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Rapid Urbanization and the Economic Cost of Fire Disasters: A Comparative Analysis of Resilience in Sindh and Punjab

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Abstract:
The study aims to explore the growing risks posed by fire incidents in major economic activities of Pakistan (Sindh and Punjab) where urbanization has occurred at an unprecedented rate and has resulted in vulnerable situation. The research finds that the "safety gap" is a recurring theme arising from the major incidents of 2012 Ali Enterprise factory fire and 2026 Gul plaza blaze and is a result of the lack of enforcement of safety regulations. The effects are devastating, causing not only loss of life, but substantial economic losses as well. This analysis using a comparative qualitative approach revealed that there is variation in institutional resilience between the provinces, with Sindh showing lower institutional resilience (0.4) than Punjab (0.7). This gap is due to differences in governance, preparedness and enforcement capacity. The results highlight the critical need to move from firefighting to a proactive approach; one that takes risks into account when planning cities. This change is necessary to avoid future disasters and minimize losses of multi billions that are still adversely affecting Pakistan's economic centers.

Keywords: Rapid Urbanization, Fire Disasters, Economic Cost, Disaster Resilience, Institutional Framework, Sindh, Punjab, Safety Regulations, Urban Planning

Introduction:

Pakistan is undergoing a phase of rapid and largely unplanned urbanization, which has reshaped its disaster risk profile. The country's vulnerabilities are no longer limited to large climate events that dominate Global headlines: they now include frequent and destructive Urban (Adnan it all 2024). The demographic shift has burdened Infrastructure, shortages of houses and left many societies and communities without essential services, all of which increases exposure to environmental and social hazards. At the center of this growing vulnerability is the risk increasing constantly of fire disasters in Sindh and Punjab, the nations considered most populated. While the events such as 2022 flood has cost an estimated $14.9 billion in damages, urban fires in these provinces represent a reoccurring and high frequency of threat. Doctor fueled by systematic infrastructure failure and weak enforcement of safety regulation (Adnan et. all 2024, Khan et all 2024). The persistence of these fire underscore a critical challenge: both provinces shared the burden of fragile infrastructure and inaccurate regulatory oversight, leaving millions at risk. However, shared national regulatory environment, Sindh and Punjab at present observe different fire risks that demand a comparative resilience analysis. In Sindh, specifically Karachi, damages

are a result of industrial negligence and extreme population density; the 2012 Ali Enterprise tragedy and 2026 Gul plaza fire serves as an eye-opening event on safety crises where over 80% of textile manufacturing buildings are considered hazardous. On the other hand, Punjab's risk profile is structured on its industrial core and widespread use of sub standards LPG cylinders, leading to approximately 500 accidents by early 2026.Although Punjab has attempted to modernize its framework through the Punjab Community Safety and Building Regulations (2022), both regions suffer from a 'reactive' rather than 'proactive' approach to safety. The major objective of this research is to enhance the understanding of how urbanization have influence on fi vulnerability while also evaluating the effectiveness of varying regulatory frameworks, such Sindh Occupational Safety and Health act, 2017 versus the enforcement effort of Punjab rescue 1122.With examination, the economic and human cost of major incisions ranging from loss of 74 lives in 2019 Tezgam train fire to $100 billion economy Pro of cul plaza incident, this research seeks to identify the technological and logical gaps and emergency response across Regional hubs like Karachi and Lahore. In Central to this inquiry are questions regarding how institutional resilience are different between the provinces and the extent to which non-complying with building codes facilitates reoccurring losses in commercial projects such as Hafeez Center. The study is significant for its potential to inform urban planners and disaster management authorities on urgent need for shift towards proactive prevention**.** The research can help guide integration between urban planning and chemical safety and building code compliance by outlining specific failure points, for example the lack of adequate internal firefighting equipment to support closed emergency exits. Where, such steps are essential for sustainable growth of Pakistan's industrial sector for overcoming the multi- billion rupee losses currently borne by the national economy. The scope of this study is strictly confined to Sindh and Punjab, using a qualitative framework to analyze historical and contemporary data from 2012 to 2016 as detailed in qualitative research. Where a limitation would include a hive level density of urban industrial fires over rural incidents, further, the research remains a critical diagnosis tool for addressing root cause of urban vulnerability in Pakistan.

