

COMMUNITY PERCEPTIONS OF FIRE PREVENTION AND FIRE MANAGEMENT EFFORTS IN A DENSELY POPULATED RESIDENTIAL AREA FOLLOWING A MAJOR FIRE: A STUDY OF DR. SUTOMO STREET, ALLEY 8, SAMARINDA CITY

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ABSTRACT

Residential fires remain a major challenge in densely populated urban settlements, where effective disaster risk reduction depends not only on institutional capacity but also on community participation. This study examines how a major fire incident shaped community risk perception and evaluates the role of community-based fire mitigation initiatives, particularly the Fire Volunteers (Redkar) and the PRO-BEBAYA Program, in strengthening fire prevention and management efforts in Dr. Sutomo Street, Alley 8, Sidodadi Village, Samarinda Ulu District, Samarinda City. A qualitative case study approach was employed involving officers from the Samarinda City Fire Department, neighborhood leaders, and residents affected by fire incidents selected through purposive sampling. Data were collected through semi-structured interviews, observations, and documentation and analyzed using the interactive model of Miles, Huberman, and Saldaña. The findings reveal that Redkar and the PRO-BEBAYA Program strengthened community awareness, preparedness, and participation in fire mitigation through education, training, and the provision of firefighting equipment. The 2024 major fire emerged as the primary factor shaping community risk perception, encouraging greater vigilance, stronger community participation, and improved preparedness for emergency response. Nevertheless, persistent structural vulnerabilities, including high building density, wooden housing, narrow access roads, and limited water resources, continue to constrain effective fire management. The novelty of this study lies in demonstrating how disaster experience and community-based mitigation programs interact to shape collective risk perception and preparedness while highlighting the continued influence of environmental vulnerability on fire management effectiveness. These findings contribute to the development of disaster sociology and risk perception studies and provide practical recommendations for strengthening community-based fire mitigation policies in densely populated urban settlements.

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INTRODUCTION

Residential fires remain one of the most significant non-natural disasters affecting urban areas worldwide, particularly in densely populated settlements. In recent years, numerous studies have demonstrated that fire risk is influenced not only by technical factors such as building conditions and electrical installations but also by social dimensions, including risk perception, community preparedness, and the capacity of local communities to undertake preventive actions and provide an initial response during fire emergencies. Research on fire risk perception indicates that individuals with direct disaster experience tend to exhibit higher levels of awareness and preparedness than those who have never encountered similar events. Furthermore, risk perception influences self-protective behavior, decision-making processes, and community participation in disaster mitigation programs (Kyei et al., 2026; Ndalila et al., 2024). Contemporary disaster studies further emphasize that successful disaster risk reduction depends not only on governmental institutional capacity but also on the active involvement of communities as key actors in community-based disaster resilience systems.

In the Indonesian context, residential fires remain frequent occurrences in many major cities and generate substantial social, economic, and psychological consequences. High building density, the extensive use of combustible construction materials, limited neighborhood accessibility, and inadequate fire protection infrastructure contribute significantly to the vulnerability of residential areas to fire disasters. Previous studies have shown that community preparedness for fire hazards varies considerably and is strongly influenced by levels of knowledge, experience, and exposure to fire safety awareness programs. Communities that regularly participate in fire training and simulation exercises generally demonstrate greater capacity to perform initial firefighting and evacuation measures than those without such experience (Evangelista & Silvitasari, 2024; Waldani et al., 2024).

Samarinda City, located in East Kalimantan Province, contains several densely populated residential areas characterized by relatively high fire risk. One of the most vulnerable locations is Dr. Sutomo Street, Alley 8, Sidodadi Village, Samarinda Ulu District. This area is characterized by high building density, a predominance of wooden houses, and narrow access roads that limit the mobility of firefighting vehicles. These conditions significantly increase the vulnerability of the area to rapid fire spread. The major fire incident that occurred in 2024, which destroyed dozens of houses, became a critical turning point that transformed community perceptions of fire risk and highlighted the importance of community-based mitigation efforts.

Interviews with officers of the Samarinda City Fire Department revealed that the Dr. Sutomo area has been the target of various fire prevention initiatives, including fire safety awareness campaigns, the establishment of Community-Based Early Fire Prevention Villages (Bekensikat/Redkar), the provision of fire pumps and portable fire extinguishers (APAR), and the construction of water storage facilities to support firefighting operations. Despite these efforts, firefighters continue to encounter substantial challenges during fire emergencies, particularly due to dense settlements, the predominance of wooden structures, limited water resources, and narrow access roads that restrict firefighting vehicles from reaching all affected locations. These findings suggest that although institutional capacity has been strengthened, social and environmental factors remain major obstacles to effective fire management.

