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Disaster Preparedness Plan in Secondary School Environments

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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 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 involves 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, utilizing communication tools and routine drills, significantly enhance 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.

Introduction

Indonesia was naturally formed through geological processes that also bring disaster risks. Therefore, it is important to recognize that the Indonesian population lives in an area that is highly vulnerable to various types of disasters. Indonesia is even often referred to as a "supermarket of disasters" due to the diversity and frequency of disasters that occur (Alfian, 2023). This reflects the high level of vulnerability to various hazards such as whirlwinds (angin putih beliung), liquefaction, tidal flooding (rob), and volcanic activity, which necessitate the design of coordinated preparedness measures across sectors, including within schools. As educational institutions for the younger generation, schools bear a major responsibility to protect students, teachers, and staff from potential disaster risks.

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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 threats and disturbances to the life and livelihoods of communities. Such events may result in material losses, environmental damage, loss of life, as well as serious social and economic impacts. In addition, disasters bring grief and suffering to victims who must face the challenge of surviving in highly uncertain situations (Rahman et al., 2024). In this context, the design of disaster preparedness in schools involves various strategic steps. Disaster risk mapping is an initial step to identify potential hazards around the school location. Subsequently, schools need to develop emergency procedures that include evacuation routes, safe assembly points, and actions that must be taken during an emergency. Regular disaster drills and simulations are also an important part of these efforts to ensure that all school members understand their respective roles when dealing with emergency situations.

The high level of disaster proneness in Indonesia is not matched by adequate public knowledge of disasters or their preparedness in facing them. Disasters such as earthquakes, for instance, cannot be predicted in terms of their exact time of occurrence. Only the potential for their occurrence in a particular area can be understood through scientific studies, so that the level of hazard in a given region may be identified, but the exact timing of the disaster remains uncertain. For this reason, communities must remain in a state of readiness to anticipate the possibility of disasters that may occur at any time (Ramli et al., 2023). Schools and educational facilities must be adequately prepared to protect their entire community from disaster risks. Ideally, schools should serve as safe environments for students, teachers, education staff, and all parties involved. According to a UNICEF survey in 2022, many students and teachers in educational institutions have been affected by disasters. Data from the book Pendidikan Tangguh Bencana (Disaster-Resilient Education) in 2019 show that over a period of more than 12 years, from 2000 to 2018, approximately 12 million students and more than 60,000 educational units were recorded as having experienced the impacts of disasters (Rahman et al., 2024).

Schools located in disaster-prone areas not only pose risks to the safety of students, teachers, and education personnel, but can also disrupt the smooth running of the learning process. Therefore, it is crucial for schools in such areas to be equipped with adequate disaster preparedness facilities, including understanding of disaster mitigation, the implementation of evacuation simulations, and school building designs that aim to minimize disaster risks (Husniawati et al., 2023). Disaster preparedness planning in secondary schools should include aspects of education, training, and the implementation of clear procedures. Education is a key element, by providing students and the entire school community with knowledge about types of disasters, potential risks, and the steps that need to be taken when disasters occur. Training in the form of regular disaster simulations will help students understand and internalize evacuation procedures and enhance their ability to respond effectively to emergency situations.

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The concept of preparedness planning plays a crucial role for stakeholders involved in disaster management. In emergency situations, a rapid and efficient response is required, which greatly depends on the existence and implementation of preparedness plans. Without appropriate actions or if the response is delayed, the risk of loss of life becomes greater. Even though the exact details of a disaster cannot be known in the early stages, measures such as identifying the location of emergency shelters, designing and disseminating evacuation routes, ensuring emergency water supplies, establishing a chain of command and communication procedures, training emergency response teams, and educating communities about the actions to be taken during emergencies are integral components of such planning.

The main objectives of disaster preparedness are to prevent disaster threats, reduce vulnerability, minimize impacts, and build partnerships with relevant stakeholders, as stipulated in the National Practice Law and the National Disaster Management Agency (BNPB) Education Curriculum of 2015. Children and adolescents are regarded as important assets in disaster risk reduction efforts and must be given the opportunity to participate. Schools have a vital role in educating students about disaster preparedness by incorporating disaster mitigation content into the curriculum as well as extracurricular activities. The goal of this approach is for students to understand appropriate actions to take in the face of disasters from an early age, given that they are among the most vulnerable groups. Preparedness itself encompasses a series of efforts focusing on development and strengthening of capacities (Putri & Bambang, 2024).

