

Strengthening urban community resilience through fire risk education and mitigation in Depok City

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Abstract

Fire is a primary non-natural disaster threat in densely populated urban areas like Depok City. This community service program aims to enhance community capacity in Limo District through fire risk mitigation and household prevention techniques. The implementation method involved focus group discussions with community leaders and participatory education utilizing presentations, posters, and flyers. Community knowledge was measured through pre-test and post-test questionnaires. The results demonstrated a significant increase in fire safety literacy, with knowledge scores rising from 78.11% to 89.19%. The program's success was driven by active citizen participation and strong support from village officials and local leaders. These findings emphasize that multi-stakeholder collaboration and communicative visual education approaches are crucial prerequisites for building community self-reliance in fire disaster mitigation within urban environments.

Keywords: Disaster; Education; Fire; Mitigation; Prevention

Penguatan resiliensi masyarakat urban melalui edukasi dan mitigasi risiko kebakaran di Kota Depok

Abstrak

Kebakaran merupakan salah satu ancaman bencana non-alam utama di wilayah pemukiman padat penduduk seperti Kota Depok. Program pengabdian ini bertujuan untuk meningkatkan kapasitas masyarakat di Kecamatan Limo melalui pemahaman mitigasi risiko dan teknik pencegahan kebakaran rumah tangga. Metode pelaksanaan dilakukan melalui diskusi terfokus dengan tokoh masyarakat serta edukasi partisipatif menggunakan media presentasi, poster, dan flyer. Pengetahuan masyarakat diukur menggunakan instrumen kuesioner sebelum dan sesudah intervensi. Hasil kegiatan menunjukkan peningkatan signifikan pada literasi keselamatan kebakaran, dengan skor pengetahuan meningkat dari 78,11% menjadi 89,19%. Keberhasilan program ini didorong oleh partisipasi aktif warga serta dukungan kuat dari perangkat desa dan tokoh masyarakat. Temuan ini menegaskan bahwa kolaborasi multipihak dan pendekatan edukasi visual yang komunikatif merupakan prasyarat krusial dalam membangun kemandirian masyarakat terhadap mitigasi bencana kebakaran di lingkungan perkotaan.

Kata Kunci: Bencana; Edukasi; Kebakaran; Mitigasi; Pencegahan

1. Introduction

One of the agendas in the Sustainable Development Goals (SDGs) is to build inclusive, safe, resilient, and sustainable cities and settlements. Substantively increase the number

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of cities and settlements that adopt and implement integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, and resilience to disasters in line with the Sendai Framework for Disaster Risk Reduction 2015-2030 ([United Nation Office for Disaster Risk Reduction, 2015](#)). Disasters, both natural and social, can occur anywhere and anytime, with residential fires contributing significantly to global injury and economic burdens ([Kementrian PPN, 2020b, 2020a; Rahman et al., 2023; Shokouhi et al., 2019](#)). Systematic reviews highlight that evidence-based policies integrating education, engineering, enforcement, and economic incentives are essential for reducing fire risks in vulnerable communities ([Amiri & Almklov, 2023; Liu et al., 2025](#)).

Fire is an uncontrolled fire that produces oxidation-reduction reactions and continuously generates heat. Fire is also known as a condition that arises due to uncontrolled fire that endangers the safety of life and property. Fires originate from nature, namely the hot sun and lightning, and also originate from non-natural causes caused by human negligence, namely exploding LPG tanks, electrical short circuits and others ([Lestari et al., 2025; Masruchin et al., 2021](#)).

Based on data from the Central Statistics Agency, in 2021 the number of fires that occurred in DKI Jakarta was 1535 cases, where 516 fire cases occurred in residential areas, 274 cases in buildings, 16 cases in industry, 102 cases in motorized vehicles and 627 others. Central Statistics Agency, stated that the number of fire cases in 2022 increased by 10.61% compared to 2021, namely 1,691, with the main causes being electricity, followed by others, gas, burning garbage, cigarettes and candles ([BPS Provinsi Jakarta, 2021, 2023](#)).

In fire management, coaching and training activities are one of the prevention activities at the pre-fire stage. Coaching activities can be carried out by counseling using media such as posters, videos, teaching materials and so on. Conducted fire disaster preparedness education using PowerPoint and animated videos to make it easier for students to understand how to prepare for fires ([Indri et al., 2023; Seyedin et al., 2020](#)). [Rasmani \(2021\)](#), in their research by conducting counseling on self-preparedness for early childhood facing fires is effective as a form of fire prevention education. [Riasasi & Augusta \(2018\)](#) also conducted education on fire prevention using posters and leaflets. Likewise, [Aini et al. \(2022\)](#), used a guidebook for learning activities on fire disaster mitigation for children aged 5-6 years.