From the community perspective, direct experience with fire disasters has become a crucial factor shaping risk perception and preparedness. Interviews with neighborhood leaders and affected residents indicated that community participation in fire awareness programs and training activities increased significantly following the 2024 fire incident. Residents who previously lacked knowledge regarding the use of portable fire extinguishers and fire response procedures became more confident and capable of taking initial action during emergencies. Experiences of housing loss, economic hardship, and threats to family safety fostered a collective awareness of the importance of fire prevention. These findings are consistent with previous studies indicating that disaster experience is a dominant factor influencing risk perception and preparedness behavior toward fire hazards and other disasters.

Although previous studies have substantially contributed to understanding urban fire disasters, their primary emphasis has remained on technical and institutional aspects, including fire risk mapping, infrastructure assessment, firefighting capacity, and quantitative measurements of community preparedness (Andini et al., 2020; Oktavian & Rahdriawan, 2023; Trifianingsih et al., 2022). These studies have successfully identified physical vulnerabilities and evaluated mitigation programs but provide limited explanation of how communities themselves interpret disaster experiences, construct risk perceptions, and respond to government-led fire prevention initiatives. As a result, the social processes underlying community preparedness remain insufficiently explored. From the perspective of disaster sociology, effective disaster risk reduction depends not only on physical infrastructure and institutional readiness but also on the meanings, experiences, and collective responses developed by communities following disaster events. Understanding these social dimensions is particularly important in densely populated settlements where community members often

become the first responders before formal emergency services arrive. Therefore, this study addresses this research gap by adopting a community perception perspective to examine how disaster experience, community knowledge, mitigation programs, and environmental vulnerability interact in shaping fire risk perception and preparedness within a high-risk urban settlement.

Theoretically, this study is grounded in the concept of perception, which explains that individuals develop understanding of events through experiences, knowledge, and social interactions. In the context of fire disasters, risk perception is shaped not only by information disseminated by government agencies but also by direct disaster experiences, interactions within the social environment, and evaluations of the effectiveness of implemented programs. Using a qualitative approach, this study explores how communities interpret fire experiences, understand risks within their environment, and assess fire prevention and management efforts implemented by government institutions and local communities.

Community perceptions regarding fire prevention and management efforts are assumed to be influenced by the level of knowledge individuals possess concerning fire risks, causes of fire incidents, and available mitigation measures. Communities that acquire knowledge through awareness campaigns, training programs, and information provided by the Fire Department are likely to develop more positive perceptions regarding the importance of fire prevention and management initiatives. This argument is consistent with the perception theories of Robbins and Judge (2009) and Walgito (2004), which identify knowledge as a key determinant in the formation of individual perceptions.

In addition to knowledge, direct experience of encountering or witnessing fire incidents is assumed to be a powerful factor shaping community risk perception. Previous fire incidents in Dr. Sutomo Street, Alley 8 encouraged residents to better understand the impacts of fire disasters and increased awareness regarding the importance of preparedness. According to Toha (2003), experience represents an internal factor influencing how individuals interpret and assign meaning to events. Previous studies have similarly found that communities with prior disaster experience generally demonstrate higher levels of vigilance and preparedness than those without such experiences.

Furthermore, the physical characteristics of densely populated settlements, closely spaced buildings, the dominance of wooden housing structures, and narrow access roads are believed to influence community perceptions regarding the severity of fire risk in their environment. Perceptions of environmental vulnerability subsequently encourage residents to participate in fire prevention and management activities, including attending awareness programs, utilizing portable fire extinguishers, and supporting community-based mitigation initiatives. Therefore, this study is based on the proposition that knowledge, experience, and environmental conditions collectively shape community perceptions of fire risk, which ultimately influence preparedness levels and participation in fire prevention and management efforts.

Based on these considerations, this study aims to analyze community perceptions of fire prevention and management efforts in Dr. Sutomo Street, Alley 8, Sidodadi Village, Samarinda Ulu District, Samarinda City. The study focuses on how community knowledge, understanding, and experiences shape perceptions of fire risk and existing mitigation programs. The findings are expected to contribute theoretically to the development of risk perception and community-based disaster studies while providing practical implications for local governments, fire departments, and communities in designing more participatory, adaptive, and socially responsive fire prevention and management strategies.

Community perception constitutes the central concept of this study because it relates to how individuals or groups interpret, understand, and assign meaning to phenomena occurring within their social environment. Robbins and Judge (2009) define perception as the process through which individuals organize and interpret sensory impressions to give meaning to their surroundings. Perception is influenced by internal factors such as experience, knowledge, attitudes, and expectations, as well as external factors including object characteristics and situational contexts (Walgito, 2004). In disaster contexts, risk perception is particularly important because it influences how communities assess threats, determine responses, and undertake mitigation actions. Botzen et al. (2021) found that higher levels of risk perception tend to encourage self-protective behavior and greater disaster preparedness. Consequently, community perceptions of fire prevention and management are shaped not only by received information but also by direct experiences, environmental conditions, and everyday social interactions.

