

Disaster Preparedness Design in Secondary School Environment

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Abstract

The design of disaster preparedness in secondary schools emphasizes coordination, information management, the use of early warning systems, and education and training. Preparing schools for disasters is crucial to minimizing risks and safeguarding the health and welfare of students, teachers, and other members of the school community. This study employs a literature review approach, analyzing existing theories and practices related to disaster preparedness, including inter-agency coordination, disaster information management, and the application of early warning systems suitable for secondary schools. Using a qualitative literature review method, this research examines academic publications, policy reports, and other relevant documents to identify critical aspects of disaster preparedness design for schools. The study involved collecting secondary data from books, scholarly articles, and official records concerning coordination, information management, early warning systems, and training programs. These data are qualitatively analyzed to uncover patterns, strategies, and recommendations for enhancing school disaster preparedness. Findings highlight that effective coordination among schools, government bodies, and related institutions is essential for developing a robust preparedness system. Efficient and timely information management ensures that school communities are well-informed about emergency procedures. Integrated early warning systems, using communication tools and routine drills, significantly increase awareness and readiness among school members. Additionally, ongoing education and structured training for students, teachers, and staff improve disaster response skills and understanding, ultimately reducing potential losses.

Keywords: Preparedness, Disaster, School Environment

INTRODUCTION

Indonesia is naturally formed through geological processes that also carry disaster risks. Therefore, it is important to realize that Indonesian people live in areas that are vulnerable to various types of disasters. In fact, Indonesia is often dubbed a "disaster supermarket" because of the diversity and frequency of disasters that occur (Alfian, 2023). This reflects the high level of vulnerability to various damages such as tornadoes, liquefaction, tidal flooding, and volcanic activity, requiring coordinated preparedness planning across sectors, including the school environment. As an educational institution for the younger generation, schools have a great responsibility to protect students, teachers, and staff from potential disaster risks.

Based on Law of the Republic of Indonesia Number 24 of 2007, a disaster is defined as an event or series of events that pose a threat and disruption to people's lives and livelihoods. This incident has the potential to cause material losses, environmental damage, loss of life, and serious social and economic

impacts. In addition, disasters bring sadness and suffering to victims who must face the challenges of survival in situations full of uncertainty (Rahman et al., 2024). In this context, disaster preparedness design in schools involves various strategic steps. Disaster risk mapping is the first step in identifying potential hazards around the school location. Next, schools need to develop emergency procedures that include evacuation routes, safe assembly points, and steps to take during an emergency. Regular disaster training and simulations are also an important part of this effort, to ensure that all school members understand their respective roles when facing an emergency situation.

The high level of disaster vulnerability in Indonesia is not matched by public knowledge about disasters or their readiness to face them. Disasters such as earthquakes, for example, cannot be predicted when they will occur. Only the potential for occurrence in an area can be understood through scientific studies, so that the level of vulnerability in an area can be known, but when the disaster will occur remains uncertain. Therefore, the

community needs to always be in a state of readiness to anticipate the possibility of disasters that can occur at any time (Ramli et al., 2023). Schools and educational facilities must be well prepared to protect their entire community from the risk of disaster. Schools should ideally be a safe environment for students, teachers, educational staff, and all parties involved. Based on a 2022 UNICEF survey, many students and teachers in educational institutions were affected by disasters. Data from the 2019 Disaster Resilient Education book shows that over a period of more than 12 years, namely from 2000 to 2018, around 12 million students and more than 60,000 educational units were recorded as having been affected by disasters (Rahman et al., 2024).

Schools located in disaster-prone areas not only pose a risk to the safety of students, teachers, and educators, but can also disrupt the smooth running of the learning process. Therefore, it is very important for schools in these areas to be equipped with adequate disaster preparedness facilities, including an understanding of disaster mitigation, implementation of evacuation simulations, and school building designs designed to minimize disaster risks (Husniawati, et al., 2023). The design of disaster preparedness in secondary schools must include aspects of education, training, and implementation of clear procedures. Education is the main key, by providing knowledge to students and all school residents about the types of disasters, the risks that may occur, and the steps that need to be taken when a disaster occurs. Regular disaster simulation training will help students understand and internalize evacuation procedures and improve their ability to respond effectively to emergency situations.

The concept of preparedness planning has a crucial role for parties involved in disaster management. In emergency situations, a quick and efficient response is required, which heavily depends on the existence and implementation of a preparedness plan. Without proper action or if the response is delayed, the risk of loss of life is higher. While the details of a disaster may not be certain at

this early stage, steps such as identifying emergency shelter locations, designing and disseminating evacuation routes, ensuring emergency water sources, establishing a chain of command and communication procedures, training emergency response teams, and educating the public on what to do in an emergency are all important parts of this planning.

