



December 31, 2020

## Fire Safety Management in High Rise Buildings of Lahore, Pakistan

Imran Siddique \*<sup>1</sup>

Sifwat Sajjad Ahmad Hussain

IJIMS have Open Access policy. This article can be downloaded, shared, and reused without restriction, as long as the original authors are properly cited.

IJIMS applies the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) to this article.

---

<sup>1</sup> Corresponding author

## Fire Safety Management in High Rise Buildings of Lahore, Pakistan

**Imran Siddique**

Rescue & Safety Officer

[rsoimran9@gmail.com](mailto:rsoimran9@gmail.com)

**Sifwat Sajjad Ahmad Hussain**

Rescue & Safety Officer

[sifwatsajjad@gmail.com](mailto:sifwatsajjad@gmail.com)

### Abstract

Basic objective of this study was to assess the degree to which the high rise buildings situated in Lahore are in compliance with the fire safety standards and SOPs regarding evacuation plans. Quantitative approach was adopted to meet the objective of the study. Ten high rise buildings situated in Lahore city were taken as sample. The buildings were selected on the basis of their size, height, and area. The selected buildings included new and old buildings, commercial and residential buildings so that the variations regarding fire safety standards could be measured. A comprehensive survey questionnaire was developed. Results of the study show that besides various critical incidents, no proper measures are taken on scientific grounds to ensure prevention or at least taking rapid response to minimize losses. There exist no fire safety risk assessments, zero ongoing monitoring, no ongoing fire safety training or awareness program, inadequate or dysfunctional fire extinguishing instruments, no building fire safety control, no automatic fire detection and alarm system, no ongoing fire evacuation drills, and the access of fire brigade to the fire sight is inadequate. Recommendations of the study may prove highly productive in constructing safe buildings from safety point of view.

**Key Words:** Safe buildings, fire sciences, effective management of buildings

### Introduction and Background of the Study

High buildings have become a basic need keeping in view the rapid growing population. The trend of high buildings has become a fashion in the present age. In institutes, markets, commercial areas, high rise buildings have become a necessity. These have also increased the usage of economic growth. Awida (2019) conducted study related to high rise buildings in Kuwait. The researchers concluded that high buildings have become popular among the community due to a number of reasons. Local market needs can be met through large size buildings. In the fast changing present day world, small buildings can't meet the challenges of the industry and growth. High buildings have

become a population fashion of the modern days. Availability of good financial resources enables businessmen, industrials, etc. to construct large size buildings. Innovative technologies are making

it easy to develop large size buildings. Growth of the industry is flourishing rapidly. In metropolitan cities across the global world, high rise buildings have got good popularity.

Ali & Kheir (2012) conducted study on tall buildings and urban habitats of the 21st century: A global perspective. They concluded that high buildings have become a latest trend among all. All countries are investing more and more money in the shaping of large size buildings. Progressive nations are investing in backward countries in the making of high rise buildings. They want to make safe investment in order to earn maximum profit. They wish to make themselves more influential. They want to raise themselves. They want to set standards in the market place.

Farooqui, Arif & Sfa (2008) conducted study on safety performance in construction industry of Pakistan. Findings of the study show that there are golden opportunities of making investment in Pakistan. National investors invest

on high buildings. They want self-development. Therefore, they erect shopping malls. They want to earn more and more. They want to make completion of their set goals without following standardized procedures for buildings. They just stand giant looking buildings without any safety measures. They don't take into account fire concerns. They just want to get more and more money. They take risk of the innocent lives. They don't take care of the property and life of stakeholders. This situation goes even unnoticed in the eyes of the authorities. In Karachi, there are many flats and high buildings. These apartments, flats and buildings have also been designed without taking into account proper mappings standards. Investors only keep in mind the aspect of profit. They don't take into concern the element of safety and protection. Often, their buildings catch fire and a huge loss to property and life takes place. These calamities take place not only because of the negligence and careless attitude of the investors but also on the part of concerned authorities that don't keep a check and balance. In Lahore, many housing schemes have been formed. Most of these housing schemes don't have proper fire escape. People are always in danger zone. They are always in the shadow of risks. Uncertainty prevails everywhere.

Gul, Danuri, Mohamed, & Nawi (2019) conducted study on safety management practices in high rise buildings in Pakistan. Findings of the study show that there are major concerns with respect to the safety of the tall buildings, maintenance, and wellbeing of the dwellers in these high rise buildings. Besides the structural limitations, narrow surroundings, and unplanned construction, there arise one major issue which is related to the fire safety concerns and safe evacuation of the residents, or working professionals present in these buildings. Firefighting has remained highly challenging. In order to effectively fight against fire, there is a dire need to learn scenario-specific fire behaviors to develop customized frameworks for effective firefighting in different situations. Limitation of resources, unskilled firefighters, no cooperativeness of the real estate owners and considerable negligence from government side has

resulted in loss of number of lives in such high rise buildings.

This is a unique study in its nature. It will prove highly useful in make safe buildings. This study will definitely help the policy makers and decision making authorities in the making of such buildings which are stable from the safety perspective.

