

Fire Risk Management and its Economic Implications in Dimapur, Nagaland

Dr. Vinyuhu Lhoungu

Associate Professor, Department of Economics, Dimapur Government College, Email:
ahulhoungu17@gmail.com

Alokito Sumi

BA 5th Semester, Economics Honours, Dimapur Government College, Email: kibakitokito@gmail.com

Abstract: *This study explores how effectively the fire services in Dimapur are able to manage fire risks and how these challenges impact the local economy. The investigators used both primary and secondary data, including surveys from the public and interviews with fire department officials in Dimapur Fire Stations. The study shows that Dimapur still faces several fire-related issues such as shortages of manpower and advanced equipment's, budget constraint, poor hydrant conditions, limited awareness among the public, and heavy traffic that delays response time. Public responses also indicate that many areas lack proper fire safety measures including fire risks awareness. Frequent fire incidents led to loss of property, disruption of business activities, and increased cost of emergency responses. The study highlights that improving fire safety infrastructure, investment in training and equipment's and awareness programs can reduce both human and economic losses in the long run. Overall, the study concludes that the Dimapur Fire Department is making continuous efforts but there is an urgent need for better planning, upgraded technology, stronger public awareness, and increased government support to ensure an effective fire risk management system in the city.*

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Introduction: Fire is one of the most common and destructive hazards in urban areas. It can cause severe loss of life, property and livelihood within a very short time. Rapid urbanization and dense population density has made Indian cities particularly vulnerable to fire risks. In many cities, including Dimapur, the growing number of commercial establishments, residential complexes and industrial activities has increased the vulnerability of fire hazards. Fire risk management, therefore, becomes a crucial component of urban safety and disaster preparedness. Fire risk management involves not only extinguishing fires but also preventing them through safety planning, regulation enforcement, community awareness and quick emergency response. The economic implications of fire disasters are often underestimated, they include direct damages such as loss of property and indirect costs such as business interruption, unemployment and reduced productivity. This study focuses on understanding how fire risks are managed in Dimapur and what economic effects fire incidents have on individuals, businesses and the city.

Statement of the Problem: Despite improvements in technology and safety laws, urban fire hazards continue to pose a serious challenge in many parts of India. In Dimapur, frequent reports of fire incidents in

commercial areas, markets and residential localities indicate that fire safety measures and institutional responses are still inadequate. Therefore, there is a pressing need to assess the existing fire risk management system in Dimapur, understand its economic implications and recommend strategies for improvement.

Rationale of the Study: The study is significant as it addresses an area that affects both safety and the economy of an urban population. Fire hazards create long-term social and economic impacts. Dimapur is the largest and most urbanized city of Nagaland, serves as the commercial hub of the state and plays a crucial role in trade and commerce, and transport, connecting Nagaland with the rest of India as it serves as the primary railhead and airport for the entire state. The city covers roughly 927 sq. km. with population estimated at over 378,811 residents (Census 2011). The literacy rate exceeds both national and state averages at roughly 86.03% (males at 88.05%, females at 83.79%) and sex ratio at 910. The city is divided into 23 administrative wards. It experiences a sub-tropical climate with hot summers and significant rainfall during the monsoon season. Due to its rapid urban expansion, diverse population and mixed land-use patterns, the city faces a variety of challenges related to fire safety and management.

Over the years, Dimapur has experienced fast population growth, leading to an increase in both residential and commercial structures. Many of these buildings are closely packed together, especially in market areas and older neighbourhoods. A significant number of houses in these areas are still made of bamboo, wood, and other combustible materials. These traditional forms of construction, though affordable, make the settlements highly vulnerable to fire hazards. The city provides a diverse context from well-developed business centres to informal residential settlements allowing for a comprehensive assessment of how socio-economic, infrastructural and environmental factors influence fire hazards and the capacity to manage them.