Literature Review

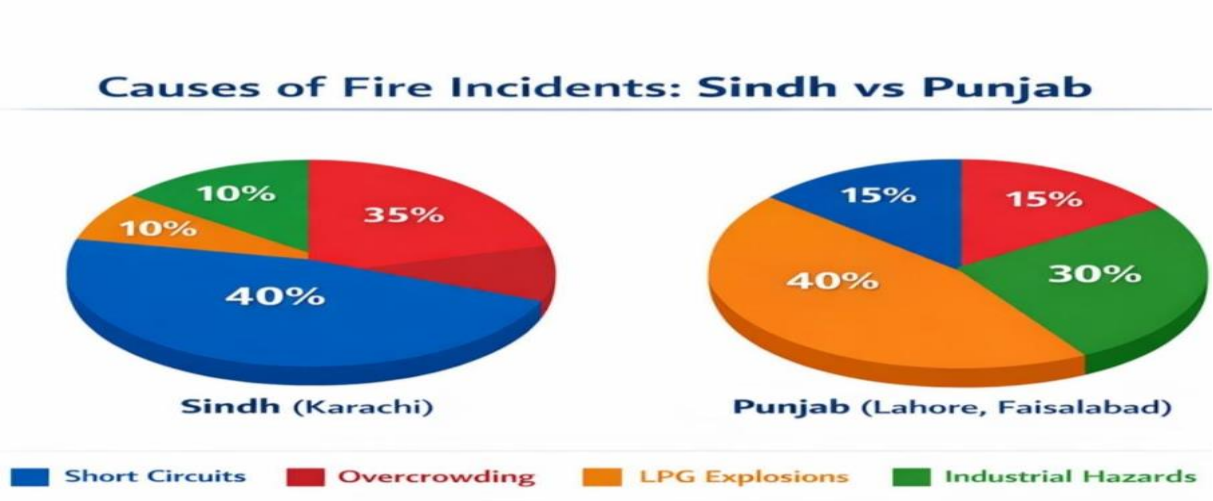
The studies of Saif-ul-Islam (2019) and Mohsin Ali Shaikh et al. (2025) together depicts a long-standing systemic issue within the Industrial sector of Pakistan that, if safety norms and proper infrastructure are not put into practice, disastrous losses in terms of human and economic resources are incurred. Analyzing the landmark. By reviewing the famous Ali Enterprises factory fire case, Saif-ul-Islam highlights that the structure related issues such as exit blockages, inadequate emergency escape pathways, and governmental neglect were key reasons for the loss of 255 lives in one of the deadliest industrial accidents of its time. By learning from history, Shaikh et al. (2025) utilize a mixed methods research design to demonstrate that such weaknesses continue to prevail, and 81.6% of the Karachi's textile garment manufacturing structures can be deemed as hazardous today. Similar factors which cause such tragedies in both situations include availability of highly flammable materials, poor planning of urban design, and lack of firefighting machinery. Hence, in order to avoid similar disasters in the future, an entirely different approach must be adopted. The Scribed (2026 inquiry report concludes that Gul plaza fire is an example of institutional collapse and technical oversight due to blocked entrances, nonconformity of building regulations and late response to disasters. While the first report concentrates on a particular event, Abdul and Yu (2020) consider the problem of increasing risk of urban disasters associated with uncontrolled growth of cities and poorly developed urban planning. Thus, both sources illustrate

