



Strategy for Implementing the Disaster-Safe Education Unit Program After the M5.0 Earthquake on September 18, 2024 in Bandung

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ABSTRACT

This study discusses the implementation strategy of the Disaster-Safe Education Unit Program (Satuan Pendidikan Aman Bencana/SPAB) in the Bandung area after the M5.0 earthquake that occurred on September 18, 2024. This earthquake caused damage to various educational units in Bandung Regency, Garut Regency, and West Bandung Regency, and highlighted the importance of disaster preparedness in the school environment. This study aims to understand how SPAB is implemented and formulate appropriate strategies to improve the preparedness of educational units in disaster-prone areas. Qualitative analytical methods were used with data collection techniques in the form of observation, interviews, and literature studies. The results of the study indicate that SPAB requires a strategy that includes increasing school capacity, providing earthquake-resistant infrastructure, collaborating with related institutions, and regular disaster socialization and simulations. Risk analysis using the PESTLE tool and Hazards & Vulnerability Assessment (HVA) was also identified as an important method in risk scanning in educational units. Policy recommendations include increasing the mitigation budget, formulating SPAB standards, and developing inter-sectoral collaboration. This study emphasizes the importance of sustainable SPAB implementation to ensure the safety and sustainability of education in earthquake-prone areas

INTRODUCTION

The main earthquake that rocked Bandung Regency, West Java Province occurred on September 18, 2024 at 09:41 WIB according to the Meteorology, Climatology and Geophysics Agency (BMKG) with a magnitude of M5.0 and in several other cities felt different scales of shock intensity, for example Majalaya, Bandung Regency III-IV MMI, and in Garut II-III MMI. According to Daryono (2024) Scale II MMI means that earthquake vibrations were felt by several people, light objects that were hanging were seen swaying, Scale III MMI means that vibrations were felt clearly in the house in the form of vibrations as if a truck was passing, and Scale IV MMI means that vibrations were felt by many people in the house and several people outside the house. Vibrations can make pottery break, windows/doors creak, and walls make noise. This earthquake occurred at a depth of 10 km and was located at coordinates 7.19 LS 107.67 BT. Aftershocks occurred up to nine times with magnitudes between 2.0 and 3.2 (Karyana. 2024). Daryono (2024) stated that the epicenter of the earthquake was due to the activity of the Garsela fault, where this fault has two segments, namely the Rakutai segment (north) which is 19 km long extending from Garut to the south of Bandung and the Kencana segment (south) which is 17 km long. The Garsela Fault is one of the active faults in West Java. (Nurrohman A. 2021; Khairiyah A. 2024; Sihotang I.C.T. and Untung Sudharmono. 2024). On the other hand, BNPB stated that this earthquake did not originate from the Garsela fault or the Lembang fault, but from a fault that had not been mapped (Muhari, Abdul. 2024).

This earthquake caused damage based on reports in two areas, namely Bandung Regency and Garut Regency. Bandung Regency, the affected area consists of five sub-districts and seven villages, while Garut Regency consists of three sub-districts and 11 villages (MDMC West Java. 2024). The impact on elementary school students due to this earthquake was physical and psychological injuries (Sihotang I.C.T. and Untung Sudharmono. 2024). An elementary school student died from falling headfirst, then hitting a fairly hard surface when the earthquake occurred (Muhari. 2024). According to CNN Indonesia, there are 52 educational units affected, with details of 31 buildings in Bandung Regency, 20 buildings in Garut Regency, and one building in West Bandung. Educational units in the West Bandung Regency area that are in disaster-prone areas are 93 schools consisting of 55 junior high schools, 13 senior high schools and two special schools. Based on these data, the implementation of Disaster Safe Education Units (*Satuan Pendidikan Aman Bencana/SPAB*) at all levels of education in Greater Bandung (Bandung City, Bandung Regency, West Bandung Regency) and Garut is important to implement. In order to run well, a strategy is needed in the implementation of the SPAB.

Research Objectives:

The objectives of this study are scientifically designed to provide a deep understanding of how the Disaster Safe Education Unit (SPAB) program is implemented after the earthquake in Bandung Regency, as well as to formulate appropriate strategies to improve the preparedness of education units in areas prone to earthquakes.

RESEARCH METHODOLOGY

The research methodology applied in this study is a combination of literature review, field observation and interviews with emergency respondents.

