

Building Urban Fire Resilience Through Integrated Disaster Management: A Case of Kemuning, Palembang

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ABSTRACT

Urban fire disasters pose significant challenges to public safety, particularly in densely populated settlements where limited road access, vulnerable buildings, and human activities may increase disaster risks. This study analyzes fire disaster management implemented by the Fire and Rescue Department in Kemuning, Palembang, based on the disaster management cycle developed by Nick W. Carter. The study employed a descriptive qualitative approach. Data were collected through in-depth interviews, field observations, and documentation involving government officials, operational firefighters, and residents in Kemuning. Data were analyzed through data collection, reduction, display, and conclusion drawing and verification. The findings indicate that fire disaster management has been implemented through prevention, mitigation, preparedness, response, recovery, and development activities, although its overall implementation remains suboptimal. Prevention is conducted through public education and socialization, but its coverage remains uneven. Mitigation is supported by adequate and routinely maintained rescue equipment, while narrow residential roads constrain operational mobility. Preparedness is strengthened through a clear command system, personnel training, and operational coordination. Response activities include evacuation and post-fire investigation, although limited water sources, dense environments, crowds, and post-fire community conditions create operational constraints. Functional resilience has been strengthened through emergency communication and Call Center 112, while structural resilience remains weak because dense settlements and combustible building materials persist. The findings highlight the need for integrated infrastructure improvement, broader community education, and stronger community participation to build more resilient urban fire management.

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Introduction

Urbanization and population growth have increased the complexity of public safety challenges faced by local governments. In metropolitan areas, dense settlements, intensive household activities, and the concentration of public and economic assets can increase vulnerability to emergency events, including residential fires. Palembang is one of the major urban centers in Sumatra and has experienced substantial population and urban development. According to the 2024 population data cited in the research, Palembang had more than 1.7 million residents within an area of approximately 400.61 km². This demographic concentration creates important challenges for local government in providing effective public safety and emergency services.

Fire is one of the recurring hazards in Palembang. Data from the Fire and Rescue Department indicate that the city recorded 142 fire incidents in 2021, 178 in 2022, 438 in 2023, 286 in 2024, and 277 in 2025. In the Kemuning area, 97 incidents were recorded in 2023, 69 in 2024, and 18 in 2025. These figures demonstrate that although the number of incidents fluctuates, fire remains an important public safety issue in densely populated urban areas.

Kemuning represents a particularly important setting for examining urban fire disaster management. The area is characterized by dense residential settlements, closely spaced buildings, narrow neighborhood roads, and household and small-business activities. Such characteristics may increase both the probability of fire occurrence and the difficulty of emergency response. Limited road width can restrict the movement of large fire engines and consequently influence the speed and effectiveness of fire suppression and rescue operations.

The Fire and Rescue Department has an important role in providing public safety services. Its responsibilities extend beyond fire suppression to include prevention, rescue, emergency response, and other forms of disaster-related intervention. The department has also established operational procedures based on minimum service standards and relevant disaster management regulations. Nevertheless, the existence of formal procedures does not automatically guarantee effective implementation in the field. Previous studies cited in the research have identified problems involving infrastructure, human resources, personnel discipline, operational capacity, and response time.

Previous studies have examined fire management from different perspectives. Studies in Palembang have identified limitations in facilities, infrastructure, funding, personnel discipline, and operational performance. Sufardi et al. (2024), for example, found that firefighter performance at the Kemuning post was not yet optimal because of competency, discipline, and infrastructure constraints. Hardiansyah et al. (2024) similarly highlighted limitations in training budgets and supporting facilities. Other studies have focused on service quality, fire station placement, and community participation. These studies provide important evidence regarding specific operational problems but tend to examine particular dimensions separately.

International research has also demonstrated that effective emergency response depends on personnel capability, collaboration, communication, organizational management, and operational resources. Vylund et al. (2024) emphasized that complex emergency response requires problem identification, incident development, personnel capability, collaboration, and management. Ofrin (2025) likewise found that operational capabilities among fire protection personnel are influenced by resource planning, organizational management, response capacity, and information dissemination.

The research gap therefore lies in the limited integration of these operational problems into a comprehensive disaster management framework. Rather than examining only personnel performance, infrastructure, or service quality, this study examines fire disaster

management across interconnected stages. The study adopts Nick W. Carter's disaster management cycle to examine prevention, mitigation, preparedness, response, recovery, and development as interconnected components of disaster management.