Education should be designed to foster an early culture of preparedness in disaster prevention, to create a culture of safety, and to build resilient communities. Therefore, outreach activities in community service will address guidelines related to disaster management facilities in educational institutions, disaster management in schools, and educational efforts that support disaster prevention and risk reduction (Rambe1 et al., 2023). Disaster education in schools can be implemented by integrating disaster-related topics into the curriculum, both in intracurricular and extracurricular activities. From the perspective of Law Number 24 of 2007 concerning disaster emergency management, this also includes safeguarding everyone's right to access education and to develop the capacity to cope with disasters (Ardhanarespati et al., 2024).

Understanding of disaster awareness among school members is clearly reflected in their knowledge of actions that need to be taken when an earthquake occurs, whether they are on the ground floor or on upper floors of a building. In terms of recognizing signs of fire, school members, particularly school guards, are able to identify indicators of fire emergence, including school areas that are fire-prone and potential sources of ignition. In addition, in general, all school members know the locations designated as safe zones or assembly points for temporary evacuation, both for earthquakes and fires. All school members agree that active participation in disaster preparedness training and evacuation exercises is highly important, even though, in theory, teachers, staff, and school employees already understand these concepts. Nevertheless,

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disaster drills and simulations must continue to be conducted regularly so that school members become accustomed to implementing standard operating procedures (SOPs) in accordance with SPAB (Safe Disaster Education Units/Satuan Pendidikan Aman Bencana) and to measure the response time of each role in facing disasters (Rahman et al., 2024).

Method

This study employs a literature review approach to evaluate and analyze various relevant works on "Disaster Preparedness Plan in Secondary School Environments." This approach enables the researcher to access information from a wide range of existing written references, such as books, journal articles, research reports, and policy documents related to disaster preparedness and risk management in secondary schools. The aim of this literature review is to obtain a deeper understanding of the various elements that must be considered when designing a disaster preparedness system in schools.

The primary data sources in this study are academic literature, including books, scholarly 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 authorities, and other institutions concerned with education and disaster mitigation are also used as references to provide a broader perspective on how the planning and implementation of disaster preparedness systems can be carried out in secondary schools.

Data collection techniques are carried out by examining and analyzing the content of various relevant literature sources. Each document reviewed is critically analyzed to extract information related to aspects of disaster preparedness, such as early warning systems, evacuation drills, resource management, and the role of the school community in responding to disasters. This process aims to identify gaps, challenges, and existing solutions in the design of disaster preparedness in secondary schools.

Data analysis is conducted by classifying and synthesizing information from multiple sources to identify relevant recurring patterns. The researcher compares the results of the literature analysis to assess the effectiveness of disaster preparedness strategies and policies implemented in secondary schools. Through this approach, the study seeks to provide a deeper understanding of how to implement an effective disaster preparedness system in secondary school environments.

The findings of this study are expected to contribute to the development of more effective disaster preparedness policies at the school level by offering practical recommendations to school administrators, educators, and other stakeholders in designing and implementing disaster mitigation and preparedness programs. This research also has the potential to fill an information gap regarding the role of secondary schools in disaster mitigation, which in turn may help

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enhance the safety and well-being of students and the broader school community in the face of disaster threats.

Results and Discussion

1) Coordination

Coordination between institutions often becomes a challenge, as each agency has procedures and policies that are not always aligned. This condition can lead to slow response and difficulties in integrating disaster management efforts. In addition, the unequal distribution of resources and the lack of training for field personnel may also reduce the effectiveness of disaster response (Syafaruddin et al., 2024). A similar situation may occur in the coordination system for disaster preparedness in schools. If the various elements in the school, such as teachers, students, educational personnel, and school management, do not have integrated procedures and policies, the response to disasters may become slow and ineffective. A lack of specialized training for all parties in the school as well as inadequate allocation of resources can also hinder the implementation of mitigation measures. Therefore, it is crucial for schools to develop a disaster preparedness coordination system that is clear, integrated, and involves all school elements in order to ensure an optimal level of readiness.

Coordination with the school is carried out through Focus Group Discussions (FGDs), involving various relevant stakeholders such as the principal, vice principal for student affairs, the person in charge of the School Health Unit (UKS), the scoutmaster, school guards, and representatives of homeroom teachers. During these meetings, various aspects are discussed, including the condition of the school environment, evacuation facilities, assembly points, the number of students who will participate in the training, and the determination of evacuation routes for multi-storey buildings. The outcomes of this coordination include the appointment of the vice principal for student affairs as the person in charge of the community service activities, as well as the designation of participants for disaster preparedness and victim evacuation training (Rahman et al., 2024).