Another relevant concept is community-based fire risk reduction. According to Ramli (2010), fire prevention encompasses a series of actions aimed at reducing the likelihood of fire occurrence through hazard control, knowledge enhancement, and community capacity building. Fire management, meanwhile, includes response, suppression, rescue, and post-disaster recovery efforts. Within disaster management frameworks, communities serve as the first line of response to fire threats before external assistance arrives (Nurjanah et al., 2012). Evangelista and Silvitasari (2024)

demonstrated that successful fire mitigation is strongly influenced by community participation in awareness campaigns, portable fire extinguisher training, and community-based preparedness systems. Similarly, Waldani et al. (2024) found that fire experiences increase risk awareness and encourage residents to become more actively involved in mitigation activities within their neighborhoods.

Previous studies indicate that research on residential fire disasters has been dominated by technical approaches, risk mapping, and institutional capacity assessments. Oktavian and Rahdriawan (2023) found that building density, limited accessibility, and low community capacity are key factors contributing to elevated fire risk in densely populated areas of Samarinda City. Andini et al. (2020) highlighted the role of the Fire Department in conducting awareness and prevention activities in Samarinda Ulu District, although their study focused primarily on institutional aspects. Meanwhile, Trifianingsih et al. (2022) examined community preparedness for fire disasters in Banjarmasin City and found that previous fire experience significantly enhances preparedness levels. However, these studies have not sufficiently explained how fire experiences, knowledge, and environmental conditions shape community perceptions regarding fire prevention and management efforts. Therefore, this study seeks to address this empirical gap by employing a community perception perspective to analyze the relationship between fire experience, community knowledge, environmental conditions, and preparedness in facing fire risks within densely populated residential areas.

METHOD

This study employed a qualitative approach using a case study design. The case study approach was selected because the research sought to develop an in-depth understanding of community perceptions regarding fire prevention and fire management efforts within a specific social context, namely Dr. Sutomo Street, Alley 8, Sidodadi Village, Samarinda Ulu District, Samarinda City. A case study design enabled the researchers to explore the experiences, meanings, and social interactions that emerged within the community following the major fire incident of 2024, as well as the various fire mitigation programs implemented by government institutions and local residents. The study was conducted between 2025 and 2026 and focused on a densely populated residential area characterized by a high level of fire vulnerability.

Research participants were selected using purposive sampling based on their ability to provide information relevant to the research objectives. The participants consisted of officers from the Samarinda City Fire Department, neighborhood leaders (RT heads) residing in fire-prone areas, and residents who had directly experienced or been affected by fire incidents. Participant selection was guided by the principle of information richness to ensure that the data collected could provide a comprehensive understanding of the phenomenon under investigation (Campbell et al., 2020; Rashid et al., 2024).

Data were collected through semi-structured interviews, field observations, and documentation. Semi-structured interviews were conducted to explore participants' experiences, knowledge, perceptions, and perspectives regarding fire risks, fire prevention programs, and community preparedness. Field observations were undertaken to identify physical environmental conditions, including building density, road accessibility, the availability of firefighting facilities, and other environmental characteristics that could increase fire risk. Documentation was used to complement the primary data through the collection of field photographs, policy documents, reports on public awareness activities, and relevant fire incident records.

To enhance the trustworthiness of the findings, this study applied source triangulation by comparing information obtained from Fire Department officers, neighborhood leaders, and affected residents. Method triangulation was undertaken by integrating evidence from interviews, observations, and documentary sources. Member checking was subsequently conducted with selected participants to confirm the accuracy of the researchers' interpretations and ensure that the findings faithfully represented participants' experiences (Stahl & King, 2020; Moon & Blackman, 2024).

Prior to data collection, all participants were informed about the objectives of the study, the voluntary nature of their participation, and their right to decline or withdraw from the interview at any stage without any consequences. Verbal informed consent was obtained from all participants before the interviews were conducted. To protect participants' privacy, personal information was treated confidentially and pseudonyms or role-based identifiers were used during data analysis and reporting. Given that several participants had experienced the 2024 fire disaster, interviews were conducted with sensitivity to their emotional condition, and participants were not required to discuss experiences that caused discomfort or distress.

Data analysis followed the interactive model developed by Miles, Huberman, and Saldaña, which consists of three main stages: data reduction, data display, and conclusion drawing. During the data reduction stage, interview transcripts,

observation notes, and documentary materials were reviewed, categorized, and organized according to the research themes. The reduced data were subsequently presented in the form of thematic narratives to facilitate the identification of patterns, relationships, and meanings emerging from participants' experiences. The final stage involved drawing conclusions and continuously verifying findings throughout the research process.