Disaster management is everyone's business. Therefore, it is necessary to share roles and responsibilities in increasing preparedness at all levels for children, adolescents and adults. Individual preparedness to anticipate disaster events includes knowledge and response to disaster risks that they may face. In other words, there needs to be a real effort to increase public knowledge about basic disaster knowledge and increase community capacity in dealing with disasters ([Rizqullah et al., 2024; Supartini et al., 2017](#)).

Family preparedness policies can take the form of family agreements regarding evacuation sites in emergency situations, person in charge (PIC) or the person responsible and family agreements to carry out or participate in evacuation simulations ([LIPI-UNESCO/ISDR, 2006](#)). In addition, preparations such as first aid kits and logistics for dealing with disasters are something that needs to be prepared carefully, considering that disasters can occur anywhere and at any time. According to research and surveys

in Japan, the Great Hanshin Earthquake 1995, disaster victims who were able to survive in the “golden times” were caused by: Self-preparedness 35%, family member support 31.9%, friend/neighbor support 28.1%, support from people around him 2.60%, support from the SAR Team 1.70% and Others 0.90%. Based on this study, it can be seen that the community, both individually and in groups, plays a very important role in disaster events in terms of evacuation which demands to be improved in order to create a disaster-resilient society. Based on several studies and survey results references, BNPB encourages the public to be able to manage threats from disasters that often/potentially occur in their environment. The public must know and understand what to do when an earthquake, building fire, tsunami, flash flood, landslide or volcanic eruption occurs in their location ([Supartini et al., 2017](#)).

Limo Village, which is located in the middle of Depok City, and the condition of Depok City which is increasingly crowded with newcomers. This is one of the justifications for developing the capacity of disaster-prepared villages by considering the linkages between local policy makers. The risk of fire is very high in Limo Village and public knowledge is still very lacking about understanding disasters and preventing and mitigating disasters such as fires ([FIKES UPNVJ, 2025; Rizki, 2024](#)). The community service activities proposed several practical and sustainable solutions that can be directly implemented by the partner, Kelurahan Limo, to strengthen fire preparedness and community resilience. These solutions collectively empower the Limo community to improve their knowledge, strengthen their response capacity, and build a more resilient and disaster-ready environment.

2. Method

The community service activity on fire disaster mitigation education for residents of Limo Village was conducted on Friday, 12 September 2025, from 09:00 to 11:30, at the Limo Village Hall. The session was attended 32 people by community representatives from each neighborhood association (RW), along with health cadres, youth organization members (Karang Taruna), and local RT administrators. These participants were selected as key community stakeholders who play a strategic role in disseminating disaster preparedness information and promoting safe practices within their respective areas.

Based on the problems, the service team is trying to create a solution with the following activity structure. First, the preparation stage contains a survey to identify problems and carry out situation and problem analysis by conducting discussions with partners to analyze the situation and determine the problems to be solved. Second, the implementation stage contains (a) preparation by discussing with the Village Head, Head of RW and Head of RT, Cadres, Religious Leaders, and youth organizations; (b) socialization of activities and providing posters and flyers containing educational material; (c) initial data collection (participants fill out a questionnaire to measure the level of knowledge about fire and fire prevention); (d) education regarding fire and fire emergency response; (e) final data collection (participants fill out a questionnaire to measure the increase in knowledge after the intervention); and (f) handover of fire extinguishers to the Limo Village.

Third, evaluation and program sustainability. Evaluation of the implementation and sustainability plan of the Community Service program, namely Fire Prevention

Education in the Community, is designed to ensure that the program is not only successful in the short term but can also be continued independently by the community. Measuring the short-term impact of activities on community knowledge, attitudes and behavior, namely: (a) increasing public knowledge about fire prevention (measured through pre-test and post-test); (b) community's ability to use fire extinguishers (measured through simulation); and (c) Level of community preparedness in dealing with fires (measured through surveys). By actively involving the community, building a strong organizational structure, and obtaining support from the government and stakeholders, this program is expected to provide long-term benefits in reducing fire risk and increasing community preparedness.

To support the evaluation process, a knowledge questionnaire consisting of 15 multiple-choice questions was used to assess participants' understanding of fire mitigation, sources of fire hazards, household electrical safety, gas leak handling, evacuation procedures, and safe behavior during fire emergencies. The total score was converted into a percentage scale (0–100%) to represent each participant's level of knowledge. The results of the pre-test and post-test were then compared descriptively to identify the improvement in community knowledge after the educational activities.

3. Results and Discussion

The fire prevention education activity in Limo Village, Limo District, Depok City, represents a strategic effort to disseminate critical knowledge, technology, and art to the community, functioning as a vital intervention for disaster risk reduction. The program was executed seamlessly according to the established plan, a success attributed to the full support of village apparatus and the active participation of 32 key stakeholders, including RT/RW representatives, health cadres, and youth organizations (Figure 1). This multi-stakeholder involvement aligns with the findings of Al-Hajj et al. (2022), who confirm that effective fire interventions must integrate the “4E” framework: education, engineering, engagement, and enforcement. By prioritizing the engagement aspect, the service team fostered a sense of communal ownership over local safety.