The following describes the coordination carried out by school members in developing disaster preparedness in the secondary school environment:

1. **Formation of a disaster preparedness team.** Establishing a dedicated team consisting of teachers, students, educational personnel, and school management to manage disaster preparedness.
2. **Development of emergency disaster protocols** by formulating standard operating procedures (SOPs) for evacuation, first aid, and communication during disasters.

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3. **Implementation of regular drills,** such as earthquake or fire evacuation simulations, to enhance the preparedness of the entire school community.
4. **Ensuring the availability of adequate emergency facilities,** such as portable fire extinguishers, first-aid kits, and sufficient evacuation routes.
5. **Providing training** for students, teachers, and staff on disaster risk mitigation and the emergency measures that must be taken.
6. **Coordinating with external stakeholders,** such as the Regional Disaster Management Agency (BPBD) and education authorities, to improve the effectiveness of disaster preparedness programs.

2) Information Management

The dissemination of disaster-related information is crucial so that communities understand the actions that need to be taken to protect themselves when a disaster occurs. This information includes guidelines for survival during a disaster, ways to obtain assistance, and useful information for the post-disaster period (Barus et al., 2024). In emergency situations, the speed and effectiveness of the government's response become key factors in minimizing the impacts of disasters. Therefore, the government needs to have an efficient and reliable system to address various types of disasters (Syafaruddin et al., 2024). In addition, post-disaster information is also needed to provide guidance on the steps that must be taken after a disaster, such as obtaining reconstruction assistance, maintaining health, and dealing with psychological impacts. This aims to ensure that communities are better prepared and more resilient.

Disaster education and simulation activities play a crucial role in strengthening students' understanding and skills in facing earthquake threats that may occur suddenly. The use of appropriate media, such as memorable songs and cartoons with simple language, is an effective strategy to ensure that children understand and internalize 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 enhance their safety and protection (Barus, 2024). In this context, disaster management can be understood as an effort to manage risks associated with disasters, often referred to as disaster risk management. This approach has emerged as a response to the uncertainty surrounding the likelihood of disaster occurrence (Mangemba et al., 2024).

Information management related to disasters in secondary schools is highly important for improving the preparedness of students, teachers, and staff. Proper information management enables all school members to understand the disaster threats that may occur in their surroundings and the actions that need to be taken to protect themselves. Information is delivered in a structured manner through various educational media to ensure that all parties are aware of emergency procedures and appropriate evacuation steps. Through tools such as posters, information boards, or digital applications, schools can ensure that everyone knows the emergency response procedures, evacuation routes, and safe assembly points.

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Furthermore, disaster information management also supports both internal and external coordination. Internally, such information helps align the roles and responsibilities of students, teachers, and staff. Externally, schools can collaborate with relevant authorities, such as the Regional Disaster Management Agency (BPBD) or other disaster management organizations, to ensure access to up-to-date disaster information. With an effective information system in place, schools can foster a culture of preparedness that not only enhances safety but also builds confidence among school members in facing emergency situations.

The following components are required in information management for disaster preparedness in secondary schools:

1. The school provides an early warning mechanism that can quickly inform all school members about impending disaster threats.
2. The school must have a clear map identifying high-risk areas around the school and safe evacuation routes.
3. The school should establish an information center that provides information on mitigation, emergency response, and post-disaster measures.
4. The school is encouraged to optimize the use of technology, such as disaster-related applications, social media groups, or other online platforms, to disseminate information quickly and widely.
5. The school involves students in disseminating disaster-related information, for example through extracurricular activities or disaster clubs, to enhance their active participation.

3) Early Warning System

The components of this system include understanding risks, monitoring and issuing warnings, distributing and communicating information, and the capacity to respond. Social, economic, and environmental factors within the community play an important role in shaping the foundation of resilience capacity paradigms, which require serious attention when developing, implementing, and strengthening early warning systems (Saputro et al., 2024). Similarly, early warning systems in secondary schools are vital for preparing students, teachers, and staff to face potential disasters. Given that schools are densely populated and activity-intensive environments, the existence of an effective early warning system can help reduce risks and enhance safety. This system should include elements such as knowledge of disaster risks around the school area, monitoring of conditions that may trigger disasters (such as extreme weather or potential earthquakes), and the rapid and clear dissemination of information.