Objectives of the Study

- To examine the effectiveness of fire risk management in Dimapur and assess the economic implications of fire incidents in the city.
- To study the causes of fire incidents in Dimapur.
- To evaluate the level of community awareness and preparedness towards the fire safety.
- To suggest suitable policy and administrative measures for improving fire risk management.

Literature Review: Fire Risk Management in India has historically received less attention than floods or earthquakes even though urban fire hazards caused thousands of incidents yearly. The National Institute of Disaster Management (NDIM) emphasizes that inadequate building codes, electrical short circuits, and illegal constructions are primary causes. Globally, research on fire risk management emphasized urban design, governance, economic loss estimation and resilience planning

Hossain (2016) examined industrial fires in garment factories in Dhaka, Bangladesh and identified inadequate exits, blocked stairways and weak regulatory enforcement as causes of repeated incidents. **Xu Lianet al. (2020)** in their study on San Francisco Fire Department– used predictive analytics and machine learning to optimize resource deployment. It reduced average response time by 15%. **Harvey et al. (2023)** in their Grenfell Tower Inquiry (UK 2017-2022) – investigated the catastrophic London tower that killed 72 people. The inquiry revealed failures in building materials regulation, risk communication and governance accountability. **Gupta (2017)** studied institutional coordination in managing high-risk fires. The study revealed poor enforcement of the National Building Code and weak inter-departmental communication. **Tomar et al. (2018)** used GIS mapping to identify high-risk fire zones in Delhi, showed that old markets and slums are most fire prone. Similarly in Mumbai, the 2017 Kamala Mills fire exposed gaps

in enforcement of safety norms in commercial complexes. **Central Building Research Institute (CBRI, 2018)** – Roorkee, proposed fire safety audits and community fire awareness programs as cost-effective risk reduction tools in small cities. **Rahman et al. (2023)** noted that fire losses often remain under-reported due to poor insurance coverage and unregistered properties. According to them, the Kamala Mills fire in Mumbai cost ₹13 crore in direct property losses, while **Surat's textile fire (2020)** halted operations for weeks, leading to cumulative economic losses exceeding ₹50 crores. **Kumaret al. (2024)** – Hyderabad, developed a Fire Risk Zoning Model combining land use, population density, and building materials using a weighted overlay approach and found that older parts of the city with mixed commercial use were most fire-prone. **Ikon (2021)** studied the critical intersection of environmental hazards and expanding cityscapes, highlighting how rapid urbanization in North-East India exacerbates fire risks and vulnerability. The study found that expanding settlements into combustible vegetation zones significantly increases hazards. **Meher (2023)** applied remote sensing and GIS to map forest fire risk using NDVI in Kohima, Nagaland, using slope and elevation data. About 68% of the district was under moderate to high fire risk.

Nagaland Fire & Emergency Services Annual Report (2024) recorded over 250 fire calls in Dimapur district, with losses exceeding ₹15 crore. The report attributed the increase to electrical short circuits, LPG leaks and market fires. During 2023-2024 there were 35 major fire incidents in Dimapur alone (**Eastern Mirror (Daily) 2024**). The **Burma Camp fire (2023)** destroyed over 260 homes, displacing around 900 residents: another fire in **Chakhesang Colony (2025)** caused property losses of nearly ₹2 crore. The city's mixed urban growth, informal housing and inadequate fire-station coverage reflect a fragile risk management structure. In Dimapur, recent fires at **Lake View Colony (2023)** and **Burma Camp (2023)** reflect substantial losses up to ₹2 crore in goods destroyed and widespread livelihood disruptions. However, official loss estimates typically exclude small informal businesses, daily wage earners and displaced households (**Nagaland Post (Daily) 2023**).