Thematic analysis was employed to identify key themes related to community knowledge of fire risks, experiences with fire incidents, perceptions of fire prevention and management programs, and forms of community preparedness in responding to fire hazards. Through this approach, the study aimed to generate a comprehensive understanding of how community perceptions of fire risk are socially constructed and how mitigation efforts evolve within densely populated residential areas of Samarinda City.

RESULT

Research Findings Matrix

Theme	Sub-theme	Informants	Main Findings
Perceptions of Fire Prevention Programs	Fire awareness campaigns and education	Mr. Zaki, Mr. Agus, Mr. Doni, Mr. Fauzi	Awareness programs were perceived as beneficial and contributed to improving community knowledge.
Fire Experience and the Formation of Risk Perception	Experience of the 2024 fire incident	Mr. Doni, Mr. Fauzi	Fire experience increased community vigilance and risk awareness.
Community Preparedness for Fire Emergencies	Portable fire extinguishers (APAR), fire pumps, and training	All informants	Preparedness improved through training activities and the distribution of firefighting equipment.
Environmental Vulnerability and Challenges in Fire Management	Narrow alleys, wooden houses, limited water supply, and crowds of spectators	All informants	Physical environmental vulnerability remains the primary challenge in fire management.

Authors' analysis based on interview, observation, and documentation data collected during fieldwork (2025–2026).

Community Perceptions of Fire Prevention Programs

The findings indicate that residents of Dr. Sutomo Street, Alley 8 generally hold positive perceptions of the fire prevention and management programs implemented by the Samarinda City Fire Department in collaboration with local government authorities. These positive perceptions have developed through community participation in fire awareness campaigns, training on the use of portable fire extinguishers (APAR), the establishment of Community-Based Early Fire Prevention Villages (Redkar), and the provision of supporting facilities through the PRO-BEBAYA Program. These initiatives have not only enhanced public knowledge regarding the causes and risks of fire but have also strengthened residents' capacity to undertake initial response measures during fire emergencies.

Interviews with officers from the Samarinda City Fire Department revealed that the Dr. Sutomo area receives continuous attention because it is classified as a fire-prone settlement. Fire prevention efforts extend beyond awareness campaigns and include community capacity-building through the establishment of community-based fire institutions. Mr. Zaki explained:

“The awareness activities were conducted in response to requests from neighborhood associations under the PRO-BEBAYA Program. These activities reached almost all neighborhood units along Dr. Sutomo Street, from Alley 2 to Alley 8, through educational programs on early fire management. Furthermore, in 2019 the area was officially designated as a Community-Based Early Fire Prevention Village, which is now known as Redkar.”

In addition to educational programs, residents have received support in the form of firefighting facilities and infrastructure distributed throughout the neighborhood. Informants perceived these facilities as enhancing community security and strengthening preparedness for potential fire incidents. Mr. Zaki further stated:

“Each neighborhood unit in fire-prone areas, particularly along Dr. Sutomo Street, has been equipped with fire pumps, fire hoses, and portable fire extinguishers (APAR). In 2025, a community-based neighborhood fire resilience unit was also established.”

Similar findings were reported by the head of Neighborhood Unit 38, who emphasized that regular fire awareness activities had significantly improved residents’ understanding of preventive measures. According to him, residents who previously lacked knowledge regarding fire emergencies had become more familiar with appropriate response procedures.

“The awareness programs included early prevention techniques, such as simple fire suppression methods using wet burlap sacks and other basic equipment. Through the PRO-BEBAYA Program, portable fire extinguishers are distributed annually to individual households.”

He further noted that these activities had influenced community attitudes and confidence in dealing with fire emergencies.

“Residents who were previously afraid of dealing with fire have become more confident and knowledgeable about initial fire response procedures after participating in these programs.”

Positive perceptions of fire prevention programs were also reflected in the high level of community enthusiasm for participating in awareness and training activities. The head of Neighborhood Unit 34, Mr. Doni Irawan, explained that residents showed strong interest in fire safety training because of previous fire experiences in their community. He highlighted that housewives were among the most active participants because they are often the first to detect fire hazards within households.

“Residents have shown tremendous enthusiasm, particularly because this area has experienced several fire incidents. Housewives, in particular, are highly engaged because they are usually the first to notice fires occurring within households.”

Similarly, the head of Neighborhood Unit 33, Mr. Fauzi, emphasized that the benefits of the awareness programs were directly experienced by community members. The activities improved not only knowledge of portable fire extinguisher use but also understanding of safe gas stove operation and household fire prevention measures.

“Community response has been highly enthusiastic. Many residents who previously lacked the confidence to operate fire extinguishers are now able to use them effectively. Likewise, residents who previously did not understand proper gas stove installation procedures have become more skilled.”

Overall, the findings demonstrate that residents perceive government-led fire prevention programs as beneficial and highly relevant to the needs of communities living in fire-prone areas. Awareness campaigns, training activities, APAR distribution, and community-based fire resilience initiatives have fostered a shared understanding that fire prevention is not solely the responsibility of government agencies but requires active community participation. The high level of public engagement in these programs indicates growing awareness and preparedness regarding potential fire hazards.

