

## THE EFFECTIVENESS OF DISASTER EMERGENCY RESPONSE TRAINING ON FAMILY FIRST AID SKILLS IN EMERGENCY SITUATIONS IN AN EARTHQUAKE-PRONE COMMUNITY

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### ABSTRAK

Gempa bumi dapat menimbulkan kondisi darurat yang membutuhkan pertolongan pertama secara cepat dan tepat. Keluarga berperan sebagai penolong pertama sebelum tenaga kesehatan tiba sehingga keterampilan pertolongan pertama perlu diperkuat melalui pelatihan terstruktur. Penelitian ini bertujuan menganalisis efektivitas pelatihan tanggap darurat bencana terhadap keterampilan pertolongan pertama keluarga di wilayah rawan gempa bumi Kecamatan Mesjid Raya. Penelitian menggunakan desain pra-eksperimental dengan pendekatan *one-group pretest-posttest*. Sebanyak 35 responden di Perumnas Neuheun, Desa Ujung Batee, dipilih menggunakan *consecutive sampling*. Intervensi meliputi edukasi, demonstrasi, dan simulasi tanggap darurat. Data dikumpulkan menggunakan kuesioner keterampilan pertolongan pertama dan dianalisis dengan uji *Wilcoxon*

*Signed Rank*. Sebelum intervensi, 37,1% responden memiliki keterampilan kategori sedang dan 62,9% kategori baik. Setelah intervensi, seluruh responden (100%) mencapai kategori baik. Rerata skor keterampilan meningkat dari 26,80 menjadi 29,71. Hasil uji *Wilcoxon* menunjukkan peningkatan yang signifikan ( $Z = -4,253$ ;  $p < 0,001$ ). Pelatihan tanggap darurat bencana efektif meningkatkan keterampilan pertolongan pertama keluarga. Pelatihan berbasis edukasi, demonstrasi, dan simulasi dapat diterapkan untuk memperkuat kesiapsiagaan keluarga di wilayah rawan gempa bumi.

### ABSTRACT

Earthquakes can create emergency situations requiring rapid and accurate first aid. Families act as initial responders before healthcare professionals arrive; therefore, first aid skills need to be strengthened through structured training. This study aimed to analyze the effectiveness of disaster emergency response training on the first aid skills of families in the earthquake-prone area of Mesjid Raya District. A pre-experimental design with a one-group pretest-posttest approach was employed. Thirty-five respondents from Perumnas Neuheun, Ujung Batee Village, were selected using consecutive sampling. The intervention comprised education, demonstrations, and emergency response simulations. Data were collected using a first aid skills questionnaire and analyzed using the Wilcoxon Signed Rank test. Prior to the intervention, 37.1% of respondents possessed moderate-level skills, while 62.9% possessed good-level skills. Following the intervention, all respondents (100%) achieved the "good" category. The mean skill score increased from 26.80 to 29.71. The Wilcoxon test results indicated a significant improvement ( $Z = -4.253$ ;  $p < 0.001$ ). Disaster

*emergency response training is effective in enhancing family first aid skills. Training programs incorporating education, demonstrations, and simulations can be implemented to strengthen family preparedness in earthquake-prone regions.*

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## INTRODUCTION

Indonesia is one of the most disaster-prone countries in the world due to its geographical location at the convergence of four major tectonic plates: the Eurasian, Indo-Australian, Pacific, and Philippine Plates. This geographical condition makes Indonesia highly susceptible to various geological disasters, particularly earthquakes, which may occur unexpectedly and result in fatalities, infrastructure damage, as well as significant social, economic, and public health impacts. Earthquakes frequently create emergency situations that require immediate and appropriate responses to reduce morbidity and mortality among affected populations (Badan Nasional Penanggulangan Bencana, 2023; Rosyida et al., 2024)

Aceh Province is among the regions with the highest seismic activity in Indonesia. Since the devastating earthquake and tsunami in 2004, the province has continued to experience recurrent earthquakes of varying magnitudes, posing substantial risks to local communities. According to the Indonesian Agency for Meteorology, Climatology, and Geophysics (BMKG), more than 1,200 earthquakes were recorded in Aceh in 2023, while several earthquakes with magnitudes of  $\geq 5.0$  were still reported in 2025, indicating that the threat of seismic disasters remains significant. One of the earthquake-prone areas is Mesjid Raya District, Aceh Besar Regency, which is located near the active Seulimeum Fault Segment. The geological characteristics of this area, including alluvial deposits and soft soil formations, may amplify seismic waves and increase the vulnerability of communities to earthquake-related hazards (Asnawi et al., 2023; Badan Meteorologi Klimatologi Geofisika, 2023; World Health Organization., 2022)

Earthquakes not only cause physical destruction but also disrupt healthcare services, transportation systems, communication networks, and the distribution of essential resources. During the early phase of a disaster, access to professional medical is often delayed due to damaged infrastructure, limited healthcare personnel, and disrupted transportation routes. Consequently, family members become the first responders who play a critical role in performing initial evacuation and providing first aid during the *golden period* before professional assistance becomes available. Timely and appropriate first aid can help stabilize victims, prevent further injury, and improve survival outcomes during

emergency situations (Arifah et al., 2024; Badan Nasional Penanggulangan Bencana, 2023; Yunus et al., 2024).

