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Research Article

APPLICATION OF SELF-RESCUE TRAINING MODULE ON DISASTER PREPAREDNESS KNOWLEDGE AMONG STUDENTS AT MADINATUL QURAN ISLAMIC BOARDING SCHOOL, BOGOR

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Abstract:

Background: Indonesia's geographic position within the Pacific Ring of Fire creates high vulnerability to geological and hydrometeorological hazards. Islamic boarding schools (pesantren) exhibit elevated disaster risks due to high living density, dormitory layouts, and predominantly adolescent occupant demographics.

Objective: To determine the effect of a self-rescue training module on disaster preparedness knowledge among female students (santriwati) at Madinatul Quran Islamic Boarding School, Bogor. Methods: This study used a quasi-experimental pretest-posttest control group design. From a population of 153 students, 138 participants met the inclusion criteria through total sampling with random odd-even allocation into an experimental group (n = 70) receiving a pocket-book training module and a control group (n = 68) receiving standard school guidance. Knowledge was evaluated before and after intervention using a validated multiple-choice questionnaire (r > 0.361, Cronbach's alpha = 0.821). Data were analyzed using the Kolmogorov-Smirnov test for normality and the Wilcoxon signed-rank test for paired comparisons.

Results: Prior to intervention, 74.29% (n = 52) of respondents in the experimental group had 'good' knowledge, and 25.71% (n = 18) had 'sufficient' knowledge. Following module delivery, respondents demonstrating 'good' knowledge in the experimental group increased significantly to 98.57% (n = 69), with only 1.43% (n = 1) remaining in the 'sufficient' category (Wilcoxon Z = -6.106, p < 0.001). Conversely, the control group showed no statistically significant change over the observation period (pretest good: 82.35% vs. posttest good: 89.71%; Z = -0.657, p = 0.511).

Conclusion: Application of the self-rescue training module significantly enhances disaster preparedness knowledge among boarding school students.

Keywords: Disaster preparedness; Islamic boarding school; Knowledge; Pocket book; Self-rescue training module; Students

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1. INTRODUCTION

Indonesia is geographically and tectonically positioned in one of the most hazardous disaster-prone corridors in the world. Straddling the active Pacific Ring of Fire and situated at the convergent boundaries of three major tectonic plates the Eurasian, Indo-Australian, and Pacific plates the Indonesian archipelago experiences incessant seismic and volcanic turbulence (Taufan Maulana & Andriansyah, 2024; Zainol et al., 2023). Geological phenomena such as earthquakes, tsunamis, and volcanic eruptions, alongside hydrometeorological extremes fueled by tropical weather systems, represent permanent environmental realities. According to official historical repositories from the National Disaster Management Agency, Indonesia has recorded more than 11.274 disaster incidents resulting in approximately 193.240 fatalities and cumulative economic damages exceeding IDR 420 trillion (Taufan Maulana & Andriansyah, 2024). This staggering burden underscores the critical necessity of fostering institutional disaster awareness and community resilience across all sectors of society.

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Within West Java Province, Bogor Regency represents a critical hotspot characterized by a high Disaster Risk Index. Bogor's topography, dominated by steep volcanic highlands, undulating hills, and proximity to active tectonic faults most notably the Cimandiri and segment faults creates extraordinary susceptibility to mass soil movements and landslides (Pratiwi et al., 2022). Compounded by high annual precipitation rates, flash floods and torrential windstorms frequently impact human settlements. Official statistics released by the Regional Disaster Management Agency (BPBD) of Bogor Regency documented 1,826 natural disaster occurrences during 2025 alone, causing significant structural devastation, loss of life, and disruption to residential zones (Mahendra, 2026). In this hazardous context, educational communities residing in mountainous and river basin corridors face persistent threats requiring structured preparedness.

Among diverse educational environments, Islamic boarding schools display unique institutional vulnerabilities during sudden-onset disasters. Characterized by high population density, multi-tier dormitory quarters, shared communal facilities, and 24-hour occupancy by predominantly pediatric and adolescent learners, boarding schools face compounded risks of mass panic and evacuation congestion (Iswati et al., 2024; Zam et al., 2022). The catastrophic potential of these settings was illustrated during the late 2025 hydrometeorological disasters across Sumatra and Aceh, which claimed 1,068 lives, inundated 226 Islamic boarding schools, and tragically resulted in 20 students and teachers swept away by sudden flash floods in Southeast Aceh (Hanifa & Meidyana, 2025; Noviansah, 2025). Despite such evident risks, initial field assessments at Madinatul Quran Islamic Boarding School in Bogor revealed that students had never received systematic disaster training, lacked tailored evacuation guidelines, and had only been exposed to incidental, non-curriculum safety briefings.