Fire Experience as a Determinant of Community Risk Perception

The findings reveal that direct experience with fire incidents has become a critical factor shaping community perceptions of fire risk in Dr. Sutomo Street, Alley 8. Repeated fire incidents, particularly the major fire of 2024, generated not only material losses but also significant social experiences that heightened public awareness of fire risks within the neighborhood. These experiences marked a turning point in how residents perceived fire hazards, transforming them from seemingly infrequent events into tangible threats that could occur at any time.

Most informants reported that the 2024 fire produced substantial psychological and social impacts. Many residents lost homes, possessions, and sources of income. Consequently, community members became more attentive to potential fire hazards, including aging electrical systems, unsafe gas stove usage, and closely spaced buildings. Direct exposure to the consequences of fire provided residents with a more concrete understanding of fire dangers than they had possessed previously.

The head of Neighborhood Unit 33, who was also a fire victim, explained:

“Within a period of only two months, this area experienced two major fires. The first occurred in 2023 and originated in Neighborhood Unit 32, while the second occurred in 2024 and spread from Neighborhood Unit 34 to Neighborhood Unit 33. Although my own house was destroyed, other residents and I worked together to prevent the fire from spreading to areas that could still be saved.”

This statement illustrates that the fire experience was not only individual but also collective in nature. During the emergency, residents collaborated to prevent the fire from spreading further, even while some of them were directly

affected by the disaster. Such experiences fostered awareness that fire management requires collective action rather than complete dependence on professional firefighting services.

The findings further indicate that significant behavioral changes occurred following the 2024 fire. Residents became more cautious in their use of electrical equipment and gas stoves and paid greater attention to the condition of household electrical installations. Moreover, community members increasingly recognized the importance of maintaining basic firefighting equipment as a precautionary measure. This awareness emerged from firsthand observation of how rapidly fire can spread in densely populated areas dominated by wooden structures.

According to the head of Neighborhood Unit 34:

“One of the key efforts implemented after the fire was the continuation of awareness programs. In 2025, additional educational activities were organized to strengthen public vigilance regarding fire risks.”

Similarly, the head of Neighborhood Unit 33 stated:

“Following the fire, efforts to increase public awareness became much more intensive. Awareness programs emphasized the importance of replacing old electrical wiring, servicing vulnerable gas stoves, and understanding how to use portable fire extinguishers.”

Overall, the findings indicate that fire experience has become a fundamental factor in shaping community risk perception. Such experiences not only increase individual vigilance but also foster collective awareness regarding the importance of prevention, preparedness, and participation in fire mitigation programs. The 2024 fire served as a transformative social experience that altered community perceptions of fire risk and encouraged more cautious behavior in everyday life.

Community Preparedness for Fire Emergencies

The findings demonstrate that the level of community preparedness in Dr. Sutomo Street, Alley 8 has improved considerably in recent years. This improvement is closely associated with ongoing fire prevention initiatives implemented by the Samarinda City Fire Department and local government authorities, particularly through the PRO-BEBAYA Program and the establishment of community-based fire resilience systems.

Preparedness is reflected not only in increased public awareness regarding fire risks but also in the availability of supporting facilities and equipment for initial emergency response. Interviews revealed that nearly all neighborhood units within the study area possess firefighting equipment, including portable fire extinguishers (APAR), fire pumps, hoses, and water storage facilities.

A Fire Department officer explained:

“All neighborhood units in fire-prone areas, particularly along Dr. Sutomo Street, have been equipped with fire pumps, fire hoses, and portable fire extinguishers.”

This finding suggests that preparedness enhancement has been pursued not only through education and training but also through the provision of practical resources that can be directly utilized during emergencies.

The head of Neighborhood Unit 34 further noted:

“Through the PRO-BEBAYA Program, nearly every household now possesses at least one portable fire extinguisher, and five firefighting equipment stations have been established throughout the area.”

The availability of firefighting equipment at both household and community levels provides opportunities for residents to suppress fires during the early stages before they escalate into larger disasters.

Preparedness is also evident in residents' improved ability to operate portable fire extinguishers and implement initial response procedures. Most participants who had attended training programs reported confidence in using APAR, performing basic fire suppression techniques, and following appropriate emergency response protocols.

The head of Neighborhood Unit 33 stated:

“Community response has been highly enthusiastic. Many residents who were previously hesitant to use fire extinguishers are now capable of operating them effectively. Residents who previously lacked knowledge about proper gas stove installation have also become more skilled.”

These findings indicate that training programs have not only increased knowledge but have also enhanced residents' confidence in responding to fire emergencies. Such capabilities are particularly important in densely populated settlements where fires can spread rapidly if not controlled immediately.