This approach is particularly relevant to Kemuning because the effectiveness of fire management is influenced not only by organizational preparedness but also by settlement characteristics, accessibility, infrastructure, and community participation. The study therefore aims to analyze how fire disaster management is implemented by the Fire and Rescue Department in Kemuning, Palembang, and to identify the main factors that continue to constrain its effectiveness.

The study contributes to public administration and government studies by demonstrating how disaster management theory can be applied to a localized urban emergency service. Practically, the findings provide evidence for strengthening community education, emergency infrastructure, operational preparedness, and structural resilience in densely populated urban settlements.

Method

This study employed a descriptive qualitative research design. The approach was selected because the research sought to understand the implementation of fire disaster management, operational practices, constraints, and experiences of actors directly involved in fire and rescue services.

The research was conducted in the Kemuning area of Palembang, focusing on the Fire and Rescue Department's operational service and its interaction with the surrounding community.

The study involved nine informants, consisting of government officials, operational firefighters, and community members. The informants were selected because of their direct knowledge, experience, or involvement in fire prevention and emergency response in Kemuning.

Primary data were obtained through interviews and direct observation, while secondary data were obtained from official documents, regulations, standard operating procedures, fire incident records, and other relevant documentation.

Three data collection techniques were employed:

1. In-depth interviews, to obtain information regarding experiences, procedures, operational constraints, and perceptions of fire disaster management;
2. Observation, to examine operational readiness, facilities, field conditions, and the relationship between formal procedures and actual practices;
3. Documentation, to examine SOPs, regulations, fire incident records, activity reports, and other supporting documents.

Data analysis followed the interactive model of Miles and Huberman, consisting of data collection, data reduction, data display, and conclusion drawing and verification. Triangulation was used to strengthen the validity of the findings.

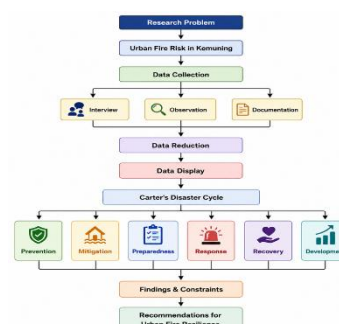


Figure 1. Research Flowchart**Results and Discussion****1. Fire Risk Context in Kemuning**

Kemuning is characterized by dense residential settlements and closely spaced buildings. Narrow roads, adjacent electrical installations, and intensive household activities contribute to fire vulnerability and simultaneously create operational challenges for firefighters. Large fire engines may experience difficulties reaching incident locations quickly because some neighborhood roads are too narrow.

The findings indicate that fire management in Kemuning has been implemented across the disaster management cycle. However, implementation remains uneven. The strongest operational elements are personnel readiness, equipment maintenance, emergency communication, and command coordination. Conversely, weaknesses remain in the reach of prevention activities, environmental accessibility, structural resilience, and some aspects of post-fire investigation.

Table 1. Summary of Fire Disaster Management Implementation

Disaster Management Stage	Main Activities	Main Finding	Assessment
Prevention	Socialization, education, information dissemination	Activities implemented but not evenly distributed	Not yet optimal
Mitigation	Rescue equipment and routine maintenance	Equipment generally ready; narrow roads constrain mobility	Relatively adequate
Preparedness	Command system, briefing, training, coordination	Personnel and operational systems are prepared	Good
Response	Evacuation and investigation	Evacuation follows procedures, but environmental constraints remain	Partially optimal
Recovery	Post-fire reporting and evaluation	Reporting is systematic and supports evaluation	Good
Development	Structural and functional resilience	Functional resilience is stronger than structural resilience	Not yet optimal

Source: Research findings, 2026

2. Prevention: Education Exists, but Its Reach Remains Uneven

Prevention is implemented through direct socialization and public education concerning household fire safety. Information includes safe gas-stove use, electrical installation safety, initial fire suppression, and the use of portable fire extinguishers.

The Fire and Rescue Department also uses communication channels such as WhatsApp, Instagram, and telephone services. However, interviews indicate that direct socialization has generally been conducted approximately once a year and has not followed a fixed schedule for every subdistrict. In Kemuning, socialization has been implemented selectively across several urban villages, while other areas have not received the same level of direct education.

Community responses were mixed. Some residents reported that socialization provided useful knowledge about fire prevention and the use of extinguishing equipment. Nevertheless, other residents indicated that the activities were not frequent enough and had not reached all community groups. The study therefore concludes that prevention has been implemented but remains suboptimal because information dissemination is not sufficiently continuous or evenly distributed.