Empirical literature across disaster nursing and health promotion indicates that knowledge constitutes the fundamental pillar of disaster preparedness; without cognitive mastery of danger signs and evacuation protocols, rational self-rescue behaviour cannot be executed (Abou Hashish & Banoona, 2023; Fazeli et al., 2024). Nonetheless, widespread evaluations among Indonesian secondary students consistently identify sub-optimal preparedness levels (Puspitasari & Atun, 2021). Structured health education using standardized pocket books and simulation modules has demonstrated superior efficacy in bridging this cognitive deficit compared to passive lectures (Iqra & Tahir, 2022; Rosdiyanah et al., 2021). A portable pocket book offers structured, step-by-step guidance, standardized BNPB emergency procedures, visual clarity, and permanent accessibility during unexpected crises (Winarti & Gracya, 2023; Yanuarto et al., 2019).

To address this empirical gap, this study aimed to examine the effect of applying a self-rescue training module (in the form of an instructional pocket book) on disaster preparedness knowledge among students at Madinatul Quran Islamic Boarding School, Bogor, in 2026. The findings are intended to supply actionable evidence for community health nurses and boarding school administrators seeking to institutionalize resilient disaster mitigation protocols.

2. METHODS

2.1 Research Design

This quantitative study employed a quasi-experimental research design utilizing a non-equivalent pretest-posttest control group approach. The research design is structured as follows: both the experimental group and the control group underwent baseline knowledge assessment (pre-test, O1). Subsequently, the experimental group received health education intervention using a dedicated self-rescue training module (X), while the control group

received standard boarding school routine guidance without the specific module. Following the intervention period, both groups were subjected to post-intervention evaluation (post-test, O2).

2.2 Research Population and Sample

The target population comprised all registered female students residing at Madinatul Quran Islamic Boarding School, Bogor, totaling 153 individuals. Initial recruitment utilized a total sampling strategy. Allocation into two groups was performed using systematic odd-even numbering from 1 to 153, whereby odd-numbered students were initially assigned to the experimental group (n = 76) and even-numbered students to the control group (n = 77). Following screening, 138 respondents met the final study criteria, resulting in 70 participants in the experimental group and 68 participants in the control group.

2.3 Research Setting and Time

The research was conducted at Madinatul Quran Islamic Boarding School, located in Bogor Regency, West Java, Indonesia. The study took place in 2026.

2.4 Research Procedures

The research was conducted in three chronological stages: administrative preparation, intervention implementation, and evaluation. During preparation, administrative permission was obtained, and learning activity units were finalized. The self-rescue training module was developed into a portable pocket book covering four core pedagogical modules: (1) definition, types, and regional disaster risks (floods, landslides, strong winds); (2) practical self-rescue phases (pre-disaster, during-impact, and post-disaster); (3) local emergency contact systems; and (4) disaster preparedness bag preparation, adapted from standard BNPB guidelines (Yanuarto et al., 2019).

2.5 Data Collection Techniques

Primary data collection was executed via self-administered closed-ended questionnaires distributed at baseline (pre-test) prior to module orientation, and re-administered under identical supervised conditions following intervention completion (post-test). Raw test scores were tabulated based on the proportion of correct responses.

2.6 Research Instruments

The measurement instrument consisted of a structured multiple-choice questionnaire developed by the researchers based on BNPB disaster preparedness indicators. The instrument underwent prior psychometric testing among 30 non-sampled respondents, demonstrating valid item-total correlation coefficients ($r > 0.361$) and high internal consistency reliability (Cronbach's alpha = 0.821). Knowledge percentage scores were categorized into three ordinal classifications based on standard Indonesian pedagogical thresholds: 'Good' (76%–100%), 'Sufficient' (56%–75%), and 'Poor' (< 56%).

2.7 Data Analysis

Data were processed using IBM SPSS Statistics software. Univariate analysis was conducted to establish frequency distributions and percentages across knowledge categories for both groups before and after intervention. Data distribution was tested for normality using the One-Sample Kolmogorov-Smirnov test, which yielded a significance value of $p < 0.001$, confirming non-normal distribution. Consequently, bivariate hypothesis testing was performed using the non-parametric Wilcoxon Signed-Rank Test to evaluate pre-test versus post-test score differences within each group at alpha = 0.05.

2.8 Ethical Considerations

Prior to data collection, all student respondents were informed about the study's objectives, procedures, potential benefits, and risks. Informed consent was obtained voluntarily from

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each respondent, with written parental consent and student assent obtained where applicable. Respondents were assured of the confidentiality of their personal information, voluntary participation, and the right to withdraw from the study at any time without any consequences.

3. RESULTS AND DISCUSSION

3.1. Result

A total of 138 respondents completed the baseline and post-intervention evaluations, comprising 70 respondents in the experimental group and 68 respondents in the control group. Table 1 presents the frequency distribution of disaster preparedness knowledge prior to the educational intervention.

Table 1. Disaster Preparedness Knowledge of Boarding School Students Prior to Module Intervention

Knowledge Category	Control Group (n = 68)		Experimental Group (n = 70)	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Poor (< 56%)	1	1.47	0	0.00
Sufficient (56% – 75%)	11	16.18	18	25.71
Good (76% – 100%)	56	82.35	52	74.29
Total	**68**	**100.00**	**70**	**100.00**

Source: Primary questionnaire data, 2026

Table 2. Disaster Preparedness Knowledge of Boarding School Students After Module Intervention

Knowledge Category	Control Group (n = 68)		Experimental Group (n = 70)	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Poor (< 56%)	3	4.41	0	0.00
Sufficient (56% – 75%)	4	5.88	1	1.43
Good (76% – 100%)	61	89.71	69	98.57
Total	**68**	**100.00**	**70**	**100.00**

Source: Primary questionnaire data, 2026.