Another notable finding concerns the active involvement of housewives in fire awareness and training activities. Informants reported that women were among the most active participants because they are often present at home and are typically the first to detect signs of fire.

The head of Neighborhood Unit 34 explained:

“Housewives are particularly enthusiastic because they are often the first to recognize fire incidents within households. They actively ask questions about the safe use of gas cylinders and appropriate actions during emergencies.”

The active participation of women suggests that preparedness has evolved beyond the individual level and has become embedded within family and community awareness. Residents increasingly recognize that fire prevention and initial response are shared responsibilities requiring the involvement of all household members and community residents.

Overall, the findings indicate substantial progress in community preparedness. This is reflected in the availability of firefighting facilities at both household and neighborhood levels, improved skills in operating portable fire extinguishers, high participation rates in fire training programs, and growing collective awareness regarding the importance of rapid and appropriate action during fire emergencies. These developments demonstrate that residents have moved beyond being passive recipients of disaster management initiatives and have become active participants in a community-based fire preparedness system.

Environmental Vulnerability and Challenges in Fire Management

The findings indicate that despite the considerable improvement in community preparedness within Dr. Sutomo Street, Alley 8, the physical environment of the area remains highly vulnerable to fire hazards. This vulnerability is associated with the characteristics of the settlement, including high population density, closely spaced buildings, the predominance of wooden houses, and limited road accessibility, all of which complicate firefighting operations during emergencies. These conditions make Dr. Sutomo Street, Alley 8 one of the areas most susceptible to the rapid spread of fire once an incident occurs.

Interviews with officers of the Samarinda City Fire Department revealed that the physical characteristics of the neighborhood constitute the primary obstacle to effective fire suppression. According to the informants, the high density of buildings enables flames to spread quickly from one structure to another within a short period. This situation is further aggravated by the widespread use of wooden materials in residential construction.

Mr. Zaki explained:

“The primary challenge in managing fires in this area is related to its characteristics as a highly fire-prone settlement with a dense population. Most buildings are still constructed from wood. During the incident, the low water level in the river further worsened the situation. In addition, extremely narrow access roads significantly hindered firefighters’ ability to contain the fire rapidly.”

This statement demonstrates that fire vulnerability in the study area is influenced not only by human factors but also by structural environmental conditions that inherently carry a high level of risk. Building density and the use of highly combustible materials accelerate fire spread and increase the scale of potential losses.

Similar observations were reported by the head of Neighborhood Unit 34, who emphasized that the area is dominated by older buildings located in close proximity to one another. According to him, building density remains a constant source of concern among residents regarding potential fire outbreaks.

“The physical condition of buildings in this area is extremely dense, both in terms of population and building concentration. As an old residential settlement, many houses still use wooden construction, making the area highly susceptible to rapid fire propagation.”

This observation was reinforced by the head of Neighborhood Unit 33, who was also affected by previous fire incidents. He explained that many structures in the area are old buildings situated near the market district and continue to rely on combustible wooden materials.

“Buildings in this neighborhood are extremely dense and closely packed because of their proximity to the market area. Many are rental properties with aging wooden structures. These conditions caused the 2024 fire to spread rapidly and extensively.”

In addition to building density and construction materials, accessibility was identified as a major challenge in fire management. Most neighborhood roads are too narrow to allow firefighting vehicles to directly access all affected locations. Consequently, firefighters are often forced to operate from limited access points, delaying suppression efforts.

A Fire Department officer stated:

“Fire engines can only enter the area up to a certain point, specifically between Alley 2 and Alley 8, but they cannot reach all locations within the neighborhood. The narrow roads remain the main obstacle preventing firefighters from accessing the fire scene directly.”

Road accessibility was also highlighted by local neighborhood leaders. The head of Neighborhood Unit 38 noted that, in addition to narrow roads, the height of the neighborhood entrance gate poses a challenge for large firefighting vehicles.

“One physical issue requiring attention is the height of the entrance gate, which is currently insufficient for large fire engines. Increasing its height by approximately half a meter to one meter would enable firefighting vehicles to enter the area directly.”

Another challenge identified in the study concerns the limited availability of water resources. Although rivers and drainage channels exist around the settlement, water availability is often inadequate, particularly during periods of low river levels. As a result, both firefighters and community members face difficulties obtaining sufficient water supplies for effective firefighting operations.

The head of Neighborhood Unit 33 explained:

“One of the major obstacles is the limited availability of water sources. Water access points are scarce in this area, and although a river is located nearby, low water levels frequently make water extraction difficult.”

Beyond physical and infrastructural constraints, the study also identified social barriers that hinder firefighting operations. Interviews revealed that crowds of residents and onlookers often gather around fire scenes, obstructing the movement of firefighters and volunteers. Such congestion narrows access routes and slows evacuation efforts as well as the distribution of firefighting equipment.