Family first aid competency is influenced by several factors, including knowledge, educational background, previous experience, access to health information, and participation in disaster preparedness training. Disaster emergency response training that combines educational sessions, demonstrations, simulation-based learning, and hands-on practice has been shown to improve participants' knowledge, practical skills, and self-confidence in responding to emergency situations. These findings are consistent with previous studies reporting that first aid education significantly improves participants' understanding of emergency response procedures. Likewise, simulation-based learning has been demonstrated to enhance both knowledge and practical skills related to basic life support and emergency care. Therefore, integrating education with practical simulations is considered an effective approach to strengthening family first aid competency in disaster-prone communities (Badan Nasional Penanggulangan Bencana, 2023; Mastura et al., 2024; Salawati, N., Syahputra., R.A., Marpaung, E., 2024; Wulandari et al., 2025)

The present study is theoretically grounded in Bandura's Social Learning Theory, which proposes that individuals acquire knowledge and behavioral skills through observation, imitation, and repeated practice. In disaster emergency response training, participants are not only provided with theoretical information but are also encouraged to observe demonstrations, participate in emergency simulations, and practice first aid techniques directly. This learning process facilitates the development of appropriate emergency response behaviors, enabling family members to respond more effectively, confidently, and safely during actual disaster situations (Bandura, 1977; Bandura, A., 2021)

Although various disaster preparedness programs have been implemented in Aceh, most interventions have primarily targeted students, volunteers, and emergency professionals, whereas families living in residential communities have received comparatively limited attention. Preliminary observations conducted in the Perumnas Neuheun community, Ujung Batee Village, Mesjid Raya District, Aceh Besar Regency, revealed that most families had never participated in disaster emergency response training or first aid education. This finding is consistent with previous studies indicating that, despite having basic knowledge of disasters, many community members still demonstrate limited practical skills in responding to emergency situations. These findings highlight a substantial gap between disaster-related knowledge and the practical first aid competency

required at the household level, particularly in earthquake-prone communities (LIPI, 2020; Madeni et al., 2024; Suryadi et al., 2021)

Given these circumstances, interventions aimed at improving family competency in providing timely, appropriate, and safe first aid during disasters are urgently needed. However, evidence regarding the effectiveness of disaster emergency response training in improving family first aid competency among earthquake-prone communities in Mesjid Raya District remains limited. Therefore, this study aimed to examine the effectiveness of disaster emergency response training on family first aid competency in emergency situations among families living in an earthquake-prone community in Mesjid Raya District, Aceh Besar Regency. The findings are expected to provide scientific evidence to support the development of family-based disaster preparedness programs and strengthen community resilience against future earthquake disasters.

## **METHODS**

This study employed a quantitative pre-experimental design using a one-group pretest–posttest approach to evaluate the effectiveness of disaster emergency response training on family first aid competency before and after the intervention. The study was conducted in the Perumnas Neuheun community, Ujung Batee Village, Mesjid Raya District, Aceh Besar Regency, Indonesia, from October to November 2025.

The study population consisted of 460 households, with a total of 35 respondents selected using a consecutive sampling technique based on predetermined inclusion and exclusion criteria. The intervention consisted of disaster emergency response training, including educational sessions, demonstrations, simulations, and first aid practice.

Family first aid competency was assessed using a 30-item questionnaire with a total score ranging from 0 to 30. The instrument demonstrated excellent content validity, with a Scale Content Validity Index/Average (S-CVI/Ave) of >0.90, construct validity assessed using the Pearson Product–Moment correlation test, and high reliability using the Kuder–Richardson Formula 20 (KR-20), yielding a Cronbach's alpha coefficient of 0.926. Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize respondents' characteristics and family first aid competency. Data normality was assessed using the Shapiro–Wilk test. As the data were not normally distributed ( $p < 0.05$ ), differences between pretest and posttest scores were analyzed using the Wilcoxon Signed-Rank Test with a significance level of  $p < 0.05$ .