The main objective of disaster preparedness is to prevent the threat of disaster, reduce its vulnerability, minimize the impacts caused, and build partnerships with related parties, as regulated in the 2015 BNPB National Practice and Education Curriculum Law. Children and youth are considered important assets in disaster risk reduction efforts and should be given the opportunity to play a role in this. Schools have a vital role in educating students about disaster preparedness by including disaster mitigation material in the curriculum and extracurricular activities. The purpose of this approach is for students to understand the right actions to deal with disasters early on, considering that they are the most vulnerable group. Preparedness itself includes a series of efforts that focus on development (Putri & Bambang, 2024)

Education must be designed to form a culture of early preparedness in disaster prevention, create a culture of safety, and build resilient communities. Therefore, outreach activities in community service will discuss guidelines related to disaster management facilities in educational institutions, disaster management in schools, and educational efforts that support disaster risk prevention and reduction (Rambel et al., 2023). Disaster education in schools can be implemented by integrating disaster materials into the curriculum, both intracurricular and extracurricular. The perspective of Law Number 24 of 2007 concerning disaster emergency management, which maintains ownership of everyone to gain access to education, as well as the ability to face disasters (Ardhanarespati et al., 2024).

Understanding of disaster awareness among school residents is very much reflected in the knowledge of actions that need to be

taken when an earthquake occurs, both when on the first floor and at the top of a multi-storey building. In terms of recognizing signs of fire, school residents, especially school guards, can identify indicators of a fire, including parts of the school that are prone to fire and potential sources of fire. In addition, in general, all school residents know the locations used as safe zones or assembly points during temporary evacuations, both for earthquakes and fires. All school residents agree that active participation in disaster preparedness and evacuation training is very important, although in theory teachers, staff, and school employees already understand this. However, disaster training and simulations still need to be carried out routinely so that school residents are accustomed to implementing SOPs in accordance with SPAB (Disaster Safe Education Unit) and to measure the response time of each role in dealing with disasters (Rahman et al., 2024)

METHODOLOGY

This study adopts a literature study approach to evaluate and analyze various relevant literature on "Disaster Preparedness Design in Secondary School Environment." This approach provides an opportunity for researchers to access information from various existing written references, such as books, journal articles, research reports, and policy documents related to disaster preparedness and risk management in secondary schools. The purpose of this literature study is to gain a deeper understanding of the various elements that must be considered in designing a disaster preparedness system in schools.

The main data source in this study is academic literature, which includes books, scientific articles, and research reports that discuss theories and best practices related to disaster preparedness in schools. In addition, policy documents from the National Disaster Management Agency (BNPB), education offices, and other institutions related to education and disaster mitigation will also be used as references to provide a broader perspective on how disaster preparedness

planning and implementation can be carried out in secondary schools.

Data collection techniques are carried out by studying and analyzing content from various relevant literature sources. Each document studied will be critically analyzed to explore information on aspects related to disaster preparedness, such as early warning systems, evacuation training, resource management, and the role of the school community in dealing with disasters. This process aims to identify gaps, challenges, and solutions in the design of disaster preparedness in secondary schools.

Data analysis is done by classifying and combining information from various sources to find relevant general patterns. The researcher will compare the results of the existing literature analysis to assess the effectiveness of disaster preparedness strategies and policies implemented in secondary schools. Through this approach, this study aims to provide a deeper understanding of how to implement an effective disaster preparedness system in a secondary school environment.

The results of this study are expected to contribute to the development of better disaster preparedness policies at the school level, by providing practical recommendations to school administrators, educators, and related parties in designing and implementing effective disaster mitigation and preparedness programs. This study also has the potential to fill the gap in information regarding the role of secondary schools in disaster mitigation, which in turn can help improve the safety and well-being of students and school residents in facing disaster threats.

RESULTS AND DISCUSSION

1) Coordination

Inter-agency coordination is often a challenge, as each agency has procedures and policies that are not always aligned. This condition can cause a slow response and difficulty in integrating handling efforts. In addition, uneven distribution of resources and lack of training for officers in the field can also reduce the

effectiveness of disaster management (Syafaruddin et al., 2024) . Similar conditions can occur in the disaster preparedness coordination system in schools. If school elements, such as teachers, students, education personnel, and school management, do not have integrated procedures and policies, the response to disasters can be slow and ineffective. Lack of specific training for all parties in schools as well as inadequate resource allocation can also hamper the implementation of mitigation measures. Therefore, it is very important for schools to build a clear, integrated disaster preparedness coordination system that involves all elements of the school to ensure the maximum level of preparedness.

Coordination with the school was carried out through focus group discussions (FGD), which involved various related parties, such as the principal, vice principal for student affairs, person in charge of UKS (School Health Unit), scoutmaster, school guard, and representatives of class teachers. In this meeting, various matters related to the condition of the school environment, evacuation facilities, gathering points, the number of students who will take part in the training, and determining evacuation routes for multi-storey buildings were discussed. The results of the coordination included the appointment of the vice principal for student affairs as the person in charge of community service activities, as well as the determination of participants in the victim preparedness and evacuation training (Rahman et al., 2024) .