the necessity of urban disaster risk in two ways: By strict control of safety regulations for high density commercial zones and developing a comprehensive urban planning strategies Involving communities. The World Bank's (2022) Post-Disaster Needs Assessment (PDNA) report, one can find that there was over USD 30 billion worth damages and losses as a result of Flood 2022 and that the State is going to apply the 'the build back better ' policy in order to mitigates the vulnerabilities of Punjab and Sindh. At the same time, the Gul plaza 2026 inquiry report shows how disastrous for people the lack of infrared in urban areas is, with almost 70 fatalities caused by fires and ineffective safety precautions. Therefore, from both sources, it is evident that irrespective of the disaster that strikes, resilience in Pakistan requires overcoming the administrative blockades to implement strict safety standards and strategies. In 2026, Gul Plaza fire at Karachi on MA Jinnah road becomes another disastrous event for Pakistan, as it has led to the death of 27 people, and a loss of Rs 100 billion because of severe overloading and lack of safety measures. While initially, it was found out that the Karachi Metropolitan Corporation (KMC) had an understaffed firefighting unit and people were locked inside the burning building, it was later revealed by The Turbine Report 2026 that it was due to an electrical fault which spread rapidly among hazardous chemicals and overcrowded shops. Together, these stories show the depth of corruption in the system, which is undermining the ability of laws, such as the 'Sindh Occupational Safety and Health Act 2017', to protect the safety of thousands of families. This January 2026 fire in Gulistan-e-Johar, which was caused by short circuits in the electrical wiring and explosions in gas cylinders, demonstrates the level of danger informal settlements face, given the lack of infrastructure and the ability to rapidly displace hundreds of families. This incident comes on the heels of a sad sequence of urban incidents, such as the fire at Arshi Shopping Mall and RJ Mall in 2023, which killed 15 people and the Mehran Fire in 2021 which killed 14 town factory fire in which 16 workers died as a result of serious systemic safety issues. Additionally, the incident at the industrial area of the New Karachi Area and at the Landhi Export Processing Zone (EPZ) in 2023 and 2025 respectively, shows how structural collapses during industrial fire incidents can be hazardous for rescuers and workers alike. These separate accounts highlight an enduring lack of regulatory enforcement in the residential, commercial and industrial cityscapes of Karachi, from historical tragedy at Regent Plaza 2015 to complete devastation of the Cooperative Market and Victoria Centre.

The regularity of fires in the city of Karachi reveals a huge gap between growth and the existing emergency response mechanism. More than 2,400 fire incidents were reported in a city of 35 million people, with only 28 fire stations. This longstanding problem is compounded by the absence of institutional oversight reflected in the recent tragic incident in 2012 when 260 workers died in the Baldia Town fire in an unregistered factory. The disaster resulted in a large-scale $5.15 million international settlement with German retailer KiK. But, as per 2019, 50 per cent of factories in Sindh were still unregistered. (Three fires cause loss to commercial concerns – Dawn). The threats are still present in the Saddar, Lea Market and New Challi fires of November 7, 2025, resulting in significant financial losses and questions regarding possible foul play. Both the structural weaknesses and insufficient investigation are exposed in these events in the city's central business districts. In the same period of March at the end of 2025, an underground fire which began from a private deep bore (cleared) in Korangi Creek illuminated for over 13 days and emitted pressurized biogenic methane. The incident highlights the need for public safety issues and environmental risks to be taken seriously in relation to unregulated excavation in industrial areas like contamination with benzene and toluene. (Sindh Act No. 1 of 2018).

Source: *Author's Calculation*

Likewise, in Hyderabad, the Akbari Mosque attack in which a 10-year-old boy was killed was the



sixth such incident after a blast from the Pole-Mounted Transformer (PMT). The incident triggered outrage and a lawsuit under the Pakistan Penal Code for the grave negligence of administration. The incidents highlight the shortcomings in implementing the Sindh Occupational Safety and Health Act 2017/2018, under which all industrial and institutional companies are mandated to take adequate measures for fire prevention and response. Research pinpoints areas for improvement in rescue response and safety at home. The results provide an urban planner and the government a definite list of measures required to move from being reactive to fire to being proactive in the prevention of the root causes of fire in the major cities of Pakistan. Punjab, serving as Pakistan's industrial heart, produces a large amount of hazardous chemicals but lacks adequate disaster management capabilities. This is a dangerous situation for possible mass casualty events. The province has a high risk profile as 14 districts are disaster prone and 90 communities lie within 2 km of industrial sites. This is compounded by a lack of skilled staff, specialized equipment and robust legislation. Thus, there is a pressing need to take a policy approach to the issue, linking urban planning with effective chemical safety and emergency response strategies, to sustain the industrial growth of Punjab.

