

Relationship Between Self-Efficacy and Fire Preparedness Among Residents

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ABSTRACT

The National Disaster Management Agency (BNPB) recorded 2,051 forest and land fire incidents and 2,020 building and residential fire cases in Indonesia. In Surakarta, fires in Joyosudiran Village have recurred despite efforts to improve residents' knowledge, indicating the need to consider other factors, such as self-efficacy, in disaster response. Objective: To determine the relationship between self-efficacy and fire preparedness among residents of Joyosudiran Village, Pasar Kliwon, Surakarta. Methods: This study used a quantitative approach with a cross-sectional correlational design and the Spearman rho test. A total of 149 respondents were selected using proportional cluster random sampling. The instruments were the General Self-Efficacy Scale (GSES) and a fire-preparedness questionnaire based on modified LIPI/UNESCO indicators. Results: Most respondents were in the early older-adult age group, were female, had a high-school/equivalent education, and had experienced fires 2–3 times. Most respondents had high self-efficacy, and fire preparedness was predominantly categorized as very ready. The Spearman rho test yielded $p = 0.015$ ($p < 0.05$) and $r = 0.199$. Conclusion: There was a significant, weak, positive relationship between self-efficacy and fire preparedness among residents of Joyosudiran Village, Surakarta.

Keywords: self-efficacy; preparedness; fire disaster



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INTRODUCTION

Natural disasters occurring worldwide include floods, droughts, extreme weather, and forest and land fires. Countries frequently experiencing forest and land fires include the United States, Indonesia, Colombia, China, Brazil, the Philippines, Venezuela, and Afghanistan. The National Fire Protection Association (NFPA) reported that 7–8 million people worldwide have experienced fire incidents and 5–8 million have sustained fire-related injuries. In the United States, 1,345,500 fires were reported, causing 3,280 deaths, 15,700 injuries, and substantial property losses. NFPA estimates that fire departments in the United States respond to a fire every 23 seconds, a residential building fire is reported every 95 seconds, a residential fire injury occurs every 52 minutes, and a residential fire death occurs every 3 hours. In 2023, 1,389,000 fires resulted in 3,670 civilian deaths and 13,350 civilian injuries. In addition, 89 firefighters died; the number of fatal firefighter injuries was the second highest since 2013. Indonesia is a tropical country with diverse forests and biological resources. With a population of 278.7 million and a forest area of 994,313.18 hectares,

Indonesia also experiences land fires. Prolonged dry seasons can increase the number of ignition points and fire incidents. Fires have occurred in various provinces, including North Sumatra, South Sumatra, Kalimantan, East Java, Central Java, Riau, and Sulawesi (1).

A major fire occurred in early January 2025 at Glodok Plaza, a popular shopping and entertainment center in West Jakarta. Fire suppression required approximately 10 hours, involving 45 fire engines and 230 personnel. Fourteen people were reported missing, and nine victims were found dead at the site. A total of 650 shops were affected. The Jakarta Regional Disaster Management Agency estimated material losses of more than IDR 90 billion from the affected areas on floors 7, 8, and 9 alone, excluding losses from the other units in the shopping center (2).

The Surakarta Fire Department reported that the largest fire in terms of affected area and losses during 2023–2024 occurred in Pasar Kliwon District, specifically in Joyosudiran Village. A fire in a scrap warehouse spread to residential areas in one community unit (RW) comprising three neighborhood units (RT). The incident caused approximately IDR 3 billion in material losses. On the night of the incident, 17 households (52 people) evacuated to the Pasar Kliwon Village Office. Subsequent reports indicated greater impacts, involving 24 houses and 34 households (112 people) who evacuated. Fifteen fire engines and more than 30 personnel were deployed. An additional 30-meter fire hose was required because fire engines could not access the village. In addition to losing homes, some residents lost their livelihoods because their businesses were destroyed. No fatalities were reported, although several residents sustained minor injuries while fetching water from the river to help extinguish the fire (3).

Before the September 2023 fire, the Surakarta Fire Department had routinely conducted emergency fire-response training sessions in Joyosudiran Village. Interviews with residents indicated that they had received training on fire-extinguishing skills through training sessions and social media, demonstrating that residents had already obtained knowledge about responding to fires (4).