The following is about the coordination carried out by school residents in preparing disaster preparedness in the secondary school environment:

- 1) Formation of a disaster preparedness team . Form a special team consisting of teachers, students, education personnel, and school management to manage disaster preparedness.
- 2) Develop disaster emergency protocols by creating standard operating

procedures (SOPs) for evacuation, first aid, and communication during a disaster.

- 3) Conduct regular drills, such as earthquake or fire evacuation simulations, to improve the readiness of the entire school community.
- 4) fire extinguishers (APAR), first aid kits, and sufficient evacuation routes.
- 5) Conduct training for students, teachers and staff on disaster risk mitigation and emergency measures to be taken.
- 6) Coordinating with external parties, such as the Regional Disaster Management Agency (BPBD) and the education office , to increase the effectiveness of the preparedness program.

2) Information Management

Dissemination of disaster-related information is very important so that people understand the actions that need to be taken to protect themselves when a disaster occurs. This information includes instructions for surviving during a disaster, how to get help, and useful information after a disaster occurs (Barus, et al., 2024). In emergency situations, the speed and effectiveness of the government's response are key factors in minimizing the impact of a disaster. Therefore, the government needs to have an efficient and reliable system to handle various types of disasters (Syafaruddin et al., 2024) . In addition, post-disaster information is also needed to provide guidance on the steps to be taken after a disaster ends, such as getting reconstruction assistance, maintaining health, and dealing with psychological impacts. This aims to make the community more prepared and

Disaster socialization and simulation have a crucial role in strengthening students' understanding and skills in dealing with the threat of earthquakes that can occur suddenly. The use of appropriate media, such as catchy songs and cartoons with simple language, is an effective strategy to ensure that children understand and are aware of the information provided.

This approach not only aims to convey information, but also to empower children to be more prepared and able to act in emergency situations, which in turn can improve their safety and protect them (Barus, 2024). This means that disaster management is an effort to manage risks related to disasters, often referred to as disaster risk management. This approach emerged in response to the uncertainty of the possibility of a disaster (Mangemba et al., 2024). Disaster information management in secondary schools is very important in improving the preparedness of students, teachers, and staff. Good information management allows all school members to understand the potential disaster threats around them and the actions that need to be taken to protect themselves. Information is delivered in a structured manner through various educational media, ensuring that all parties know the emergency procedures and proper evacuation steps, information boards, or digital applications, schools can ensure that all parties know the emergency response procedures, evacuation routes, and safe assembly points.

In addition, disaster information management also supports internal and external coordination. Within the school, this information helps align roles and responsibilities between students, teachers, and staff. Meanwhile, externally, schools can work with authorities, such as BPBD or disaster management organizations, to ensure the availability of up-to-date information about disasters. With an effective information system, schools can build a culture of preparedness that not only improves safety but also provides a sense of confidence for the school community in dealing with emergency situations.

The following is needed in information management for disaster preparedness in secondary schools:

1) Schools provide early warning mechanisms that can quickly notify the

entire school community about the threat of disaster.

- 2) Schools should have clear maps of high-risk areas around the school and safe evacuation routes.
- 3) Schools must establish an information center in the school that provides information on mitigation, emergency response, and post-disaster steps.
- 4) Schools should optimize technology such as disaster applications, social media groups, or other online platforms to disseminate information quickly and widely.
- 5) Schools involve students in disseminating disaster information, such as through extracurricular activities or disaster clubs, to increase their active participation.

3) Early Warning System

The components of this system include understanding the risks, monitoring and warning, distributing and communicating information, and the ability to respond. Social, economic, and environmental factors of the community play an important role in forming the basis of the resilience capacity paradigm, which requires careful attention when developing, implementing, and strengthening early warning systems (Saputro, et al., 2024). Likewise, early warning systems in secondary schools are vital in preparing students, teachers, and staff for potential disasters. Given that schools are places with a high concentration of activity and people, having an effective early warning system in place can help reduce risks and improve safety. This system should include elements such as knowledge of disaster risks around the school, monitoring conditions that can trigger disasters (such as extreme weather or potential earthquakes), as well as the rapid and clear dissemination of information.

Effective early warning can improve community preparedness and rapid response in facing the threat of flooding, so that the impact of losses can be reduced (Abdul Azis et al., 2024). Therefore,

disaster mitigation efforts are needed through an early warning system to reduce the risks and impacts (Zamil et al., 2024). By considering the social, economic, and environmental context of the school, the early warning system must also be adjusted to the characteristics and needs of students, including vulnerable groups such as children with disabilities or those who need special attention. The involvement of all parties in the planning, implementation, and evaluation process of this early warning system will increase its effectiveness and strengthen the school's resilience capacity in dealing with disasters.