The situation of Mass casualty events in Punjab is not going very smoothly because of massive production of hazardous chemicals in the region which is not in line with disaster management capacity. The province has a high risk profile: 14 districts are disaster-prone and 90 human settlements are within a hazardous 2 km distance of the industrial units. It also suffers from a severe shortage of trained personnel, special equipment and firm administrative structures. The LPG Distributors Association figures reveal 488 LPG-related accidents that occurred as a result of poor cylinders, further highlighting this safety problem. The incidents resulted in the injury of 286 people and loss of life in several incidents, including Lahore where 170 injuries were reported. Districts such as Hafizabad and Lodhran did not report any accidents, while the ever-present likelihood of explosions has been leading to coordinated police operations in locations such as Faisalabad, Sheikhupura and Gujranwala by the Oil and Gas Regulatory Authority (OGRA) and provincial departments. In the end, Punjab's industrial growth is not sustainable without immediate policy changes that connect urban planning with stricter enforcement against

illegal manufacturers and stronger chemical safety measures. The seriousness of the public safety problem in Punjab can be highlighted through the figures provided by the LPG Distributors Association, with 488 incidents, 286 injuries, and some fatalities due to low quality cylinder issues, with Lahore leading the list of affected districts, having witnessed 170 cases. This problem came into the fore after the tragic incident that occurred in Hafeez Centre Lahore on October 18, 2020, where 25 people were rescued and fire was put out through a joint rescue operation which lasted for 14 hours and destroyed the 500 stores valued up to Rs. 3 billion. Though joint efforts from the OGRA and provincial departments are aimed towards the crackdown of dangerous spots such as Faisalabad and Gujranwala, the Hafeez Centre incident revealed major loopholes in the system, which include the lack of any internal firefighting arrangements and combustible construction material. Regardless of no casualties in the Hafeez Centre fire, it triggered much anger among the traders, giving birth to a fourteen-member fact-finding team. The safety situation in Punjab is deteriorating. It was observed when the Tezgam Express caught fire near Rahim Yar Khan in 2019. A gas cylinder probably. There was an electrical problem. This killed least 74 people and hurt more than 40. Many of these people were going to an event. The military and civilians had to work to rescue everyone. This showed how dangerous things can be on trains and trains are not safe. The government had to look into how safe the railway. There are also problems in factories and on the roads in Punjab. For example, a fire broke out at a shoe factory in Shahdara because of a circuit. This hurt eight people. Daily people get hurt on the roads in Punjab. There are 1,427 injuries and 13 deaths every day because of 1,309 accidents in 37 districts. All these things show that the government is not doing a job of keeping people safe. There are things that can cause big accidents, like things that can catch fire, bad equipment and too many cars on the road. The safety situation, in Punjab is a problem because of all these things. The province of Punjab is not safe because of these problems. The fire at Lahore's Indigo Hotel was very sad. It started due to unknown event in the basement -air conditioner or a boiler. The fire shows us that we need to act when something like this happens and we also need to make sure we are checking everything beforehand. The fact that three young people died is very sad. It is good that almost 300 people were rescued from the 19-story building. This happened because of the fire hydrants and the fast response of the emergency teams. They were able to save a lot of lives. This fire shows us that while the emergency teams are getting better at dealing with fires we need to make sure we are preventing them from happening in the place. The Punjab Community Safety and Building Regulations that were put in place in 2022 are a step forward. The regulations were issued by Rescue 1122. Being very important as they make sure that big buildings, hospitals and shopping centers are safe. They require these places to have safety certificates to prevent fires from happening over and over. This is a change in the way Pakistan handles disasters. According to the Business Recorder in 2026 these regulations are an evolution in Pakistan's disaster management framework. The Indigo Hotel fire shows us that we need to follow these regulations. We need to make sure that all high-rise buildings, which are 50 feet and above have these safety certificates. This will help prevent fires like the one, at the Indigo Hotel from happening. For the study conducted regarding Koh-e-Suleiman region, GIS-based data and ARIMA model has been used to show that drought, coupled with temperature above 25°C, has caused the outbreak of wildfires in 2022 resulting in the destruction of 34 km of the largest Chilgoza pine forest, as well as air pollution (Fire risk assessment and post fire evaluation of world largest Chilgoza pine forest). Furthermore, the study regarding the heritage buildings of Lahore, uses the Fire Risk Index (FRI) to find out that about 17% of the studied locations are vulnerable to Fires; and in almost all such cases fire propagation is seen to be the major hazard, wing to a lack of safety