Figure 1. Fire education and fire emergency response in Limo Village

At the outset, a pre-test was conducted to establish a baseline of public knowledge regarding fire hazards. The results revealed a significant gap, with an average score of only 78.11% (Table 1), indicating that many residents still viewed fires as unavoidable “fate” rather than a manageable risk. Most participants lacked a family evacuation plan

and possessed no practical skills in operating a Light Fire Extinguisher (APAR). To address these deficiencies, the service team provided comprehensive material covering the causes of residential fires, ranging from electrical short circuits to negligence with LPG and candles, alongside the fundamental principles of a “Fire Safe House.” The methodology transitioned from interactive lectures and group discussions to direct field simulations. This shift is crucial, as literature suggests that educational interventions limited to lectures tend to produce low retention, whereas direct practice and visual media significantly enhance understanding and self-efficacy ([Indri et al., 2023](#); [Johnston & Tyler, 2022](#)).

Tabel 1. Pre-test and post-test results

Variable	Score (%)	Improvement
Pre-test	78.11	
Post test	89.19	11.08

The core of the education focused on household fire mitigation and family-level preparedness. Participants were taught to identify risk factors, such as non-standard electrical cables and improper gas leak checks, while being introduced to the necessity of disaster preparedness bags and evacuation maps. Remarkably, while 80% of participants had never prepared an evacuation plan before, the majority were able to successfully draw house plans with designated meeting points following the intervention. This hands-on approach is consistent with global best curriculum and research by [Kodur et al. \(2019\)](#), which emphasizes that reliable fire protection systems and public awareness are the dual keys to mitigating building fire hazards. The economic implications of such preparedness are vast; as [Rahman et al. \(2023\)](#) notes, residential fires can incur staggering costs in lost productivity and property damage, ranging into the billions of dollars globally.

The post-test results demonstrated the program’s efficacy, with the average knowledge score rising significantly to 89.19%. This 11.08% increase mirrors meta-analyses showing that interactive, hands-on fire safety programs consistently yield substantial knowledge gains ([Johnston & Tyler, 2022](#); [Tyas et al., 2025](#)), contributing to a reduction in fire-related injuries and property loss ([Ahrens, 2019](#); [Higgins et al., 2016](#); [McKenna et al., 2018](#)). Furthermore, the intervention successfully instilled a culture of preparedness, as evidenced by the initiative of RT heads and PKK cadres to integrate fire safety material into routine neighborhood gatherings. To symbolize this transformation and ensure sustainability, the service team handed over an APAR unit to the Limo Village government ([Figure 3](#)), marking the village’s transition toward becoming a resilient disaster-ready community, a principle of empowerment emphasized by [Nasution \(2011\)](#).

Despite these positive outcomes, which support the Sendai Framework for Disaster Risk Reduction 2015–2030, certain limitations remain. The reach of the program is currently limited to 32 participants, and as [Rasmani et al. \(2021\)](#) points out, knowledge retention can diminish in less than six months without repetition. Therefore, long-term monitoring and recurring simulations are essential. Future programs may also benefit from innovative technologies such as Augmented Reality (AR), which [Domguez K et al. \(2025\)](#) found significantly increases learning motivation and confidence in fire safety training. Ultimately, this activity confirms that fire prevention education in Limo Village is not only effective in building immediate skills but is also deeply relevant to international

best practices in fire risk management and long-term community empowerment (Lailiyah et al., 2021; Widyasari et al., 2020).



Figure 3. Handover of fire extinguishers to the head of Limo Village

4. Conclusion

The fire prevention education activity in Kelurahan Limo has been carried out smoothly, orderly and according to plan. Active participation from participants, support from village officials, and the involvement of community leaders are key factors for success. This shows that multi-stakeholder collaboration is an important prerequisite in disaster risk mitigation programs. The evaluation results show a significant increase in the level of public knowledge and skills. The average pre-test score of 78.11% increased to 89.19% on the post-test. Despite its success, this activity has limitations. First, the number of participants is relatively small and does not yet represent the entire population of Limo Village. Second, the evaluation is still short-term, so the long-term impact on behavior cannot be ascertained. For this reason, repeated training, periodic simulations, and monitoring at least every 6 months are needed to maintain the sustainability of the results.

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Author Contribution

Activity implementation: S, DU, FJ; Article preparation: S, DU, FJ, YA, NA; Analysis of service impact: S, NA; Presentation of service results: S, DU; Article revision: S, DU.

Conflict of Interest

The authors state that there is no conflict of interest in the publication of this article.

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