Preparedness is one phase of disaster management, as stipulated in Law No. 24 of 2007 on disaster management. Communities, as the primary elements directly affected by disasters, need to have the capacity to respond independently because disaster losses are strongly influenced by community preparedness, knowledge, and skills. Indicators used to assess community disaster preparedness based on LIPI-UNESCO/ISDR (2006) include knowledge, preparedness attitudes, emergency response plans, early warning systems, and resource mobilization (5).

Knowledge and individual assessment of one's capabilities can also influence disaster preparedness (6). Knowledge is important, but individuals also need confidence or belief in their own capabilities, referred to as self-efficacy. Self-efficacy strengthens motivation to achieve success; the stronger an individual's belief in their own capabilities, the stronger their commitment and effort to complete tasks and achieve goals (7).

A preliminary study conducted in January in Joyosudiran Village involved interviews with seven residents who had been affected by fires. Residents reported that they had frequently received fire-response training before fires occurred, but when a fire actually occurred, they felt uncertain and lacked confidence in their ability to manage it. An interview with the local RW leader confirmed that residents felt uncertain about their ability to extinguish fires and tended to rely on the fire department.

The focus on preparedness in this study was based on initial field findings showing that some residents still engaged in risky behavior, such as burning waste near densely populated residential areas, and that community members had low confidence in acting when a fire occurred. These conditions reflect weaknesses in knowledge and attitudes as well as resource-mobilization capacity, which are key indicators of preparedness according to LIPI–UNESCO/ISDR. This study did not focus on preventive structural disaster mitigation but on individuals’ capacity to respond directly to disasters, which is strongly influenced by self-efficacy.

Based on the above problems, no previous study had examined the relationship between self-efficacy and fire preparedness among residents of Joyosudiran Village, Pasar Kliwon, Surakarta. Therefore, this study was conducted to examine the relationship between self-efficacy and fire preparedness among residents of Joyosudiran Village, Pasar Kliwon, Surakarta.

METHODS

This study used a descriptive-analytic quantitative approach because it was inferential, with conclusions based on statistical hypothesis testing using empirical data obtained through measurement during data collection. A cross-sectional correlational design was used to determine whether two or more variables were related. The study examined the relationship between self-efficacy and fire preparedness among residents of Joyosudiran Village.

The population consisted of all residents of Joyosudiran Village, totaling 200 people. Proportional cluster random sampling was used to determine the number of respondents from the population. Data consisted of primary data obtained through interviews with selected respondents and secondary data from the National Fire Protection Association (NFPA), the National Disaster Management Agency (BNPB), the Regional Disaster Management Agency (BPBD), the Surakarta Fire Department, the Pasar Kliwon Village Office, books, and journals.

Data processing involved editing, coding, data transfer, and organizing raw data into a structured form. Research ethics included informed consent, anonymity, confidentiality, and veracity.

RESULTS

The following results describe the frequency distribution of respondent characteristics, self-efficacy, and fire preparedness among residents of Joyosudiran Village.

Univariate Analysis

Table 1. Frequency distribution of respondents by age

Age category	Frequency (n)	Percentage (%)
Late adolescence (17–25 years)	25	16.8
Early adulthood (26–35 years)	27	18.1
Late adulthood (36–45 years)	33	22.1
Early older adulthood (46–55 years)	35	23.5
Older than 55 years	29	19.5
Total	149	100

Most respondents were in the early older-adult age group (46–55 years), comprising 35 respondents (23.5%).

Table 2. Frequency distribution of respondents by sex

Sex	Frequency (n)	Percentage (%)
Male	70	47.0
Female	79	53.0
Total	149	100

Female respondents predominated, with 79 respondents (53.0%), while 70 respondents (47.0%) were male.

Table 3. Frequency distribution of respondents by educational level

Education	Frequency (n)	Percentage (%)
Elementary school/equivalent	30	20.1
Junior high school/equivalent	39	26.2
Senior high school/equivalent	45	30.2
Higher education	35	23.5
Total	149	100

The most common educational level was senior high school/equivalent, with 45 respondents (30.2%), while elementary school/equivalent was the least common, with 30 respondents (20.1%).

Table 4. Frequency distribution of respondents by fire experience

Fire experience	Frequency (n)	Percentage (%)
Never	2	1.3
Once	32	21.5
2–3 times	105	70.5
More than 3 times	10	6.7
Total	149	100

Most respondents had experienced a fire 2–3 times (105 respondents; 70.5%), while 2 respondents (1.3%) had never experienced a fire.