measures in historic architectures (Fire risk assessment for heritage structure of Lahore). Both of these pieces of research highlight the importance of GIS analysis and use of risk indices to design strategic frameworks to help restore the ecology of Pakistan.

Methodology

This research employs a qualitative comparative case study based on Literature Synthesis analysis in which archival inquiry reports of (for instance, Gul Plaza 2026 report), provincial safety laws, and PDNAs by the World Bank are comprehensively studied to arrive at a triangulation of findings. The comparative case analysis among the two prime economic centers of Karachi (from Sindh) and Lahore/Faisalabad (from Punjab) aims to examine socio-technical aspects of "reactive" governance and "non-compliance" with building codes. Through this synthesis, recurring themes such as that of a short circuit as a major factor responsible for igniting the fire will emerge. This research methodology maintains four main pillars of trustworthiness in the form of credibility (triangulation) and conformability (findings based entirely on reality of disasters in Pakistan 2012-2026).

Data Analysis and Discussion

The Conceptual Risk Model

This study employ conceptual risk model for analysis according to which, disaster risk is considered a linear chain of events consisting of the onset of rapid urban expansion which progressively increases vulnerability. Due to the increasing urbanization, population density increases, and infrastructure and essential public services are subjected to more pressure. This infrastructure stress, improper urban planning and lax safety measures, increase the possibility of urban fires and other calamities. These risks lead to significant economic losses due to property damage, business disruption, loss of livelihoods and higher public expenditure on emergency response and reconstruction. This is very clear in Pakistan in the province of Sindh where the urbanization process has been fast and largely unchecked, which has worsened disaster conditions. In comparison, the risks have been more effectively managed in Punjab, with relatively good levels of urban planning, building codes and infrastructure management, but with significant challenges in the context of fast-growing cities.

Comparison of Regional Resilience

Table 1: Comparative Analysis of Resilience Dimensions

Dimension	**Sindh**	**Punjab**
Urban Planning	Weak	Moderate to Strong
Fire Safety	Weak	Moderate to Strong
Infrastructure	Enforcement Poor	Improved
Institutional Capacity	Low	Medium
Disaster Resilience	Low	Medium- high
Economic Impact	Severity	High - Moderate