Research Gap: Although a number of studies have explored fire risk management in India, most of them concentrate on major metropolitan cities where infrastructure and institutional supports are relatively advanced, making their conditions quite different from smaller cities like **Dimapur**. As a result, there is very little literature that examines fire risk from the perspective of medium-sized cities in the Northeast, where the combination of rapid urban growth, congested roads, and limited firefighting resources poses unique challenges. Another noticeable gap in the existing literature is the **lack of studies linking fire risk management with operational difficulties faced by fire departments in smaller cities**. Challenges such as, shortage of modern firefighting tools, inadequate staffing and delayed response times due to heavy traffic are rarely addressed in depth. Given these gaps, there is a need for **localized study** to fill that void by focusing on **Dimapur which** represents the peripheral city problem –medium sized city with limited resources yet growing risks making Dimapur a valuable case for contextualizing broader Indian fire-risk patterns at a smaller-city scale and in assessing how fire risks are managed in practice, and analysing the broader economic implications of fire incidents within the city.

Methodology: The study adopts a descriptive survey method to examine the state of fire risk management and its economic implications. Both primary and secondary data have been used. The primary data were collected through questionnaire distributed among residents, shop owners, and business people in different areas of the city and officials of the Dimapur Fire & Emergency Department. Secondary data were collected from various published and unpublished sources including Annual Reports of the Dimapur Fire & Emergency Department and the Nagaland State Disaster Management Authority (NSDMA), official records and statistics related to fire incidents between 2021 and 2025, articles from newspapers and online platforms highlighting major fire cases in Dimapur, academic journals, books, and government publications related to disaster management and fire safety.

Sampling: A stratified random sampling technique was used as Dimapur city has a mix of residential, commercial, and industrial areas, each with different levels of fire risk. The population for the study included residents, business owners, shopkeepers and firefighter personnels and officials. Each group was considered a different stratum and 50 respondents each were randomly chosen within those groupsto ensure that every group was fairly represented with a total of 200 samples.

Statistical techniques used in the study: Statistical techniques such as simple descriptive statistics, charts, averages and percentage were used to analyse the data.

Data Analysis and Discussion

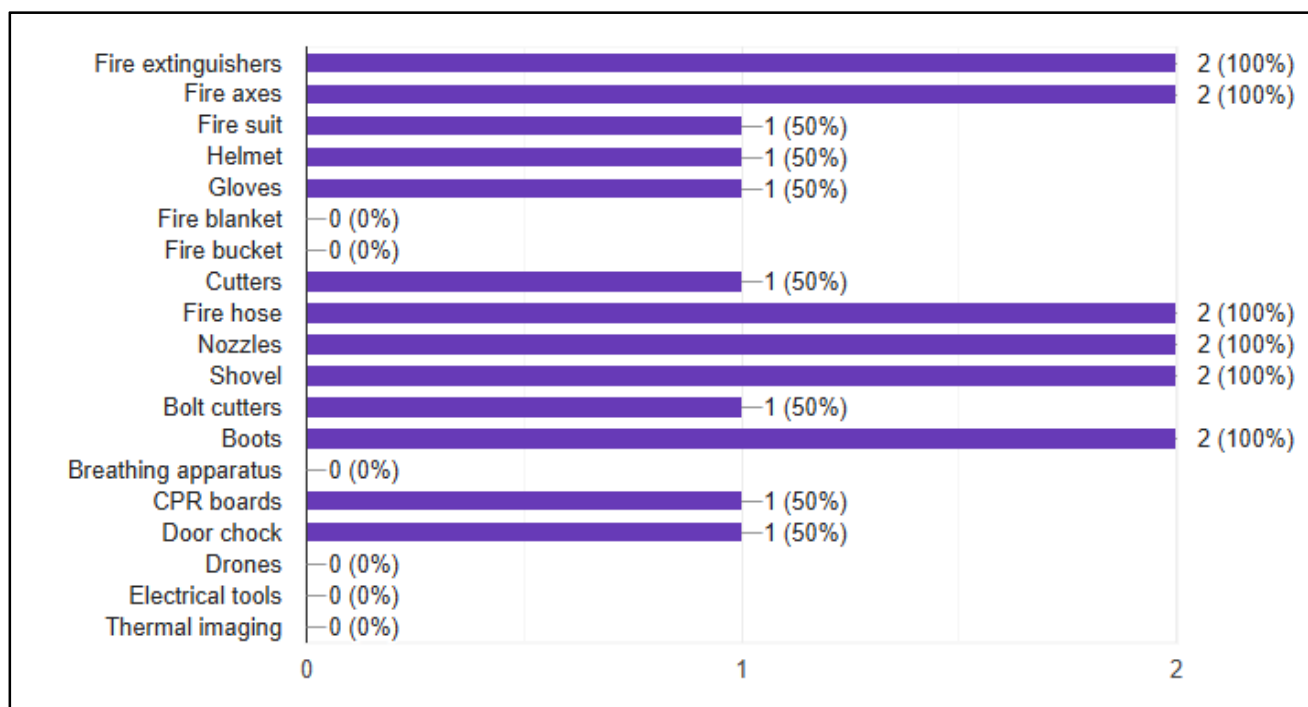
A. Fire Department: This section summarizes the key findings from Dimapur Fire & Emergency Department regarding manpower, equipment, response time, major causes of fire and overall preparedness in the city.