Table 3. Wilcoxon Signed-Rank Test Results on Knowledge Scores Pre and Post Intervention

Group	Statistical Parameter	Post-Test – Pre-Test	p-value (Asymp. Sig. 2-tailed)	Statistical Decision
Experimental (n = 70)	**Wilcoxon Z-Score**	**-6.106**	**p < 0.001***	**Significant (Reject H0)**
Control (n = 68)	Wilcoxon Z-Score	-0.657	p = 0.511	Not Significant (Accept H0)

**Statistically significant at alpha < 0.05. Source: Primary questionnaire data, 2026.*

The findings demonstrate that health education using a structured self-rescue training module in pocket-book format significantly improved disaster preparedness knowledge among boarding school students ($Z = -6.106$, $p < 0.001$). The proportion of students with good knowledge in the experimental group increased from 74.29% to 98.57%, representing a 24.28-percentage-point improvement, whereas the control group showed no significant change ($p = 0.511$). These findings are consistent with previous studies reporting the effectiveness of module-based training, disaster pocket books, and structured educational interventions in improving disaster preparedness knowledge, critical thinking, self-efficacy, and emergency response competencies (Iqra & Tahir, 2022; Rosdiyanah et al., 2021; Iswati et al., 2024; Zam et al., 2022; Fazeli et al., 2024; Abou Hashish & Banoona, 2023). The results also support the importance of targeted disaster education in residential educational institutions.

The improvement can be explained through Nola Pender's Health Promotion Model and David Kolb's Experiential Learning Theory, which emphasize self-efficacy, active learning, and engagement in health-promoting behaviors (Winarti & Gracya, 2023). The pocket book helped transform fragmented disaster awareness into structured and actionable knowledge by organizing information into mitigation, emergency response, and post-disaster safety stages (Yanuarto et al., 2019). Its concise explanations, standardized emergency checklists, contact information, and visual illustrations may facilitate understanding, independent learning, and knowledge retention (Rosdiyanah et al., 2021). Although baseline knowledge was already relatively good (74.29%–82.35%), students may still have lacked practical understanding of local hazards and appropriate emergency procedures. This is particularly important in areas vulnerable to flash floods and landslides, where inadequate procedural preparedness may increase the risk of panic during emergencies (Pratiwi et al., 2022). Therefore, a low-cost, nurse-designed pocket book may offer a practical and scalable approach to strengthening disaster preparedness in Islamic boarding schools across Indonesia.

3.3. Implications

The findings have direct policy and practical implications for boarding school administrators, the Ministry of Religious Affairs (Kemenag), and local disaster management agencies (BPBD). Pocket-book-based disaster training modules should be formally integrated into mandatory new student orientation programs. Community health nurses stationed at local health centers can utilize this modular format to conduct routine school health outreach, certifying student dormitories as Disaster-Resilient Boarding Schools.

3.4 Research contribution

This research contributes empirical, quasi-experimental field evidence validating the utility of BNPB-aligned self-rescue modules in a high-density, adolescent female boarding school population in West Java. It provides clear baseline and post-test data that demonstrate the inadequacy of passive guidance and the high responsiveness of students to structured printed instructional media.

3.5 Limitations

Several methodological limitations must be acknowledged: (1) The study evaluated only cognitive knowledge via multiple-choice testing, without assessing practical psychomotor skills, evacuation speed, or affective panic responses; (2) The sample was limited to female students at a single institution, limiting generalizability to male cohorts or different school types.

3.6. Suggestions

Future investigations should implement randomized cluster trials integrating real-time simulation drills, measure psychomotor performance using objective structured clinical/disaster evaluations (OSDE), and conduct periodic booster sessions to assess knowledge retention over time. School authorities are advised to establish physical evacuation signage, designate clear assembly points, and ensure that every dormitory room is equipped with a functional Disaster Preparedness Bag.

4. CONCLUSION

The application of a self-rescue training module in the format of an instructional pocket book significantly increases disaster preparedness knowledge among female students at Madinatul Quran Islamic Boarding School, Bogor ($Z = -6.106$, $p < 0.001$), elevating students with 'good' knowledge from 74.29% to 98.57%. The module provides an effective, portable, and easily standardized educational medium for primary disaster mitigation in crowded boarding school environments. However, given the absence of practical simulation evaluations and long-term retention tracking in the primary study, further research incorporating objective behavioural drills is warranted to establish complete operational preparedness.

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AUTHOR CONTRIBUTIONS STATEMENT

All authors contributed to the conception and design of the study, data collection, data analysis, interpretation of the results, and manuscript preparation. All authors reviewed, revised, and approved the final version of the manuscript and agreed to be accountable for the integrity and accuracy of the work.

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