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Knowledge Proficiency of Disaster Mitigation in Deaf Students

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Abstract. Indonesia is prone to natural disasters, and the deaf community is a particularly vulnerable group. Disaster education in schools is crucial for improving preparedness, especially for deaf students, and for achieving inclusive disaster risk reduction. This study aimed to assess the knowledge level of disaster mitigation among deaf students at Karya Mulia Inclusive Senior High School in Surabaya. Using a cross-sectional design and total sampling, 41 students from grades X to XII participated. A structured questionnaire was used to evaluate their disaster mitigation knowledge. Results revealed that 56.1% of students had poor knowledge, 43.9% had sufficient knowledge, and none demonstrated good knowledge. This highlights a critical gap in the integration of disaster education in special education settings. The study emphasizes the need for structured, disability-inclusive disaster education using adaptive media, visual aids, simulations, and teacher empowerment to improve preparedness among deaf students.

Keywords: disaster mitigation; knowledge; deaf student

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Introduction

Indonesia is exceptionally susceptible to natural disasters owing to its geographical position on the Pacific Ring of Fire and the intersection of three significant tectonic plates. The most prevalent disasters include hydrometeorological events such as floods, landslides, and forest fires, in addition to geological phenomena such as earthquakes and volcanic eruptions (BNPB, 2025). Natural disasters generate a multitude of potential challenges and affect communities in various ways. These repercussions are particularly pronounced among vulnerable populations, especially the deaf community.

The total number of disasters recorded in Indonesia amounted to 2,042, encompassing floods, extreme weather conditions, landslides, forest and land fires, tidal waves and coastal erosion, earthquakes, droughts, and volcanic eruptions. The ramifications of natural disasters are extensive, impacting both human lives and resulting in material and non-material losses. Specifically, 4,588,495 individuals were affected and displaced, 490 individuals sustained injuries, 298 fatalities were

reported, and 28 individuals were classified as missing. Infrastructure sustained significant damage, with 23,065 residential structures affected and 473 facilities compromised, including 278 educational institutions, 160 places of worship, and 35 healthcare establishments (Geoportal Data Bencana Indonesia, 2025).

The severity of the effects induced by seismic events underscores the imperative for disaster risk mitigation. The acquisition of knowledge and readiness among students serves as a critical foundation for alleviating the repercussions of earthquakes. The Sendai Framework 2015–2030 emphasizes the importance of comprehending disaster risk and bolstering disaster preparedness to facilitate effective responses, thereby highlighting the necessity for systematic disaster education within educational institutions. Such educational initiatives have demonstrated efficacy in enhancing student readiness through various programs, simulations, and meticulously designed learning materials (Hodson et al., 2024).

Global estimates suggest that roughly 70 million individuals are Deaf, while approximately 430 million individuals are affected by disabling hearing loss, a significant number of whom are children (Cooper et al., 2024). Research indicates that these demographics face multiple dimensions of vulnerability, including restricted access to disaster drills, challenges in comprehending evacuation directives, and systematic exclusion from preparedness strategy formulation (Abdulhalim et al., 2021; Cooper et al., 2024).

Knowledge serves as a fundamental element and a pivotal factor in disaster preparedness. It enhances individuals' attitudes and awareness towards disaster preparedness initiatives. Education is instrumental in facilitating effective disaster preparedness outcomes. Insufficient community readiness for disasters represents a significant contributor to increased disaster risk. Educational institutions function as key stakeholders in disaster risk reduction by serving as vital sources of knowledge and providers of disaster education. (Kurniawati, 2017). Assessing the awareness of deaf students regarding natural disasters constitutes an essential initial step in promoting inclusive disaster risk reduction. This research seeks to evaluate the extent of knowledge possessed by deaf students concerning natural disasters.

Methods

The research design used an analytical survey method with a cross-sectional approach. The study was conducted at Karya Mulia Surabaya's inclusive senior high school. The population in this study were all 41 students in grades X, XI, and XII. The sampling technique in this study was total sampling. The instrument in this study used a disaster mitigation knowledge questionnaire.

Result and Discussion

The research was conducted at Karya Mulia inclusive senior high school, focusing on the special needs of deaf students. The distribution of respondents' gender, age, education level, and knowledge is presented as follows:

Table 1. Distribution of Respondent Characteristics: Knowledge Level of Disaster Mitigation among Deaf Students Karya Mulia inclusive senior high school

Respondent Characteristics	**Frequency**	
	N	**%**
Gender		
Male	28	68,3
Female	13	31,7
Age		
Teenager	27	65,8
Adult	14	34,2
Education Level		

Grade X	7	17
Grade XI	16	39
Grade XII	18	44

(Primary data, 2025)

Table 1 shows that 28 (68.3%) male respondents and 13 (31.7%) female respondents. This indicates that the majority of respondents were male. Most respondents were teenagers (27 (65.8%), while 14 (34.2%) were adults. Most respondents were in grade 12, with 18 (44%), grade 11 were 16 respondents (39%), and the remaining 7 (17%) were in grade 10.