Manpower and Training: The study shows that manpower continues to be one of the major issues affecting fire management in Dimapur. At present, the Dimapur Central Fire Station has 41 firefighters, while the West Fire Station has 30 firefighters, making a total of 71 firefighters serving the entire Dimapur area. For a fast-growing city with vulnerablycongested marketplaces and residential houses, and frequent fire incidents, this number is considered quite low.

In terms of training, while all firefighters receive basic training, specialised training does not happen regularly. This is mostly because of limited budget, lack of training centres, and the need to keep staff on duty, which prevents sending them for long training programs.Overall, it was found that more recruitment and regular specialised training would improve the department's preparedness and overall efficiency.

Equipment and Technology: The equipment and tools which are available and used by fire stations in Dimapur are presented in the chart below:

Available Equipment and Tools in Dimapur Fire Stations



Source: Field Survey, May -June 2025

Despite having a wide range of tools, it was found that not all tools are modern or upgraded requiring replacement. In terms of technology, the department rated themselves mostly between average and below average. This is because they still depend on traditional tools and lack many of the modern fire technologies use in most developed fire stations which is shown in the chart above like lack of drones, breathing apparatus, electrical tools, thermal imaging, etc. Overall, there is a need for upgraded machinery, better technology, and more advanced devices to improve their effectiveness, especially during large or complex fire incidents. The data shows that Dimapur Central Fire Station has 5 fire trucks and 41 firefighters whereas Dimapur West Fire Station has only 2 fire trucks and 30 firefighters.

Availability of Fire Risk Management System in High-Risk Areas: It was found that high-risk management system is available in only 20% of the high-risk areas of the city which include crowded markets, areas, fuel station and certain commercial zone where the chances of fire risk are high. This shows that there is no proper fire risk management system in 80% of the high-risk locations where many vulnerable areas still lack proper planning, monitoring, and safety equipment, which increases the risk during fire emergencies. This highlights the need for a more structured and city-wide fire risk management plan and strict adherence to safety guidelines.

Budget Issues: It was found that insufficient funding is a critical challenge wherein the budget allocation by the state government is too limited to support regular vehicle maintenance, upgradation of firefighting equipment or advance training. Officers have also reported that some fire engines are very old and certain safety tools are not replaced but repaired as frequently as needed.

The state budget allocation for 21 active fire stations operating under Fire & Emergency Services Department in Nagaland for 2 years shows a dismal condition.