1. Literature review: the activity of analyzing, evaluating, and synthesizing literature sources that are relevant to the research topic. The literature sources come from scientific journals and online news.
2. Observation: Direct observation of the chronology of disaster events and the implementation of earthquake disaster emergency response to understand the dynamics and interactions between stakeholders.
3. Interviews with emergency responders: conducting interviews directly or indirectly (WhatsApp application) with volunteers who assisted in emergency response as informants in the study.

RESULT AND DISCUSSION

The sources of earthquakes in the Bandung area are 1) the Lembang fault zone located 10 km north of Bandung City which extends from west to east through the city of Lembang, where the earthquakes that occur are concentrated at the ends of the fault (Rasmid.2014) the Lembang fault extends 29 km (Iswanti W. Ambarwati, Selly Frenie, and Adrin Tohari. 2020), 2) the southern Java subduction zone (megathrust) also threatens Bandung (Iswanti W. Ambarwati, Selly Frenie, and Adrin Tohari. 2020), 3) the Cimandiri fault which extends from Pelabuhan Ratu to the Padalarang area, 4) the Rajamandala fault located on the east side of Saguling is a continuation of the Cimandiri fault whose northern end is located at the western end of the Lembang fault, 5) the Baribis fault is located north of Subang to Majalengka, 6) the Majalengka Thrust Belt is located between Majalengka and Kadipaten where the northern side is bordered by the Baribis fault and the southern side is the Cadasngampar thrust fault, 7) the Cicalengka fault located in the south of Bandung extending from Cicalengka to the southwest (Handayani. 2009), and 8) the Garsela fault which caused the earthquake in Bandung on September 18, 2024 (Daryono. 2024).

Strategy is an approach or general plan to achieve predetermined goals. Strategy includes decisions about resource allocation and direction of action to achieve desired results (abstracted from: Firdaus & Kamil. 2023). For example in the Context of Disaster-Safe Higher Education, strategies could include: "Developing a curriculum that integrates disaster education into study programs," or "Establishing partnerships with disaster management agencies to increase disaster preparedness capacity" (Lasmana. 2024).

The SPAB program in its implementation requires a strategy, where this strategy is built with the first step in the form of environmental scanning in the context of risk analysis. In this environmental analysis, disaster risk is used as a basis as a component that affects the environment. UNDRR in 2009 defined disaster risk as the potential loss resulting from the interaction between natural or anthropogenic hazards and existing vulnerability conditions. This includes losses to life, health, livelihoods, assets and services, which can occur in a community or society. Meanwhile, BNPB (National Disaster Management Agency), disaster risk is the potential loss that may occur in a certain area and time period caused by the interaction between hazards, vulnerability, and

capacity (Law No. 24 of 2007 concerning Disaster Management). One of the tools in environmental scanning is PESTLE. For example, an education authority in an area prone to natural disasters uses PESTLE Analysis to develop a disaster-safe education unit program:

- Political: identifying and analyzing government policies related to disaster preparedness and emergency response that affect the inclusion of disaster management subjects in the school curriculum.
- Economic: Education budget allocated for teacher/lecturer training and procurement of disaster management education materials.
- Social: Public awareness (in this case the educational unit community) of the importance of disaster knowledge and preparedness that may affect student and parent participation in the program.
- Technological: Use of technology for disaster simulations and training through digital platforms.
- Legal: Compliance with school/campus security regulations and emergency evacuation policies.
- Environmental: Readiness of school infrastructure in facing disasters such as earthquake-resistant buildings or nearby evacuation zones.

One of the risk analysis tools in educational units that can be used is the Hazards & Vulnerability Assessment or HVA tool. This tool is commonly used by health service institutions in developing disaster-resilient health service institutions (Galih Endradita M. 2021). In this tool, hazards or disaster threats that exist in educational units and educational environments are identified, for example natural disasters such as earthquakes, tsunamis, or landslides as external threats, and fires as examples of threats from within educational units. Then the component of the severity of the educational unit when hit by a hazard consists of two components, namely the impact component and the mitigation component. The impact component is given a value according to the real conditions when the analysis is carried out, this component consists of three sub-components, namely human impact, property impact and business impact. Then there is a mitigation component consisting of three components known as the preparedness sub-component, internal response and external response. The severity component consisting of the impact and mitigation components acts as a vulnerability component of an educational unit that has a value range from 0 to 3. In the impact component, the worst value is 3, while in the mitigation component, the worst value is 1. A value of 0 is considered the irrelevance of the problem. The results of the risk analysis with this HVA device are used as the basis for environmental scanning such as the PESTLE device.