This finding supports the argument that community participation is an important component of fire prevention. Abdillah et al. (2022) emphasize the role of community participation in supporting fire prevention. Similarly, Cahyani et al. (2023) found that limited socialization coverage can result in uneven community knowledge regarding fire prevention.

The implication is that prevention should not be understood simply as the existence of educational programs. Its effectiveness depends on frequency, geographic coverage, accessibility, and community participation.

3. Mitigation: Adequate Equipment Confronted by Environmental Constraints

Mitigation in Kemuning is supported by the availability and maintenance of rescue equipment. Personnel routinely inspect vehicles, hoses, nozzles, water tanks, and other operational equipment during shift changes. The equipment was observed to be maintained and prepared for emergency use.

This condition indicates that organizational mitigation capacity has been strengthened through equipment maintenance. The finding is consistent with Ramadhani and Alhadi (2021), who emphasize the importance of fire-fighting facilities and infrastructure in determining the effectiveness of fire prevention and response.

However, equipment readiness does not automatically translate into optimal mitigation. The physical environment remains a major constraint. Several residential roads in Kemuning are narrow and difficult for large emergency vehicles to access. Consequently, the effectiveness of available equipment is partly dependent on the accessibility of the surrounding settlement.

This finding demonstrates an important distinction between organizational capacity and territorial capacity. The Fire and Rescue Department may possess adequate equipment, but the benefit of that equipment can be reduced when urban infrastructure does not support emergency mobility.

4. Preparedness: Strong Command and Personnel Readiness

Preparedness is implemented through a structured command system, division of responsibilities, regular briefings, operational coordination, and personnel training. The operational system places the team under a Fire Team Commander, who provides direction and clarifies responsibilities before deployment.

The study found that regular preparedness briefings help ensure that personnel understand their respective roles and responsibilities. Training and simulations also strengthen technical readiness and coordination.

The operational system is particularly important because Kemuning's environmental conditions can complicate emergency response. Narrow roads, traffic congestion, densely

arranged buildings, and crowds can reduce the available operational space. Therefore, effective preparedness requires not only personnel readiness but also the ability to make rapid decisions under constrained environmental conditions.

This finding is consistent with Permana and Sembiring (2024), who argue that fire incident management requires clear operational command, inter-personnel coordination, and rapid decision-making.

5. Response: Evacuation Is Structured, but Access and Water Supply Remain Constraints

The response stage is implemented through evacuation and investigation. Evacuation follows operational procedures and is supported by a target response time of up to 15 minutes to reach incident locations. Rescue teams are responsible for opening evacuation routes, while medical or ambulance units provide initial assistance to victims.

Observation also indicated that personnel move quickly after receiving fire reports and that task division helps organize field operations. Simulation exercises are conducted to strengthen evacuation skills and coordination.

Nevertheless, response effectiveness remains constrained by several environmental and logistical factors. These include limited water sources, narrow roads, traffic congestion, and crowds around fire locations. In densely populated settlements, these factors can delay access and reduce operational space.

The investigation component has also been implemented through site inspection, coordination with the police, and initial data collection. However, investigators may not immediately obtain complete information because residents are often still in a state of panic after a fire. Consequently, initial information collection can be delayed until conditions become more conducive.

The response findings therefore demonstrate that organizational preparedness alone cannot guarantee rapid emergency management. Physical accessibility, water availability, crowd management, and post-disaster social conditions are equally influential.

6. Recovery: Reporting as an Instrument of Accountability and Learning

Post-fire recovery is reflected in systematic reporting. Reports are prepared after operational response and investigation activities have been completed and are submitted to the operational control section as administrative records and evaluation materials.

The reporting mechanism serves two functions. First, it represents bureaucratic accountability by documenting what occurred during the incident. Second, it functions as organizational learning by identifying operational constraints and areas for improvement. The research found that reports are used to evaluate communication and coordination, including the use of Call Center 112 and radio communication to improve inter-post response.

This finding supports Fatimah et al. (2025), who view reporting as an accountability mechanism and an instrument for evaluating operational performance.

Thus, recovery in this context is not limited to physical restoration. Administrative documentation also becomes an important mechanism through which the organization learns from previous incidents and improves future emergency operations.

7. Development: Functional Resilience Is Stronger Than Structural Resilience

The development stage reveals the most important weakness in Kemuning's fire disaster management. Development was examined through structural and functional resilience.