- In the 2023–24 budget, the Fire & Emergency Services department received ₹ 968.08 lakh (about ₹ 9.68 crore) with an average of 46 lakhs per fire station for various purposes including construction of staff quarters, purchasing firefighting equipment, but major chunk was sliced out for improving the directorate's infrastructure. (IPR Nagaland, 2025)
- For 2024–25, the Nagaland government allocated ₹ 1,073.90 lakh (~₹ 10.74 crore) to its Fire & Emergency Services. This funding is designated for building new fire stations, staff quarters, training centres, and procurement of firefighting appliances. (Nagaland Tribune, June, 2025)

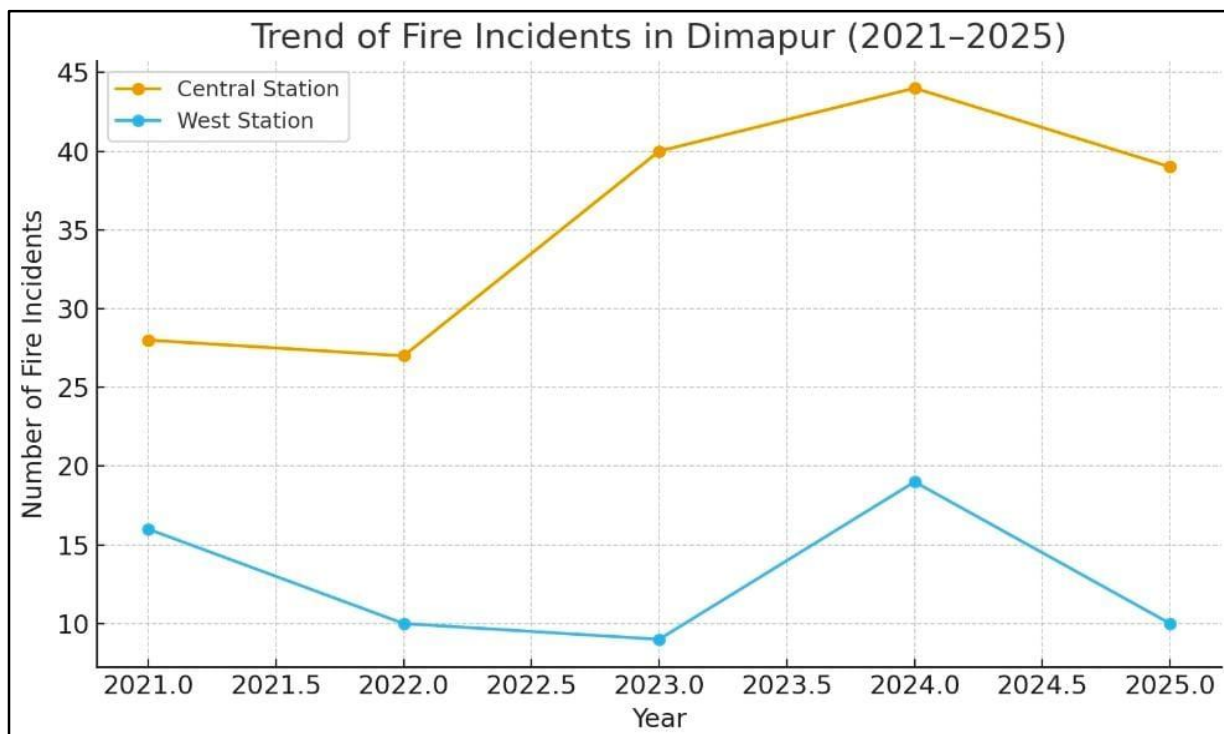
The current allotments don't match the scale of Dimapur's needs, especially for better equipment, frequent maintenance, and training.