Table 5. Distribution of self-efficacy levels

Self-efficacy level	Frequency (n)	Percentage (%)
Low	0	0
Moderate	3	2.0
High	146	98.0
Total	149	100

Most respondents had high self-efficacy (146 respondents; 98.0%), while 3 respondents (2.0%) had moderate self-efficacy and none had low self-efficacy.

Table 6. Distribution of fire preparedness levels

Fire preparedness	Frequency (n)	Percentage (%)
Not ready	0	0
Less ready	1	0.7
Nearly ready	2	1.3
Ready	50	33.6
Very ready	96	64.4
Total	149	100

Most respondents were categorized as very ready (96 respondents; 64.4%), followed by ready (50; 33.6%), nearly ready (2; 1.3%), and less ready (1; 0.7%).

Bivariate Analysis

Table 7. Relationship between self-efficacy and fire preparedness among residents of Joyosudiran Village

Self-efficacy	Less ready n (%)	Nearly ready n (%)	Ready n (%)	Very ready n (%)	Total	p	r
Moderate	0 (0.0%)	0 (0.0%)	2 (66.7%)	1 (33.3%)	3	0.015	0.199
High	1 (0.7%)	2 (1.4%)	49 (33.6%)	94 (64.4%)	146		
Total	1 (0.7%)	2 (1.3%)	50 (33.6%)	96 (64.4%)	149		

Among respondents with moderate self-efficacy, 66.7% were categorized as ready and 33.3% as very ready. Among those with high self-efficacy, 64.4% were very ready and 33.6% were ready. The Spearman rho test showed $p = 0.015$ ($p < 0.05$), indicating a significant relationship between self-efficacy and fire preparedness. The correlation coefficient ($r = 0.199$) indicated a weak positive relationship, meaning that higher self-efficacy was associated with higher fire preparedness.

DISCUSSION

Respondent characteristics by age. The study showed that the largest age group was early older adulthood (46–55 years), with 35 respondents (23.5%). This is consistent with Indah (8), whose study of disaster-mitigation understanding was dominated by respondents aged 46–55 years (37 respondents; 34.3%). Similarly, Andini (9) reported that 69.2% of respondents were in the early older-adult category (46–55 years). Jepisa (10) reported that most older adults had high self-efficacy (68.57%). Early older adults may be more prepared to face disasters because they generally have stronger physical capabilities than older adults in later age groups (9). The researcher concluded that individuals in early older adulthood may have relatively greater psychological stability during crises and may be more capable of decision-making.

Respondent characteristics by sex. Female respondents constituted 53.0% of the sample, compared with 47.0% male respondents. This finding is consistent with Priambada (11), in which 54.2% of respondents were female, and Labora (12), in which 57% were female. Tia

(13) also reported high self-efficacy among most female respondents. Sex may influence self-efficacy; previous research has reported higher self-efficacy among women than men (14). Compared with men, women may also constitute a higher proportion of people exposed to disaster risk (15).

Respondent characteristics by education. Senior high school/equivalent was the most common educational level (45 respondents; 30.2%). Priambada (11) similarly reported senior high school as the most common level (82 respondents; 56.9%), while Yulianti (16) found that 35.5% of respondents had senior high school education. Indah (8) reported good knowledge and attitudes regarding mitigation and preparedness among respondents with senior high school education. Endriono reported that 12 respondents (75%) with senior high school education had good self-efficacy knowledge. Higher education may facilitate information acquisition and increase experience, knowledge, and confidence. Education can influence cognitive perception; individuals with higher education may have stronger reasoning abilities (6).

Respondent characteristics by fire experience. Most respondents had experienced fires 2–3 times (105 respondents; 70.5%). Anisa (17) reported a moderate level of disaster experience (78.98%), while Andini (9) found high disaster experience among 95% of subjects. People who have received disaster information or experienced disasters more frequently tend to have higher preparedness and self-efficacy than those without such experience (18). Individuals with direct disaster experience may develop better self-efficacy than those who have never experienced a disaster (17).