Mr. Doni Irawan stated:

“One of the most common challenges is the large number of residents gathering to watch the incident. This obstructs the mobility of emergency personnel and creates additional congestion around the fire scene. Traffic flow in the surrounding area is also disrupted.”

This observation is consistent with statements from Fire Department officers, who emphasized that public behavior remains a significant challenge in densely populated settlements. Fires are often treated as public spectacles, reducing the effectiveness of emergency response efforts.

Based on the overall interview findings, all informants agreed that the development of an independent hydrant system and an improved water distribution network is urgently needed to enhance fire management effectiveness in Dr. Sutomo Street, Alley 8. According to the participants, hydrants connected to reliable water sources would accelerate firefighting operations while reducing dependence on fire engines that frequently encounter access limitations in densely populated residential areas. Furthermore, the establishment of a comprehensive water distribution system is viewed as a long-term solution capable of strengthening community-based fire resilience and improving the overall capacity of the neighborhood to respond to future fire emergencies.

DISCUSSION

The findings of this study demonstrate that community perceptions of fire prevention and management efforts in Dr. Sutomo Street, Alley 8 are shaped through the interaction of knowledge acquired from awareness programs, experiences of fire incidents, levels of community preparedness, and the environmental vulnerabilities of the residential area. These four dimensions are interconnected and collectively influence how residents understand, assess, and respond to fire risks within their community. The findings suggest that community perception is not formed spontaneously but rather emerges through an ongoing social process involving experience, interaction, and collective learning.

The first finding indicates that residents hold positive perceptions of fire prevention programs implemented by the Samarinda City Fire Department in collaboration with local government authorities. Awareness campaigns, APAR training programs, the establishment of Fire Volunteer Groups (Redkar), and infrastructure support provided through the PRO-BEBAYA Program were perceived as beneficial and relevant to community needs. This finding is consistent with the perception theory proposed by Robbins and Judge (2009), which argues that perceptions are formed through the reception and interpretation of information obtained from the surrounding environment. Continuous awareness programs provide new information and experiences that shape positive community perceptions regarding the importance of fire prevention. The finding also supports the study by Andini et al. (2020), which demonstrated that fire safety awareness initiatives implemented by the Fire Department can enhance public awareness of fire hazards and the importance of preventive measures. However, this study further reveals that positive perceptions are not solely the result of successful government programs but are also strongly influenced by residents' direct experiences with fire incidents. Consequently, the effectiveness of mitigation programs cannot be separated from the social context of the communities that receive them.

The second finding identifies fire experience as the most influential factor in shaping community risk perception. The major fire that occurred in 2024 provided a direct experience that fundamentally transformed residents' understanding of fire hazards. Experiences of losing homes, personal belongings, and witnessing the destructive impacts of fire increased awareness of potential causes of fire, including unsafe electrical installations, gas cylinder use, and combustible building materials. This finding reinforces the argument of Walgito (2004), who emphasizes that experience is a crucial internal factor in the formation of individual perceptions. The results are also consistent with the findings of Trifianingsih et al. (2022), which demonstrated that disaster experience enhances both risk awareness and community preparedness. Nevertheless, this study offers a broader perspective by showing that fire experiences shape not only individual perceptions but also collective memory and shared community awareness. Such experiences function as mechanisms of social learning that encourage greater participation in fire mitigation programs and preparedness activities.

The third finding concerns community preparedness for fire emergencies. The study reveals substantial improvements in preparedness, reflected in the availability of portable fire extinguishers in nearly every household, the provision of fire pumps at the neighborhood level, increased community competence in operating firefighting equipment, and high levels of participation in fire safety training programs. These findings indicate that preparedness is determined not only by the availability of physical resources but also by the knowledge and skills possessed by community members. This result supports the findings of Evangelista and Silvitarsi (2024), who concluded that community-based training programs significantly enhance local capacity to respond to fire risks. An important finding of this study is the active participation of housewives in awareness and training activities. This suggests that fire preparedness develops not only through formal community structures but also through the domestic roles performed by women within households. The finding highlights the importance of incorporating family and community perspectives into the development of community-based fire mitigation systems.

Despite the improvement in preparedness, the study found that community resilience remains constrained by persistent environmental vulnerabilities. The fourth finding indicates that physical environmental conditions continue to represent the primary obstacle to effective fire management. High building density, the predominance of wooden houses, limited road accessibility, and inadequate water resources contribute to elevated fire risk despite increased preparedness among residents. This finding is consistent with the study by Oktavian and Rahdriawan (2023), which identified the physical characteristics of densely populated settlements as major determinants of urban fire risk. However, the present study further reveals that barriers to effective fire management are not exclusively physical but also social in nature. The tendency of residents to gather and observe fire incidents often obstructs the movement of firefighters and emergency responders. This finding demonstrates that fire vulnerability results from the interaction between structural conditions and social behaviors within the community.