## RESULT AND DISCUSSION

**Table 1.** Frequency distribution of respondent characteristics (n = 35)

| Characteristics                                | n  | %    |
|------------------------------------------------|----|------|
| <b>Gender</b>                                  |    |      |
| Male                                           | 0  | 0    |
| Female                                         | 35 | 100  |
| <b>Age (years)</b>                             |    |      |
| 18-25                                          | 11 | 31.4 |
| 26-35                                          | 8  | 22.9 |
| 36-45                                          | 10 | 28.6 |
| >45                                            | 6  | 17.1 |
| <b>Education Level</b>                         |    |      |
| Elementary School                              | 2  | 5.7  |
| Junior High School                             | 12 | 34.3 |
| Senior High School                             | 16 | 45.7 |
| Bachelor's Degree                              | 5  | 14.3 |
| <b>Occupation</b>                              |    |      |
| Housewife                                      | 23 | 65.7 |
| Teacher                                        | 5  | 14.3 |
| Midwife                                        | 1  | 2.9  |
| Private Employee                               | 6  | 17.1 |
| <b>Previous Disaster Simulation Experience</b> |    |      |
| Yes                                            | 0  | 0    |
| No                                             | 35 | 100  |

Based on **Table 1**, all respondents in this study were female (100%), indicating that the disaster emergency response training was attended entirely by women who predominantly served as homemakers and played a central role in providing care and first aid to family members. Most respondents were in the productive age group of 18–25 years (31.4%), had completed senior high school education (45.7%), and were homemakers (65.7%). In addition, none of the respondents (100%) had previously participated in disaster emergency response simulations or first aid training.

These characteristics indicate that the respondents represent a population with an essential role in providing initial emergency care within the family but have limited prior experience in disaster preparedness. The absence of previous participation in disaster response simulations may contribute to inadequate preparedness and limited competency in delivering appropriate first aid during emergency situations. Wulandari et al. (2025) reported that first aid education significantly improved participants' knowledge, enabling them to provide appropriate initial emergency care. Similarly, Mastura et al. (2024) demonstrated that simulation-based learning effectively enhanced participants' knowledge and practical skills in performing basic life support. Therefore, the characteristics of the respondents in this study suggest that disaster emergency response training is a relevant

intervention for improving family first aid competency, particularly because none of the participants had previously received similar training.

**Table 2.** Frequency Distribution of Family First Aid Competency Before and After Disaster Emergency Response Training (n = 35)

| Family First Aid Competency | Pretest |      | Posttest |     |
|-----------------------------|---------|------|----------|-----|
|                             | n       | %    | n        | %   |
| Poor (0-10)                 | 0       | 0    | 0        | 0   |
| Fair (11-20)                | 13      | 37.1 | 0        | 0   |
| Good (21-30)                | 22      | 62.9 | 35       | 100 |

Based on **Table 2**, the pretest results showed that most respondents were already classified as having good family first aid competency (62.9%), while 37.1% demonstrated a fair level of competency, and none were categorized as having poor competency. Following the disaster emergency response training, all respondents (100%) achieved the good competency category, with no participants remaining in the fair or poor categories. These findings indicate an overall improvement in the distribution of family first aid competency after the training intervention.

The improvement in family first aid competency suggests that the disaster emergency response training effectively enhanced respondents' knowledge and practical skills in managing emergency situations. The training combined educational sessions, demonstrations, simulations, and hands-on practice, enabling participants not only to acquire theoretical knowledge but also to apply first aid procedures in practical scenarios, thereby promoting more effective learning. These findings are consistent with Bandura's *Social Learning Theory*, which emphasizes that individuals develop new knowledge and skills through observation, imitation, and repeated practice in realistic situations (Bandura, 1977; Bandura, 2021). The present findings are also in line with those of Wulandari et al. (2025), who reported that first aid education significantly improved participants' knowledge of emergency management. Similarly, Mastura et al. (2024) demonstrated that simulation-based learning effectively enhanced participants' knowledge and practical skills in performing basic life support. Therefore, the disaster emergency response training implemented in this study proved to be an effective intervention for strengthening family first aid competency and enhancing community preparedness in earthquake-prone areas.

**Table 3.** Mean scores of family first aid competency before and after disaster emergency response training (n = 35)

| Variable  | n  | Minimum | Maximum | Mean  | Standard Deviation (SD) |
|-----------|----|---------|---------|-------|-------------------------|
| Pre-test  | 35 | 13      | 30      | 26.80 | 4.59                    |
| Post-test | 35 | 26      | 30      | 29.71 | 0.83                    |

Based on **Table 3**, the pretest results showed that the mean family first aid competency score before the disaster emergency response training was 26.80 (SD = 4.59), with scores ranging from 13 to 30. Following the training, the mean score increased to 29.71 (SD = 0.83), with a minimum score of 26 and a maximum score of 30. The findings indicate an increase of 2.91 points in the mean family first aid competency score after the intervention. Furthermore, the reduction in the standard deviation from 4.59 to 0.83 suggests that respondents' competency became more homogeneous following the training, indicating a more consistent level of knowledge and practical skills among participants.