Resilience Index

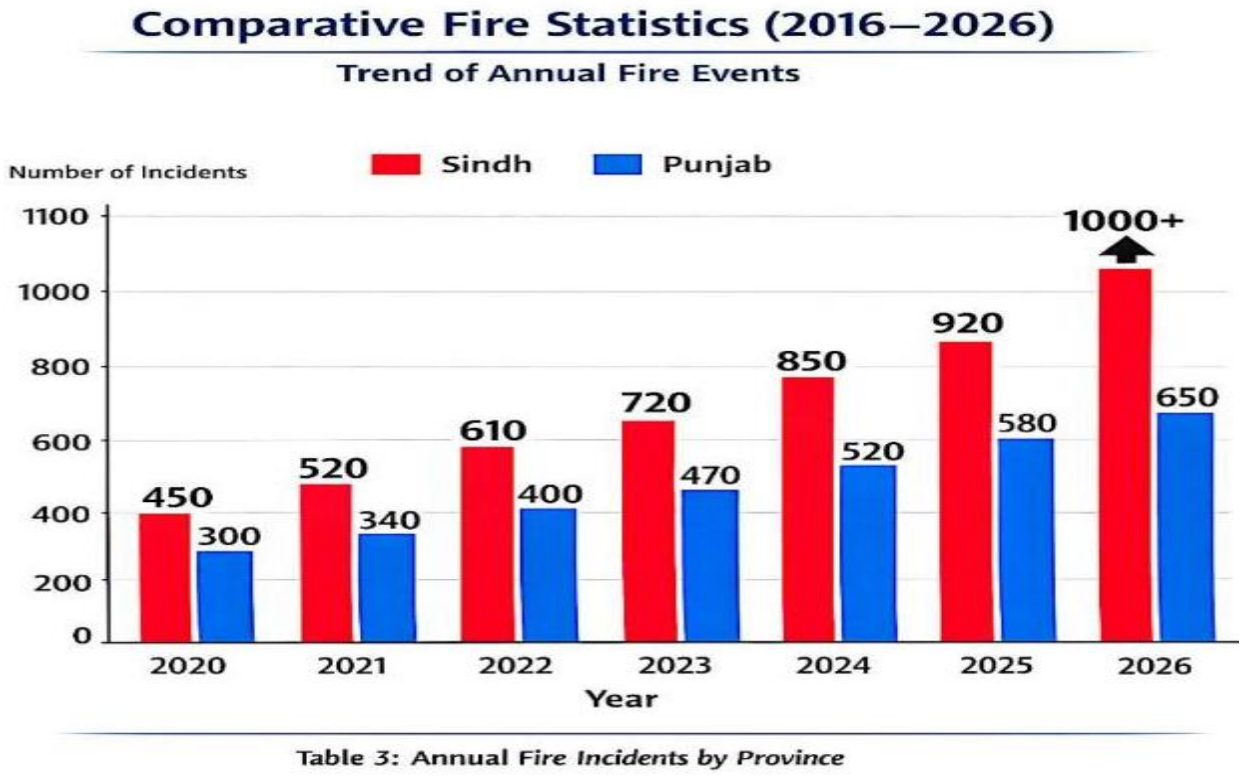
Table 2: Regional Resilience Index Scores

Indicator	Sindh	Punjab
Response Capacity	Low	Medium
Infrastructure	Low	Medium
Governance	Weak	Stronger
Preparedness	Low	Medium
Overall Index	0.4	0.7

Comparative Fire Statistics (2016-2026) Trend of Annual Fire Incidents

Table 3: Annual Fire Incidents by Province

Year	Sindh Incidents	Punjab incidents
2020	450	300
2021	520	340
2022	610	400
2023	720	470
2024	850	520
2025	920	580
2026	1000+	650