Frequency and Trends of Fire Incidence: The trend of fire incidents in Dimapur over the last few years shows noticeable variation between the Central Fire Station and the West Fire Station. The data from the fire department gives a clearer picture of how fire cases have been changing and whether the city is becoming more vulnerable to fire risks

For the Dimapur Central Fire Station, the number of reported fire incidents was 28 cases in 2021, slightly decreased to 27 cases in 2022, but then increased sharply to 40 cases in 2023. This rising trend continued with 44 cases in 2024, which is the highest in the five-year period. In 2025, the number has already reached 39 cases (and still counting), showing that the year may again end with a high number of fire calls. This indicates that the Central area of Dimapur is becoming more prone to fire incidents, possibly due to increasing population, more commercial activities, and dense electrical wiring. In contrast, the Dimapur West Fire Station shows a different pattern. In 2021, the station recorded 16 cases, which dropped to 10 cases in 2022, and then slightly decreased again to 9 cases in 2023. However, in 2024, the number increased to 19

cases, showing a sudden spike. For 2025, the number is 10 cases and may increase in the remaining months. While West Dimapur generally shows lower fire incidents compared to the Central Station, the sudden rise in 2024 suggests that fire risks can increase unexpectedly if preventive measures are weak.

The study revealed that the main causes of fire incidents in Dimapur continue to be short-circuit and carelessness. Short circuit occurs mainly because of overloaded electrical lines, old wiring, and improper handling of electrical appliances. Carelessness includes activities such as unattended cooking, burning waste near houses, and mishandling of gas cylinders. Overall, the trend shows that although fire incidents vary from year to year, both stations face recurring challenges. The increasing number of cases in recent years signals the need for stronger fire safety awareness, better electrical maintenance, and stricter safety regulations in high-risk areas.



Source: Field Survey, May -June 2025

Respond Time and Hydrant Conditions: Based on the information collected from the Dimapur Fire Department, the average response time recorded for major fire calls was around 1 minute after receiving the emergency call. This shows that the firefighters are quick in mobilising and preparing to leave the station because the first few minutes of a fire are the most critical. However, the actual arrival time at the spot usually gets delayed due to traffic congestions, narrow roads, or blocked passages.

Regarding the condition of fire hydrants in Dimapur, it was found that most hydrants are in poor or below-average condition. Many of them are either not properly maintained or lack sufficient water pressure which creates serious challenges during fire emergencies. When hydrants do not function properly, they have to depend entirely on the water carried in the fire engine, which is limited and slows down the firefighting process, especially in large fire incidents where continuous water supply is necessary. Overall, while the response time of the fire department is fast, public cooperation and the hydrant system remains a major weakness that needs urgent improvement to support effective fire management in Dimapur.

Public Awareness and Fire Instruction Law: The study found that the level of public awareness about fire safety in Dimapur is still quite low. Although regular drills and awareness programs were conducted,

especially in schools, colleges and marketplaces, many people do not know how to use basic fire extinguisher, often panic during fire incidents and in crowded areas people were found callous about fire safety rules which increases the risk.

With regard to adherence of fire safety laws, it was found that in most commercial buildings, especially malls, hotels, and large shops the fire instruction laws were followed to meet safety standards to get their licenses. But in crowded areas like markets and residential clusters, the law enforcement was found to be weak as many buildings do not have fire exits, extinguishers, or electrical safety checks. Hence, while awareness programs were happening, fire safety laws were not equally enforced everywhere which creates serious challenges for fire department during emergencies.

Challenges Faced by Dimapur Fire Stations: Dimapur fire department faced several difficulties to handle fire emergencies. The biggest problem is traffic congestions - narrow roads and blocked passages. Apart from traffic, limited resources which affects their efficiency due to shortage of fund. Another challenge is public awareness and law enforcement. Many people are not aware of basic fire measures and in crowded areas fire safety rules are often ignored. This makes the job of the fire department more difficult. These challenges together create obstacle for the fire department in managing fire emergencies effectively in Dimapur.

B: Public Perspectives: The public perspectives on fire risk management in Dimapur shows a mixed result. The table below summarises the major concerns.