Effective early warning can improve community preparedness and rapid response in the face of flood threats, thereby reducing potential losses (Abdul Azis et al., 2024). Therefore, disaster mitigation efforts through early warning systems are needed to reduce risks and their impacts (Zamil et al., 2024). By taking into account 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 requiring special attention. The involvement of all parties in the planning, implementation, and

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evaluation processes of the early warning system will increase its effectiveness and strengthen the school's resilience capacity in facing disasters.

The following are early warning system components that can be implemented in secondary schools as part of disaster preparedness efforts:

1. The school installs an audible alarm system that can be heard by all school members as a warning sign of impending disasters, such as earthquakes or fires.
2. The school uses mobile notification systems (SMS/WhatsApp), utilizing text messages or app notifications to inform students, teachers, and staff about disaster warnings or emergency situations.
3. The school designs digital notice boards that display real-time information on disaster warnings or evacuation instructions.
4. A public address system is provided, enabling school personnel to deliver disaster warnings or evacuation instructions directly to all school members.
5. The school maximizes the use of social media–based early warning information systems by utilizing 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, particularly among children and young people. Such training programs include learning how to protect oneself during disasters as well as efforts to prevent avoidable accidents in daily life (Putri & Bambang, 2024). In addition, these programs also provide information and explanations on disaster management in the school environment for teachers and school management. The aim is to improve their understanding of the steps that must be taken to reduce potential disaster risks, including prevention, mitigation, and preparedness. This training serves as a highly important initial step in developing disaster management capacity, both in terms of knowledge and practical skills (Ardhanarespati et al., 2024).

Beyond theory, the training also emphasizes the importance of collaboration and coordination between schools, communities, and relevant stakeholders in dealing with disasters. Techniques such as group discussions, simulations, and role-plays have proven effective in deepening understanding and developing cooperation skills. Each stage of the training is designed by taking into account the specific conditions and unique characteristics of the local area (Efendi et al., 2024). The training aims to strengthen teachers' preparedness in facing potential disasters, given the high level of disaster risk in the region 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 adjusted to the abilities and conditions of children. Through emergency response training provided by Disaster Prepared Schools, relevant skills are delivered to students, teachers, and school staff, with emphasis on competencies that are particularly important for vulnerable groups. In this way, they are able to respond quickly and effectively when a disaster occurs and provide appropriate assistance to those in need. After the initial socialization, students who show interest

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are given follow-up training to learn about disaster-related applications. This training includes hands-on practice to understand how the application works, recognize its key features, and participate in simulated emergency situations. The purpose of this training is to enhance practical skills, broaden relevant knowledge, and foster a responsive awareness toward emergency or disaster situations (Suleman, 2024).

The following are key elements of 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 their impacts and associated risks, 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 prevention and risk reduction from an early age.
3. Developing an effective communication system within the school, both among school members and with external parties such as BPBD or other disaster management agencies, in order to accelerate response during emergencies.
4. Strengthening emergency infrastructure and facilities, by ensuring that the school has sufficient emergency resources such as fire extinguishers, first-aid kits, and safe shelters, and that all school members know the location of these facilities and how to use them.
5. Conducting evaluations after every disaster drill and simulation to assess the effectiveness of the actions taken and to make continuous improvements to the school's disaster preparedness system.

Conclusion and Recommendations

Conclusion

The findings of this study can be summarized into four main points as follows:

1. The importance of designing disaster preparedness in schools. Disaster preparedness in secondary schools is crucial for protecting students, teachers, and the entire school community from the impacts of disasters.
2. Effective coordination. Strong coordination between schools, government bodies, and relevant institutions forms the foundation for establishing an integrated disaster preparedness system.
3. Accurate and well-managed information. Fast and reliable information management is essential to ensure that all school members are aware of the actions that must be taken in disaster situations.
4. The importance of continuous education and training. Ongoing disaster preparedness education and training have proven effective in enhancing the mitigation skills needed by students and teachers in facing disasters.

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Recommendations

Based on the above conclusions, several recommendations can be proposed for relevant stakeholders:

1. **Strengthening institutional coordination.** Schools should enhance coordination with government agencies and related organizations to ensure the availability of guidelines and support for the implementation of disaster preparedness programs.
2. **Improving disaster information management.** Disaster information management needs to be strengthened by utilizing fast and efficient communication technologies to disseminate important information to all school members.
3. **Integrating early warning systems.** Schools are encouraged to integrate early warning systems, such as automatic alarms and digital information boards, in order to increase vigilance toward potential disaster threats.
4. **Embedding preparedness education and training in the curriculum.** Disaster preparedness education and training programs should be incorporated into the school curriculum and conducted regularly to enhance the skills and awareness of the entire school community.

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