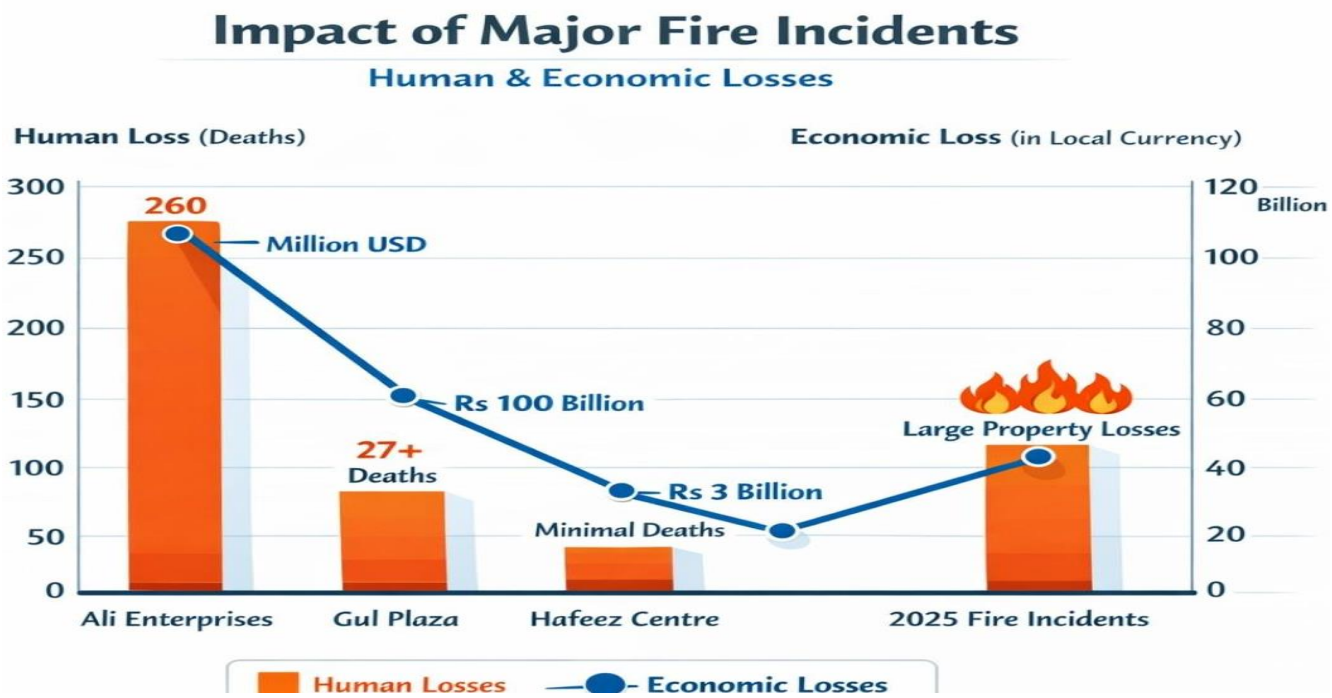
Source: Authors calculation from Table 3.

Socio- Economic & Life Loss

Fire Incidents in Pakistan has result in severe human and financial loss. A major fire can send the business back by 10 years.

Table 4: Human and Economic Losses

Incidents	Human loss	Economic loss
Ali Enterprises	260	Million USD
Gul Plaza	27+	Rs. 100 billion
Hafeez Center	Minimal death	Rs. 3 billion
Floods 2022	Thousands effected	USD 15.2 billion
Karachi Fire Incidents	Multiple	Large property loss



Source: Authors calculations from Table 4

Notable Life loss Incidents:

Ali Enterprises (2012): 289 deaths.
Tezgam Train Fire (2019): 74 deaths.
Gul Plaza Fire (2026): Over 70 deaths.
LPG Accidents (Punjab, 2026): Multiple fatalities and 286 injuries and annual trends of fire incidents (2020-26) show a steady climb, with Sindh consistently reporting higher frequency and higher economic devastation.

In 2021, Sindh experience 520 incidents while Punjab faces 340 incidents including the Hyderabad PMT tragedy while in 2026 Sindh confronts 1,000 cases including Incidents of Gul Plaza and Korangi Refinery while Punjab confronts 650 cases.

Conclusion

Fire threat in Pakistan is neither "bad luck" nor "accidents," but rather a consequence of the lack of control over urban development, along with the continuous "safety gap" of inadequate regulations. As this study shows, there is an evident gap in the Resilience Index, where Punjab is gradually moving toward preventative solutions, using Rescue 1122 and 2022 Building Regulations, while both provinces are still highly reactive in nature -where only 20% of the city is reachable within the life-saving seven-minute window. The reality in Lahore is that, due to poor urban planning, not all areas can be reached during the seven minutes when firefighters are most effective. It is concluded that, Pakistan cannot be considered sustainable from a business perspective in terms of its economy and industrial capacity until the transition to the "build back better" principle takes place. Saving billions in losses for the Pakistani economy is not simply possible through improved fire services, but should include building code adherence, eradication of bribes in the inspections process, and chemical safety inclusion in urban zoning. Otherwise, the country's natural and cultural treasures will continue being in a perpetual