Self-efficacy among residents of Joyosudiran Village. Most residents had high self-efficacy (146 respondents; 98.0%). Priambada (11) reported high self-efficacy in 62.5% of respondents, while Endriono (6) reported 57.1%. Sithoresmi (18) also reported a high level of self-efficacy among respondents. The present data were predominantly from women. Psychological and social factors may influence self-efficacy, including emotional responses, stress, social support, and verbal communication, which can contribute to confidence-building.

Fire preparedness among residents of Joyosudiran Village. Most residents demonstrated high fire preparedness, with 64.4% categorized as very ready. This is consistent with Trifianingsih (5), who reported 59.5% as very ready. Sithoresmi (18) found a high preparedness level in 63.84% of respondents. The findings suggest that preparedness is shaped not only by technical factors but also by experience, knowledge, and supportive social structures. Adequate preparedness can facilitate faster and more appropriate disaster response and reduce casualties and damage.

Preparedness by indicator. For knowledge and attitudes, 147 respondents (98.7%) were categorized as very ready. This is consistent with the first LIPI-UNESCO parameter, which identifies knowledge and attitudes concerning natural phenomena and preparedness as key aspects of disaster anticipation (19). Attitudes are influenced by knowledge and can affect disaster readiness, particularly among people living in high-risk areas (20). For policies and guidelines, 62.4% of respondents were very ready and 21.5% were ready, consistent with Pramono (21), who reported 62.8% as ready. For emergency plans, 68.5% were very ready, consistent with Priambada (11), who reported good emergency-response planning among 54.9% of respondents. Most residents had prepared anticipatory measures such as evacuation routes, assembly points, and role distribution during fires.

For early warning systems, the largest proportions were ready (44.3%) and very ready (40.3%). This is consistent with Pramono (21), who found 53.5% of respondents categorized as ready, and Priambada (11), who reported good preparedness in this aspect among 87.5% of respondents. For resource mobilization, 43.0% were very ready, 34.9% nearly ready, and 20.8% ready. Priambada reported good resource-mobilization preparedness in 93.8% of respondents, whereas Pramono reported that 69.8% were less ready. Although overall preparedness was good in the present study, resource capacity still needs strengthening, including trained personnel and supporting facilities such as fire extinguishers, hydrants, and evacuation access. Early warning systems also remain an area for improvement.

Relationship between self-efficacy and fire preparedness. Among respondents with moderate self-efficacy, 66.7% were ready and 33.3% were very ready. Among respondents with high self-efficacy, 64.4% were very ready, 33.6% were ready, 1.4% were nearly ready, and 0.7% were less ready. The Spearman rho test yielded $p = 0.015$ ($p < 0.05$) and $r = 0.199$, indicating a significant, weak, positive relationship. Thus, higher self-efficacy was associated with higher fire preparedness. This finding is consistent with Sithoresmi (18), who found a significant relationship ($p = 0.000$; $r = 0.380$), and Endriono (6), who also found a significant relationship ($p = 0.000$). In contrast, Tia (13) reported no significant relationship ($p = 0.226$).

According to Bandura's concept of self-efficacy, individuals with high self-efficacy tend to have confidence when facing uncertain situations. Self-efficacy is related to preparedness because it influences action, decision-making, and the ability to cope with stressors. The weak correlation in the present study indicates that factors other than self-efficacy may also influence preparedness. These external factors were not specifically examined in this study. Overall, the findings support the view that self-efficacy plays an important role in disaster preparedness. People with high self-efficacy tend to be more confident and optimistic in responding to emergencies. Experiences such as disaster training and simulations may strengthen confidence and the ability to plan, recognize early warnings, and mobilize resources effectively.

CONCLUSION

Most residents of Joyosudiran Village were in the early older-adult age group, were female, had a senior high school/equivalent education, and had experienced fires 2–3 times. Most residents had high self-efficacy, and fire preparedness was predominantly categorized as very ready. There was a significant relationship between self-efficacy and fire preparedness among residents of Joyosudiran Village, with a weak positive correlation.

Recommendations: Educational institutions may use this study as a reference, particularly in disaster-management courses. Communities may use the findings to increase knowledge regarding self-efficacy and fire preparedness. Future researchers may use this study as a reference for further research on self-efficacy and fire preparedness. Local government, the Surakarta Fire Department, the Surakarta BPBD, and other disaster-management organizations may use these findings as a basis for designing fire-preparedness training programs that strengthen self-efficacy.

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