The impact on humans (human impact) for example is injury and death, where death is the highest number in this column followed by injury. In an earthquake, the possibility of death is quite high due to the impact of the earthquake, for example due to being hit or buried by a collapsed building, being hit by a damaged or fallen part of a building (Fauzi and Mussadun. 2021) and even due to a poor evacuation process. From the analysis in this section, it is hoped that appropriate, easy and efficient risk control efforts will be found in efforts to save lives.

Property impact looks at the impact received by the educational unit building, the assessment can refer to total damage, partial damage, or minimal damage or no damage. So from this component we can obtain whether the building is safe or not from the threat of earthquakes. From the analysis of the impact on this property, it is expected to know how to ensure that the property (in this case the campus building) affected by the earthquake does not experience significant damage. Business impact looks at the impact on the operation of educational units due to a disaster emergency, for example, it cannot operate at all, is disrupted for some time, and is not disrupted. From the results of this analysis, it is hoped that the earthquake that occurred will not disrupt the main services of the educational unit, namely the continuation of the teaching and learning process both on campus and in other places with the independent learning curriculum approach. The mitigation components analyzed in educational units according to the HVA guidelines are the existence of contingency plans, risk reduction plans, disaster emergency response and alert teams, and the implementation of training, emergency response simulations, and cooperation with emergency institutions or organizations such as PMI, Fire Department, SAR Post, Hospitals/Health Centers, etc. (Galih Endradita M. 2021), the development of a disaster curriculum is also included in mitigation. The knowledge of students on how to act when an earthquake occurs is also part of mitigation. The actions of dropping, covering and holding on when an earthquake occurs have been proven to save lives, so that these simple actions can be trained to all components of the learning community (Lasmana & Supriyadi. 2024) in order to reduce the fatality rate.

Tabel 1. Format HVA

HAZARD AND VULNERABILITY ASSESSMENT TOOL NATURALLY OCCURRING EVENTS								
EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						RISK
	Likelihood this will occur	HUMAN IMPACT Possibility of death or injury	PROPERTY IMPACT Physical losses and damages	BUSINESS IMPACT Interruption of services	PREPARED-NESS Preplanning	INTERNAL RESPONSE Time, effectiveness, resources	EXTERNAL RESPONSE Community/ Mutual Aid staff and supplies	
SCORE	0 = Nil 1 = Low 2 = Moderate 3 = High	0 = Nil 1 = Low 2 = Moderate 3 = High	0 = Nil 1 = Low 2 = Moderate 3 = High	0 = Nil 1 = Low 2 = Moderate 3 = High	0 = Nil 1 = High 2 = Moderate 3 = Low or none	0 = Nil 1 = High 2 = Moderate 3 = Low or none	0 = Nil 1 = High 2 = Moderate 3 = Low or none	0 - 100%
Earthquake	0	0	0	0	0	0	0	0%
Tidal Wave	0	0	0	0	0	0	0	0%
Temperature Extremes	0	0	0	0	0	0	0	0%
Drought	0	0	0	0	0	0	0	0%
Flood, External	0	0	0	0	0	0	0	0%
Wild Fire	0	0	0	0	0	0	0	0%
Landslide	0	0	0	0	0	0	0	0%
Dam Inundation	0	0	0	0	0	0	0	0%
Volcano	0	0	0	0	0	0	0	0%
Epidemic	0	0	0	0	0	0	0	0%
AVERAGE SCORE	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%

From the results of the risk analysis, strategies can be developed that are suitable for controlling risks so that the objectives of the SPAB program can be achieved. The objectives of SPAB are (West Java Province Education Quality Assurance Center):

1. Improve the ability of resources in educational units to overcome and reduce disaster risks.
2. Protect investment in educational units so that they are safe from disasters.
3. Improve the quality of educational unit facilities and infrastructure so that they are safe from disasters.
4. Provide protection and safety to students, educators, and education personnel from the impact of disasters in educational units.
5. Ensure the continuity of educational services in educational units affected by disasters.
6. Provide educational services that are in accordance with the characteristics of disaster risk and the needs of educational units.
7. Recover the impact of disasters in educational units.
8. Build the independence of educational units in implementing the SPAB program.