The following is an early warning system that can be implemented in secondary schools for disaster preparedness:

- 1) The school installed an audible alarm system that can be heard by the entire school community as a warning sign of an impending disaster, such as an earthquake or fire.
- 2) Schools use a notification system via Mobile Phone (SMS/whatsapp). The use of text messages or application notifications to notify students, teachers, and staff of disaster warnings or emergencies.
- 3) The school designed a digital bulletin board that displays information about disaster warnings or evacuation instructions in real-time.
- 4) A voice announcement system that allows school staff to provide disaster warnings or evacuation instructions directly to the entire school community.
- 5) Schools maximize the use of social media-based early warning information systems : Utilizing social media platforms such as WhatsApp, Facebook, or Twitter to disseminate information and early warnings quickly and widely.

4) Public Education and Training

Disaster preparedness training plays a vital role in building a culture of safety,

especially among children and the younger generation. This training program includes learning about how to protect yourself during a disaster as well as accident prevention efforts that can be avoided in everyday life (Putri & Bambang, 2024). In addition, this training also includes providing information and explanations about disaster management in the school environment to teachers and school management. The purpose of this training is to improve their understanding of the steps that need to be taken to reduce potential disaster risks, including prevention, mitigation, and preparedness. This training is a very important initial step in building disaster management capabilities, both in terms of knowledge and practical skills (Ardhanarespati et al., 2024).

In addition to theory, this training also emphasizes the importance of collaboration and coordination between schools, communities, and related parties in dealing with disasters. Techniques such as group discussions, simulations, and role-playing have proven effective in deepening understanding and developing collaboration skills. Each stage of the training is designed taking into account the unique conditions and characteristics of the area (Efendi et al., 2024). This training aims to strengthen teacher preparedness in dealing with potential disasters, given the high potential for disaster risk in the area and the need for comprehensive disaster mitigation education for educators (Arwin1 et al., 2024). Aspects such as appropriate evacuation, first aid, and effective communication must be tailored to the abilities and conditions of children. Through emergency response training provided by Disaster Preparedness Schools, related skills are provided to students, teachers, and school staff, with an emphasis on skills relevant to vulnerable groups. This way, they can respond quickly and effectively when a disaster occurs, and provide appropriate assistance to those in need. After the initial socialization, for

interested students, further training is provided to learn the disaster application. This training includes hands-on exercises to understand how the application works, recognize its main features, and participate in emergency situation simulations. The purpose of this training is to improve practical skills, expand relevant knowledge, and foster responsive awareness of emergency or disaster situations (Suleman, 2024).

Here are the important things about public education and disaster preparedness training in secondary schools:

- 1) Providing students, teachers and school staff with an understanding of the types of disasters that may occur, as well as the impacts and risks they cause, so that all parties are prepared to face emergency situations.
- 2) Integrating knowledge about disaster mitigation into lessons and extracurricular activities, so that students understand the importance of disaster risk prevention and reduction from an early age.
- 3) Building an effective communication system in schools, both between school residents and with external parties such as BPBD or other disaster management agencies, to speed up response in emergency situations.
- 4) Strengthening emergency infrastructure and facilities. Ensure that schools have sufficient emergency facilities, such as fire extinguishers, first aid kits, and safe shelters, and ensure that all school members know where and how to use these facilities.
- 5) Conduct evaluations of each disaster drill and simulation conducted, to evaluate the effectiveness of the actions taken and make continuous improvements in the school's disaster preparedness system.

CONCLUSION AND SUGGESTIONS

Conclusion

The conclusions of this study can be summarized in four main points as follows:

- 1) The importance of disaster preparedness planning in schools. Disaster preparedness in secondary schools is essential to protect students, teachers, and the entire school community from the impact of disasters.
- 2) Effective coordination. Good coordination between schools, government, and related institutions is the foundation for building an integrated preparedness system.
- 3) Fast and accurate information management. Fast and accurate information management is essential to ensure that all school residents know the steps to take in a disaster situation.
- 4) The importance of continuing education and training. Ongoing disaster preparedness education and training has been shown to be effective in improving the mitigation skills that students and teachers need to deal with disasters.

SUGGESTIONS

Based on these conclusions, suggestions that need to be considered by various parties are:

- 1) Schools should strengthen coordination with government agencies and related organizations to ensure the availability of guidance and support in implementing disaster preparedness programs.
- 2) Disaster information management needs to be improved by utilizing fast and efficient communication technology to disseminate important information to all school residents.
- 3) Schools are advised to integrate early warning systems, such as automatic alarms and digital information boards, to increase awareness of potential disaster threats.
- 4) Disaster preparedness education and training programs should be included in the school curriculum and conducted routinely to improve the skills and awareness of school residents.

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