centers, or other child-focused facilities. Schools play a crucial role in risk reduction by facilitating disaster education (Bandecchi et al., 2019). With appropriate policy frameworks, trained teachers, textbooks, and curricula, schools offer an ideal environment for preparing children for disasters. However, children's access to such resources can be limited by factors such as availability of schools, teachers, financial means, or social barriers including gender, socioeconomic status, or ethnicity (Bandecchi et al., 2019).

Regarding disaster planning indicators, the majority of respondents were in the "Prepared" category. Emergency disaster planning is essential for ensuring efficient and effective responses during emergencies, particularly in the critical first 24 hours, before external assistance arrives. Effective planning reduces casualties and includes provisions such as evacuation routes, assembly points, and rescue equipment (Erlia et al., 2017).

For early warning indicators, nearly half of the respondents were "Almost Prepared." Implementing early warning systems can be challenging during disasters. Therefore, in non-emergency times, efforts should focus on prevention, including the development of traditional and formal warning systems, even in regions with lower earthquake risk. Early warning systems help notify at-risk communities, enabling timely and appropriate response actions. These systems may be based on local wisdom—such as beating drums or calling the adhan—or formal government protocols, both of which aim to ensure community understanding and prompt action (Suradi et al., 2021).

In terms of resource mobilization, the findings were polarized, with nearly half of respondents classified as "Very Prepared" and another half as "Not Prepared." Resource mobilization involves managing human resources, funding, and infrastructure for emergency situations. Poor mobilization can impede preparedness (Istihora & Basri, 2020). At SD Muhammadiyah Mertosanan Kulon, resource mobilization challenges include limited skills in first aid, preparedness, and evacuation. When training is available, it is often attended by only a small group of individuals (Fitriyani et al., 2021).

CONCLUSION

Students' preparedness for earthquakes and tsunamis at SD Muhammadiyah Mertosanan Kulon, Banguntapan–Bantul, was generally high, with 82.5% classified as "Prepared", 10% as "Almost Prepared", and 7.5% as "Very Prepared." However, some respondents were still "Not Prepared" in the resource mobilization indicator. Therefore,

training and disaster management skill-building activities are needed within the school community to improve preparedness levels, particularly in the area of resource mobilization at SD Muhammadiyah Mertosanan Kulon, Banguntapan.

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CONFLICT OF INTEREST
The authors declare that there are no conflicts of interest related to the data presented in this manuscript or any affiliations with external parties.

AUTHOR CONTRIBUTIONS
Istinengtiyas Tirta Suminar: Conceptualization, proposal writing, ethics approval, data collection, data analysis, manuscript preparation.
Diah Nur Anisa: Proposal development, research permissions, data collection, manuscript writing.
Hamudi Prasestiyo: Data collection and data analysis.

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