Structural resilience concerns the physical characteristics of buildings and settlements. The Fire and Rescue Department conducts supervision of buildings considered vulnerable to fire and provides education concerning electrical safety and safer building materials. However, many buildings in densely populated areas still use combustible materials such as wood and plywood, while settlement density remains high.

Consequently, structural resilience has not improved significantly. The physical environment remains vulnerable and may facilitate the spread of fire.

Functional resilience, in contrast, has developed more positively. The emergency Call Center 112 provides a communication mechanism through which residents can report fire incidents. Personnel also receive regular physical and technical training. The combination of emergency communication, operational procedures, and personnel capacity supports faster emergency response.

The contrast between these two dimensions is significant. The institutional system has developed mechanisms that support emergency response, but the physical environment in which those mechanisms operate remains vulnerable. The research therefore identifies structural resilience as the principal weakness in the development stage.

8. Integrated Interpretation

The findings demonstrate that fire disaster management in Kemuning cannot be improved through operational capacity alone. The disaster management cycle illustrates a chain of interdependence:

Limited prevention coverage → persistent community vulnerability → environmental exposure → operational constraints → limited structural resilience.

At the same time, positive institutional capacities—such as personnel training, equipment maintenance, command coordination, reporting, and emergency communication—provide important foundations for strengthening the overall system.

The main challenge is therefore to connect institutional readiness with territorial and community resilience. Improving fire management requires not only a capable Fire and Rescue Department but also accessible infrastructure, safer residential structures, regular community education, and stronger public participation.

Conclusion

This study concludes that urban fire disaster management in Kemuning, Palembang, has been implemented through an integrated sequence of prevention, mitigation, preparedness, response, recovery, and development activities. However, the implementation has not yet been fully optimal because the effectiveness of each stage is influenced by persistent infrastructure, environmental, operational, and community-related constraints. Thus, the research objective of examining the implementation of integrated fire disaster management in Kemuning is addressed by demonstrating that the existing system has established important operational capacities, but remains constrained by the vulnerability of the urban settlement environment and uneven community preparedness.

The prevention stage is supported by public education and socialization, although coverage and frequency remain uneven. Mitigation is supported by the availability and

routine maintenance of rescue equipment, but narrow residential roads constrain the effectiveness of these resources. These findings indicate that the availability of institutional and technical resources alone is insufficient to reduce fire risk when physical settlement conditions limit access to affected areas.

Preparedness is one of the stronger components, characterized by a clear command structure, division of responsibilities, operational briefings, personnel training, and coordination. Response activities, particularly evacuation, are implemented according to operational procedures and supported by trained personnel. However, limited water sources, narrow roads, traffic, crowds, and dense settlements continue to affect response effectiveness. Post-fire investigation is also constrained by the difficulty of collecting immediate information from affected residents. Therefore, although organizational preparedness and response capacity are relatively well established, operational effectiveness remains dependent on the accessibility and physical characteristics of the settlement and on the availability of timely information from the community.

Recovery is supported by systematic post-fire reporting that functions as both an accountability mechanism and a source of organizational learning. Development, however, remains uneven. Functional resilience has been strengthened through Call Center 112, communication systems, and routine personnel training, whereas structural resilience remains weak because dense settlements and combustible building materials continue to create significant fire vulnerability. This demonstrates that post-disaster management has contributed to institutional learning and functional resilience, but has not yet been sufficiently supported by structural improvements that address the underlying physical vulnerability of densely populated settlements.

Overall, the main finding is that fire disaster management in Kemuning is relatively stronger in organizational preparedness, response capacity, coordination, and functional resilience, while the main weaknesses remain in prevention coverage, physical mitigation, response accessibility, community participation, and structural resilience. The effectiveness of fire disaster management is therefore determined not only by the capacity of the Fire and Rescue Department but also by the interaction between government preparedness, community participation, infrastructure conditions, and settlement characteristics.

The principal implication is that strengthening urban fire disaster management requires an integrated approach. The Fire and Rescue Department should expand the frequency and coverage of community education, while local government should improve the accessibility and physical resilience of high-risk settlements. Community participation should also be strengthened because prevention cannot rely exclusively on government intervention. An integrated policy approach should therefore combine institutional preparedness and emergency response with preventive community engagement, infrastructure improvement, settlement planning, and structural risk reduction. Such an approach would enable fire disaster management to move beyond responding to individual incidents toward reducing the underlying vulnerability of Kemuning's urban communities.

Future research should further examine the relationship between community participation, settlement resilience, infrastructure planning, and fire disaster risk reduction in densely populated urban areas.

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