Based on these things, SPAB development strategies that can be carried out include 1) strengthening the capacity of educational units; 2) provision of infrastructure and supporting facilities; 3) increasing collaboration with stakeholders and safety and rescue service providers; 4) periodic socialization and simulation; 5) periodic monitoring and evaluation; 6) determination of priority action plans for six months, one year, and 2-3 years; and 7) policy recommendations that can consist of: a) increasing the disaster mitigation budget, b) SPAB regulations, standards and SOPs, and c) collaboration between sectors.

Strengthening the capacity of educational units can be in the form of training for teachers, education personnel, and students, and integrating disaster mitigation into the curriculum. Provision of infrastructure and supporting facilities can be in the form of renovation and construction of earthquake-resistant schools with a build back better approach or safe reconstruction, provision of preparedness tools in the form of personal protective equipment, first aid kits, and survival equipment, and determining safe routes and zones for gathering when evacuation is carried out. Increasing collaboration with stakeholders and safety and rescue service institutions or agencies can be in the form of partnerships with BNPB, BPBD, PMI, Basarnas through SAR Posts in the region, the regional Fire Department, Health Department and others, as well as increasing community participation around educational units such as encouraging the participation of school communities, parents and local residents in evacuation simulation activities and emergency response training. Periodic socialization and simulation, making plans for socialization schedules and earthquake simulations accompanied by periodic evacuation processes, for example on April 26 (as disaster preparedness day in Indonesia) and one day in October (in celebration of disaster risk reduction

month) by involving all elements of educational units (students, teachers, education personnel, security, canteen managers and traders, etc.). Disaster awareness campaigns can also be implemented to increase the understanding of educational unit residents about the dangers of earthquakes and how to save themselves.

The preparation of priority action plans can also be designed by dividing them into three stages, 1) Stage I (6 months), for example with identification activities (finding) and risk assessment of schools located in earthquake-prone areas, initial training for teachers and education personnel on disaster risk management, and socialization and awareness campaigns about SPAB to the school community. 2) Stage 2 (1 year), can be in the form of implementing evacuation simulations in all schools affected and prone to disasters, preparing disaster mitigation curricula that are adjusted to local conditions, and renovating school buildings located in earthquake-prone areas. 3) Stage 3 (2-3 years) with activities that can be in the form of developing earthquake-resistant school infrastructure in all vulnerable areas with the principle of build back better, evaluating and improving SPAB strategies based on audit results and feedback from schools.

Periodic monitoring and evaluation as an effort to ensure that the program runs on the planned track and also to make the program achieve its goals and better can be done with the efforts of 1) School Readiness Audit: Conducting routine audits of school readiness, including infrastructure, evacuation procedures, and disaster training, and 2) Evaluation of SPAB Implementation: Conducting periodic evaluations of SPAB implementation in schools affected by the earthquake to ensure the effectiveness of the program and make adjustments to the strategy if necessary.

CONCLUSION AND SUGGESTION

Conclusion

SPAB program strategy focuses on 1) safety of educational unit residents, 2) risk-based, 3) changes in safe behavior through increasing knowledge, attitudes, and actions of students, 4) continuing education during emergency response, and 5) rebuilding better educational unit facilities & infrastructure (build back better) because earthquakes can recur due to the location of Greater Bandung in an earthquake-prone area consisting of active faults and subduction zones, including other areas in active fault areas and subduction zones.

Suggestions

Policy suggestions that can be implemented include:

1. Increasing the disaster mitigation budget: Local governments must allocate more funds for disaster mitigation in the education sector, especially in the Greater Bandung area which is prone to earthquakes.
2. Using the PESTLE tool and Hazards & Vulnerability Assessment (HVA) as Risk analysis tools was also identified as an important method in risk scanning in educational units.
3. SPAB regulations and standards: Formulate local regulations in Greater Bandung that require the implementation of SPAB in every educational unit, including routine preparedness audits.

4. Inter-sectoral collaboration: Encourage collaboration between the government, private sector, and the community to support the development of sustainable SPAB.
5. Further research: Encourage the implementation of research related to the SPAB program in Greater Bandung in order to improve efforts and results from the SPAB program that are better, simpler, and easier to implement so that they are sustainable.

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