The increase in the mean score indicates that disaster emergency response training effectively improved family first aid competency. The combination of educational sessions, demonstrations, simulations, and hands-on practice enabled participants to better understand and apply first aid procedures in emergency situations. These findings support Bandura's Social Learning Theory, which emphasizes that learning through observation and repeated practice can improve knowledge and skills (Bandura, 1977; Bandura, 2001). The results are also consistent with previous studies by Wulandari et al. (2025) and Mastura et al. (2024), which reported that first aid education and simulation-based training significantly improved participants' knowledge and practical skills. Therefore, disaster emergency response training can be considered an effective approach to strengthening family first aid competency in earthquake-prone communities.

**Table 4.** Shapiro-wilk normality test results

| Variable  | Statistic | df | P-Value |
|-----------|-----------|----|---------|
| Pre-test  | 0.702     | 35 | 0.000   |
| Post-test | 0.405     | 35 | 0.000   |

Based on **Table 4**, the Shapiro-Wilk normality test showed that both the pretest and posttest data had  $p$ -values of  $<0.001$ . Since these values were below the significance level of 0.05, the data were not normally distributed. Therefore, the assumption of normality was not fulfilled, indicating that a non-parametric statistical test was required for further analysis.

The normality test plays an important role in determining the most appropriate statistical method for hypothesis testing. Because the distribution of both pretest and posttest scores did not meet the assumption of normality, the Wilcoxon Signed-Rank Test was selected to compare respondents' family first aid competency before and after the disaster emergency response training. This approach ensures that the statistical analysis is appropriate for the characteristics of the data and provides more reliable results in evaluating the effectiveness of the intervention. The use of the Wilcoxon Signed-Rank Test

is consistent with methodological recommendations for paired data that are not normally distributed, thereby strengthening the validity of the study findings.

**Table 5.** Wilcoxon signed-rank test results for family first aid competency before and after disaster emergency response training (n = 35)

| Category       | n  | Mean Rank | Sum of Ranks | Z     | P-Value (2-tailed) |
|----------------|----|-----------|--------------|-------|--------------------|
| Negatif Ranks  | 0  | 0.00      | 0.00         | 4.154 | 0.000              |
| Positive Ranks | 22 |           | 253.00       |       |                    |
| Ties           | 13 | 11.50     |              |       |                    |

Based on **Table 5**, the Wilcoxon Signed-Rank Test showed that no respondents experienced a decrease in family first aid competency after the disaster emergency response training (negative ranks = 0). In contrast, 22 respondents demonstrated an improvement in competency (positive ranks), with a mean rank of 11.50 and a sum of ranks of 253.00, while 13 respondents showed no change in their scores (ties). The statistical analysis yielded a Z value of -4.153 with a *p*-value of <0.001, indicating a statistically significant difference in family first aid competency before and after the intervention. These findings demonstrate that disaster emergency response training effectively improved family first aid competency. The findings indicate that disaster emergency response training effectively improved family first aid competency. The combination of educational sessions, demonstrations, simulations, and hands-on practice enabled participants to better understand and apply first aid procedures in emergency situations. These findings support Bandura's *Social Learning Theory*, which explains that knowledge and skills develop through observation and repeated practice (Bandura, 1977; Bandura, 2001). The results are also consistent with previous studies by Wulandari et al. (2025) and Mastura et al. (2024), which reported that first aid education and simulation-based training significantly improved participants' knowledge and practical skills. Therefore, disaster emergency response training is an effective strategy for strengthening family first aid competency in earthquake-prone communities.

## CONCLUSION

This study demonstrated that disaster emergency response training was effective in improving family first aid competency among families living in the earthquake-prone community of Mesjid Raya District, Aceh Besar. Following the intervention, participants showed improved first aid competency, as reflected by higher posttest scores and a statistically significant difference between pretest and posttest results. The integration of educational sessions, demonstrations, simulations, and hands-on practice enabled

participants to strengthen both their knowledge and practical skills in providing first aid during emergency situations. These findings indicate that disaster emergency response training is an effective community-based educational strategy for enhancing family preparedness and empowering families to act as first responders before professional medical assistance becomes available. Therefore, similar training programs should be implemented more widely in disaster-prone communities to strengthen community resilience and improve disaster preparedness.

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