Public Perspectives on Fire Risk Management in Dimapur

Sl. No	Areas of Concern	Response (%)	Results
1	Dimapur is adequately prepared for major fire incidents	Yes – 18 No – 67 Maybe – 15	Majority believe Dimapur is not prepared.
2	Fire safety equipment at home/workplace	Yes – 32 No – 68	Majority do not have any fire safety equipment at home or workplace
3	Awareness of fire safety programs	Yes – 25 No – 75	Awareness programs not reaching most communities.
4	Confidence in fire department's response time	High – 20 Moderate – 45 Low – 35	Public confidence is moderate
5	Experienced or witnessed fire incidents	Yes – 67 No – 33	Majority have seen or experienced fire incidents.
6	Main causes of fire	Electrical faults – 52 Negligence – 27	Electrical faults are the leading causes followed by negligence

		Gas leakages – 13 Others – 8	
7	Sufficient fund for department?	Yes – 15 No – 85	Public strongly feels budget is insufficient.
8	Fire drills and awareness campaigns in locality	Regularly – 10 Sometimes – 20 Never – 70	Most areas never had a fire drill.
9	Suggested improvements	Better equipment – 35 More manpower – 28 Awareness – 22 Faster response – 15	Better equipment and manpower are top needs.

Source: Field Survey, May -June 2025

The public feels that Dimapur is not prepared for major fire emergencies. Lack of safety equipment at home and lack of awareness programs show low community preparedness. However, majority of the residents have seen or experienced fire incidents where electrical faults were the leading causes. A high majority (85%) of respondents believe that the fire department does not receive required fund, which aligns with the department's requirements. Hence, the public strongly feel that modern equipment, increased manpower, and better awareness programs as the key improvements needed in managing fire risk in Dimapur.

Frequent fire incidents in markets and residential areas have led to huge damage of shops, houses, and stored goods. According to *Eastern Mirror Nagaland (Daily)*, the state recorded **182 fire incidents in 2024**, and many of the worst cases were reported from Dimapur. A report by *Nagaland Post (Daily)* stated that **over 1,000 families were affected by just three major fire incidents** in Dimapur in July 2024.

Evaluation of Fire Risk Management Strategies

1. Accessibility: Most fire-prone areas in Dimapur, such as New Market, Purana Bazaar, Murgi Patti, Burma Camp and other residential colonies, have narrow lanes that fire trucks cannot enter. Lack of hydrants or nearby water sources also slows down operations, forcing firefighters to depend on tankers.

2. Community Preparedness: Although people are aware of fire risks, practical preparedness is low. Market unions do not conduct regular fire drills, and most residents rely fully on the fire department. There is little involvement of trained community volunteers who can help during the first few minutes of an incident.

3. Coordination: Coordination between the fire department, Dimapur Municipal Council, police and local communities was found to be weak. During large fire outbreaks, communication gaps slow down evacuation, traffic control and water arrangement.

4. Emergency Response Gaps: In several cases, fires become severe before help arrives because early response is missing. Lack of smoke detectors, alarms or basic fire-fighting tools in shops and homes means people only notice the fire once it has already spread.

5. Community Volunteer Groups: Forming local fire-safety volunteer groups can help control small fires before they grow. These volunteers can also assist during emergencies by guiding people, clearing pathways, or helping the fire department access congested areas.

6. Use of Media and Social Platforms: Posters, radio messages, local newspapers, and social media can spread fire-safety information quickly. Using these platforms to highlight common mistakes and preventive measures can make awareness more widespread and effective.

Key Findings: The study shows that fire incidents in Dimapur are most common in crowded market areas, old residential colonies and locations with congested buildings. These areas have narrow lanes, poor spacing and old wiring, which increases both the chance and the speed of fire spread. Most fires recorded in the study were caused by electrical short circuits. Many buildings, especially old shops and rental units, still use outdated or overloaded wiring. This makes them highly vulnerable, especially during peak business hours when electrical load is high.

Another major finding is the gap between awareness and actual practice. People know about fire hazards, but they do not follow basic precautions. Extinguishers are missing, expired, or kept only for formality. Many shops also store flammable items close to heat sources.