From a practical perspective, the findings suggest that fire prevention and management strategies should integrate community capacity building with improvements in environmental infrastructure. Awareness campaigns and training programs should be maintained on a continuous basis, as they have proven effective in increasing public awareness and preparedness. However, these initiatives should be accompanied by the development of community-based hydrant systems, improved road accessibility, strengthened water distribution networks, and safer settlement planning. In addition, behavioral interventions are needed to encourage community actions that support emergency response operations during fire incidents.

From a theoretical standpoint, this study contributes to the development of disaster sociology, particularly in understanding the formation of risk perception among communities residing in fire-prone areas. The findings demonstrate that risk perception is shaped not only by knowledge acquired through awareness programs but also by direct disaster experiences and the environmental conditions in which people live. Risk perception can therefore be understood as a social process resulting from the interaction of experience, knowledge, preparedness, and environmental vulnerability.

Future research should further investigate the role of vulnerable groups, including women, older adults, and children, within community-based fire preparedness systems. Comparative studies involving other densely populated settlements are also recommended to examine how different social and environmental contexts influence risk perception and the effectiveness of fire mitigation programs.

The novelty of this study lies in its finding that the experience of a major fire not only increases risk perception and preparedness but also generates a form of collective awareness that encourages active participation in community-based fire mitigation systems. The study further demonstrates that while preparedness can be strengthened through awareness campaigns, training programs, and the provision of firefighting equipment, structural vulnerabilities characterized by high building density, wooden housing structures, limited road access, and inadequate water resources

remain the principal constraints on effective fire management. Based on these findings, this study proposes a conceptual model in which community risk perception is shaped through a dynamic relationship among fire experience, mitigation programs, community preparedness, and environmental vulnerability. Together, these factors influence the effectiveness of fire prevention and management efforts in densely populated urban residential areas.

CONCLUSION

This study demonstrates that community perceptions of fire prevention and management efforts in Dr. Sutomo Street, Alley 8, Sidodadi Village, Samarinda Ulu District, are socially constructed through the interaction of knowledge gained from fire awareness programs, direct disaster experience, community preparedness, and environmental vulnerability. Residents generally hold positive perceptions of the fire prevention initiatives implemented by the Samarinda City Fire Department and local government authorities, including fire awareness campaigns, training on the use of portable fire extinguishers (APAR), the establishment of Fire Volunteers (Redkar), and the provision of supporting facilities through the PRO-BEBAYA Program. These initiatives have strengthened community awareness, encouraged active participation in fire mitigation activities, and improved residents' capacity to undertake initial fire response.

The findings further reveal that the major fire incident of 2024 became the most influential factor shaping community risk perception. Direct disaster experience encouraged residents to become more vigilant toward potential fire hazards, increased participation in mitigation programs, and fostered collective preparedness within the community. However, enhanced preparedness alone has not been sufficient to substantially reduce fire risk because persistent structural vulnerabilities, including high building density, the predominance of wooden housing structures, narrow access roads, and limited water resources, continue to constrain effective fire management. These findings indicate that successful fire mitigation depends not only on community capacity but also on improvements in the physical environment and supporting infrastructure.

From a theoretical perspective, this study contributes to the development of disaster sociology and risk perception studies by demonstrating that disaster experience functions as a social process that shapes collective awareness and preparedness through continuous interaction between community experience, mitigation programs, and environmental conditions. This finding extends previous research that has primarily emphasized technical and institutional aspects of fire management by highlighting the importance of community perception as a determinant of disaster risk reduction.

From a practical and policy perspective, the findings suggest that local governments should complement community-based fire awareness and preparedness programs with more targeted infrastructure interventions. Priority actions include establishing community-based hydrant systems connected to reliable water sources in densely populated neighborhoods, improving neighborhood water distribution networks to support firefighting operations, widening or redesigning access roads to facilitate the movement of fire engines, and strengthening the capacity of Fire Volunteers (Redkar) through regular training, simulation exercises, and periodic evaluation. Integrating these infrastructure improvements with continuous community education and participation will enhance the effectiveness of fire prevention and emergency response in high-risk urban settlements.

This study has several limitations. The research was conducted in a single fire-prone neighborhood using a qualitative case study approach; therefore, the findings reflect the specific social and environmental context of the study area and should not be generalized to all urban settlements. In addition, the study primarily explored the perspectives of fire department officers, neighborhood leaders, and affected residents, without specifically examining the experiences of other vulnerable groups such as women, older adults, children, or persons with disabilities. Future research is therefore recommended to conduct comparative studies across different urban settlements and to employ mixed-methods approaches that integrate qualitative and quantitative analyses. Further studies should also examine the role of vulnerable groups and evaluate the long-term effectiveness of community-based fire mitigation programs in strengthening urban disaster resilience.

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