Policy recommendation

It is recommended to adopt the following basic safety options:

- Smart Compliance: Start a single digital "Safety Portal", combining building permits with fire safety certificates to tackle the gaps and cut out fire safety inspection corruption.
- The "Responsible Person" Model: Legally define building owners or the contractors as the "Responsible Person", and establish the legal liability for the recurrent fire risk assessment.
- Pre-Utility Certification: Implement the Fire Safety Certificate (FSC) requirements of 2022, which apply to all high-rises, (50ft+), across the country before they can be connected to the utilities.
- The Seven-Minute Target: Adopt NFPA aligned response goals (6–7 min) and create "Station Density Maps" to fill the need for underserved urban response (6–7 min) zones.
- Specialized Fleet Modernization: Use of high reach snorkels for vertical fires and "Mini-Tenders" for narrow historic alleyways instead of general purpose trucks.
- Mobile water supplies for industrial and commercial centers: Require separate, high pressure hydrant networks, thereby eliminating dependence on mobile water supplies tankers.
- Mandatory ERTs: In-house Emergency Response Teams (ERTs) should be required on all large commercial complexes, shopping malls, high-rise buildings, industrial facilities and other high occupancy buildings. These teams should have enough members to be well trained and be able to quickly respond to fires or emergencies before the arrival of the municipal fire service. The frequency of emergency drills, certification, and coordination with local fire departments should be required to guarantee operational readiness and reduce loss of life and property in disaster situations.
- Emergency Response Teams (ERTs) should always on high alert to address the "First 15 Minutes" of an emergency incident.
- National Safety Curriculum: Create a standard set of training for chemical hazards and electrical load management for industrial managers that reduces short circuit hazards.
- Industrial Buffer Zoning: Providing 500m to 2km buffer zone where industrial units are located near houses is forbidden.

- Informal Settlement Upgrading: Implement "Land Readjustment" to improve access roads in areas of high density, providing access for emergency vehicles.
- Fire Load Regulation: Adopt "Inventory Density" limits to limit the rate of fire in wholesale markets and in high-stock environments.
- Mandatory Fire Insurance: Reassurance for commercial inventory, high-rises, to move the burden of cost and responsibility of recovery to the private sector, and to encourage increased safety standards.
- Post-Disaster Recovery Fund: Establish coordination between Chambers of Commerce and disaster agencies so as to offer small traders immediate liquidity.
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Comparative Context: Global Best Practices

Feature	Pakistan (Current)	Developed Country Standard (Goal)
Enforcement	Manual/Reactive	Digital/Proactive (Singapore's CORENET)
Liability	Often ambiguous	Clearly defined "Responsible Person" (UK FSO)
Logistics	Response hindered by congestion	Decentralized Fire Stations (USA NFPA 1710)
Prevention	Minimal internal training	Mandatory ERTs & Drills (Japan/ Singapore)
Economic	Massive uncompensated loss	Mandatory Insurance/ Risk Transfer

The comparative analysis reveals that there is a huge gap between the existing fire risk management system in Pakistan and best practices in the world. Fire safety enforcement in Pakistan is mostly manual, reactive and the inspections are mostly conducted after an incident, instead of regular digital inspections. Developed countries, on the other hand, have implemented various technology-based systems, one of which is Singapore's CORENET, a digital system that combines building approvals, compliance monitoring, and safety inspections. Like in Pakistan, the responsibility for fire safety is sometimes split between different authorities or even not clearly defined, but in the UK this is clearly defined as the responsibility of a designated Responsible Person under the Fire Safety Order - this means that fire safety compliance and fire negligence is reduced. Operating from an operational perspective.

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