The study found that fire incidents create serious economic losses for small traders and families. Most victims do not have insurance, so even a small fire becomes a major financial shock. Many lose their stock, documents and livelihood in a single incident. Response time from the fire service is often affected by narrow roads, traffic congestion and lack of direct access to certain clusters. Even when the fire service reaches quickly, the physical layout of the area delays effective response. Overall, the findings suggest that fire risk in Dimapur is not just a technical issue; it is linked with urban congestion, poor maintenance, weak safety practices and limited preparedness. Without stronger prevention and better cooperation between the municipality, fire services and communities, the risk will continue to rise.

Administrative Policy Recommendations

- i. Regular fire safety inspections should be carried out in markets, commercial buildings and residential areas.
- ii. Old and crowded buildings should undergo compulsory yearly electrical safety checks.
- iii. Fire stations in Dimapur need upgraded equipment, more staff and better tools.
- iv. Small fire sub-stations should be set up in busy areas like New Market and Purana Bazaar to reduce response time.
- v. More fire hydrants should be installed, and water availability for firefighting should be ensured.
- vi. Building rules should be made stricter to include proper spacing, emergency exits and safer construction materials.
- vii. Illegal extensions and unsafe structures in market areas should be removed or corrected.
- viii. Better coordination is needed between the fire department, municipal council, police and market unions.
- ix. A simple system should be created for the public to report unsafe wiring, blocked exits or fire hazards.

- x. Important buildings like markets, hotels and go downs should have mandatory yearly fire safety certificates.
- xi. Officials and inspectors should receive regular training to improve their skills in safety checking and emergency response.

Suggestions for Future Research: Although this study gives an overall idea of fire risk management and its economic effects in Dimapur, there are still many areas that future researchers can look into. A more detailed study in the following areas would help improve fire safety planning in the city:

1. Economic Loss Calculation: Future research can try to calculate the actual financial loss faced by families, shops and local businesses after fire accidents. This will help show how serious the economic impact really is.

2. Comparison with Other Towns: Comparing Dimapur with other cities in the Northeast may show how Dimapur is doing and what needs improvement. This kind of study can help identify best practices.

3. Public Behaviour and Preparedness: Another area for research is how people react during fire emergencies and what factors influence their level of preparedness. This can help design better awareness programmes.

4. Seasonal and Weather Factors: A study focusing on how weather conditions (like dry seasons or heat waves) affect fire incidents can also be useful for predicting high-risk periods.

5. Use of Technology: Researchers can explore how technology such as mobile alert systems, GIS mapping, drone surveillance or digital reporting can support fire management in Dimapur

6. Budget Utilisation and Policy Review: Another research direction could be analysing whether the fire department's budget is enough, how it is used, and what financial changes are needed.

7. Effectiveness of Awareness Programmes: Future studies may examine whether awareness drives, school programmes and community trainings actually change people's behaviour in the long run.

8. Fire Insurance Study: Since many people in Dimapur do not have fire insurance, future research can look into why insurance coverage is low and how it can be encouraged.

Conclusion: The study found that fire risk management in Dimapur is affected by a number of internal and external factors requiring improvement at multiple levels. There are severe financial constraints faced by the fire department which affects their ability to expand fire stations, buy modern equipment, and hire more trained firefighters. As such, the department is only able to manage medium-sized fires involving about 2 to 3 buildings at a time. The existing capacity of fire stations is helpful, but not sufficient for a rapidly growing town like Dimapur. The increasing number of fire incidents, especially in commercial and crowded areas, shows that the city needs a more prepared and better equipped fire management system. Many fire incidents could be avoided if people followed basic safety measures and maintained electrical systems properly. Lack of awareness and carelessness were two of the biggest causes behind fire incidents in the study. Better coordination between different agencies like police, ambulance services, and local authorities is required to improve the overall response during emergencies.

Overall, the study shows that while progress has been made, a lot more needs to be done to make Dimapur safer and more prepared for future fire-related emergencies.

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