The data distribution reveals that among the 41 participants, a significant majority were male (68.3%) in contrast to female respondents (31.7%). This ratio underscores the preeminence of male students at Karya Mulia Inclusive Senior High School. According to Santrock (2018), males generally exhibit higher levels of physical activity during practical learning experiences, which can prove advantageous for simulations in the context of disaster mitigation. Numerous studies suggest that there are distinct differences in the learning styles and responses to disaster risks between men and women (Lestari & Wahyudi, 2021). Given the overrepresentation of males within the respondent group, it is plausible that more dynamic and simulation-oriented instructional methods may yield greater efficacy.

In regard to age demographics, a significant portion of the respondents comprised adolescents (65.8%), with the remaining participants being adults (34.2%). This distinction is crucial as the ability to comprehend and react to disasters is profoundly shaped by cognitive development. Erikson (1968) articulated that the adolescent phase represents a period of identity exploration, marked by the quest for self-identity, which includes the cultivation of environmental awareness and readiness for disaster situations.

In terms of educational level, respondents consisted of 10th grade students (17%), 11th grade students (39%), and 12th grade students (44%). This indicates that the majority of respondents were in the final year of special education. This educational level is relevant because the curriculum delivered in 11th and 12th grades typically covers more complex material and can address disaster issues, especially if teachers adapt the curriculum to the needs of students with special needs (UNESCO, 2020).

This data also suggests that understanding of disaster mitigation is likely influenced by educational level and age. XII-grade students, who are in their final year of education and more cognitively mature, are more likely to have a higher level of knowledge than tenth-grade students. Research by Nugraheni & Handayani (2021) emphasizes the importance of developing visual and kinesthetic-based learning media for deaf students, particularly in the context of disaster preparedness. Therefore, while educational level can influence knowledge, the appropriate learning approach is crucial.

The level of knowledge about disaster mitigation among deaf students Karya Mulia inclusive senior high school is shown in the table below:

Table 2. Frequency Distribution of Knowledge Levels of Disaster Mitigation among Deaf Students Karya Mulia inclusive senior high school.

Knowledge	**Frequency**	**Percentage (%)**
Poor	23	56,1
Sufficient	18	43,9
Good	0	0
Total	41	100,0

(Primary data, 2025)

Based on Table 2, of the 41 respondents, 23 (56.1%) had insufficient knowledge, 18 (43.9%) had sufficient knowledge, and no respondents were in the good knowledge category. This table shows that the majority of deaf students at Karya Mulia inclusive senior high school do not yet have an adequate understanding of disaster mitigation efforts.

This lack of knowledge can be caused by several factors. First, limited access to information for deaf students, who rely heavily on visual media and sign language. Research by Septiani et al. (2020) shows that deaf students face significant challenges in understanding disaster information if it is not presented through methods appropriate to their needs, such as motion-based visual videos, symbols, or live simulations.

Second, the suboptimal integration of disaster material into the special education curriculum is also a barrier. A study by Wahyuni and Arief (2021) revealed that many special schools in Indonesia have not systematically incorporated disaster preparedness content into their lessons, even though students with disabilities are considered a vulnerable group during disasters. The study of Setyowati et al. (2019), who stated that the preparedness of students with special needs is highly dependent on a participatory educational approach and the use of adaptive learning media. More inclusive and contextual disaster mitigation learning strategies are needed, such as the use of visual media, role-playing, regular evacuation drills, and training for teachers to understand the learning needs of deaf students.

Conclusion

Based on the analysis of respondent characteristics, these characteristics provide good potential for delivering disaster mitigation education through learning methods tailored to their learning styles and developmental levels. The results showed that the majority of deaf students had insufficient knowledge of disaster mitigation (56.1%) and none had a high level of knowledge. This indicates that disaster education efforts for students with disabilities, particularly those with hearing impairments, still need significant improvement.

Disability factors, limited adaptive learning media, and minimal teacher training in delivering disaster material inclusively are the main causes of students' low understanding. A structured and disability-friendly educational approach is needed, including the integration of disaster mitigation material into the official inclusive curriculum, the use of visual media and motion-based simulations, teacher and teaching staff training on inclusive disaster education, and active student involvement in evacuation activities and disaster simulations.

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