#### **Review of Literature**

Fire cases are always of serious concern from the ancient times to the modern times. Methods to cope with fire cases have been changed to a great deal in the present age that is known as the period of ever changes. Now modern chemical methods are used to manage fire dangers. History shows that fire was used in old wars to conquer areas lands and the enemies. It was thought as the symbol of horror and fire. Fire affects humans and animals equally. It spreads havoc on a large scale. Even forests also catch fire and a large number of trees become a heap of ashes due to the same. People are burnt miserably due to fire. During the explosion of deadly weapons, fire spreads life loss on a massive scale. There are few methods to avoid fire issues. In an under-developing country like Pakistan, it becomes more difficult to cope with fire issues. The rulers of poor countries don't invest much on fire safety gadgets. Craighead (2009) stated that engineers and architects should be very vigilant in the making of high rise buildings. Mapping should be shaped efficiently. Emergency measures should be completed in all aspects. There should be emergency exits in case of calamities. Security of the life and resources must be ensured. Value of human life must be placed on top priority. Companies should be resourceful. Owners of the company should care the life of all employees. All steps need to be implemented. Proper training should be given to manage the situations of emergency. Standardized procedures and guidelines should be followed. No risk should be taken. Safety measures should be given importance.

Chou & Chen (2013) conducted study on emergent disaster rescue methods. Findings of the study show that practical steps need to be taken for ensuring safety of high rise buildings. If

practical steps are not taken, then huge loss of property and life may happen. Proper measures are highly essential for the safety of tall buildings. All proper steps should be taken at start so that no problems may occur later on. Methods of prevention should be ensured on top priority. Emergency management should be an integral part of all high rise buildings. Mapping of the buildings should be shaped keeping in view the latest needs. Human life should be taken care of. No compromise should be made with human lives as life doesn't come back and loss of property happens too if buildings are not stable.

Huge loss of life and property happens due to poor fire safety management. Fire is not considered a major concern in Pakistan. Owners of buildings are usually careless. They don't think about future demands. They are generally greedy. They want to enhance their own economy. Farooq, S.H. & Haseeb (2014) conducted study on fire safety measures in Pakistan. Results of the study show that in backward countries like Pakistan, no proper steps have been taken regarding fire safety measures. Government agencies and relevant departments are not educated enough to ensure fire safety in buildings. They don't make practical policies. They believe in oral theories rather than documented regulations. Awareness level is very low regarding the severity of fire among all stake holders. Money is not spent on the proper designing of the tall buildings. No proper procedures are followed in the building of commercial areas. Government doesn't play its vital role in making implements of standardized procedures. The study shows the need of proper safety management in tall buildings.

It is not an easy task to manage fire threats. Proper planning is needed to face such issues. All concerns should have proper awareness of fire related matters. There should be proper sessions to manage emergencies. Buildings are needed to be designed keeping in view the set standards. Fire cases are needed to deal scientifically. Fire science is not a single area. It covers multiple aspects. It includes risk planning, safety measures, designs, wild life safety and an adequate management. Various aspects are needed to be taken into account while

encountering fire related tasks. Akhtar (2014) conducted study on improving fire emergency response in Rawalpindi. Findings of the research show that fire-fighting is not an easy task. To manage fire cases in high rise buildings is a professional job. Skilled man power is required to tackle fire cases. Buildings are usually not managed properly. These are poorly treated. No proper steps are taken to avoid calamities that may befall any time. Fire fighters face multiple problems. Sufficient resources are not available to the fire fighters and therefore they can't cope with the emergent situations efficiently. Media plays a positive role in showing the importance of safety measures to be implemented in tall buildings.

Ali, S.S. (2015) conducted study on fire protection services in Karachi. Findings of the study show that fire service is one of the basic services which needs to be provided by the government to its public as people give taxes to the government and in return they expect safety of their property and life. Agencies of the government should establish special units that may ensure protection from fire. Fear of fire disturbs the peaceful lives of people. Government needs to enforce revolutionary steps to ensure the lives of people. Safety of the people should be the major concern of Government. Services should be functioned adequately. Fire fighter units should always be kept on high alert to manage any emergency cases. Fire and human beings have lived side by side for centuries and fire has remained one of the key elements that has played vital role in survival and development of human as superior human beings. Besides its positive contributions to human life, when it is erupted as uncontrolled brutal, it has claimed wide spread losses in terms of human lives as well as other financial assets.

Minhal (2015) conducted study on safety practices in multi-story buildings projects at Lahore. Findings of the study show that the industry of construction is one of the major industries all around the world. It plays an important role for the uplift of economy. Safety in the high rise buildings should be taken as a major concern so that no problems may happen in future. Material of the construction should be of

high quality. Proper regulations need to be followed while the construction of tall buildings. There should be documented policies and procedure in designing high rise buildings so that risks of accidents may be finished.

**Research Objectives**

Following are research objectives of this study:

- To know the safety-status of high rise buildings in Lahore
- To furnish suggestions for the fire safety management in tall buildings

**Research Methodology**

Quantitative research approach was used to assess the degree to which the high rise buildings are in compliance with the fire safety standard. Ten high rise buildings situated in Lahore city were taken sample. The buildings were selected on the basis of their size, height, and area.

Apart from this, the selected buildings included new and old buildings, commercial and residential buildings so that the variations regarding fire safety standards could be studied in that regard. Expert safety standards analysts were selected for data collection who had also live experience of firefighting in such high rise buildings. Survey design was used to objectively assess the multidimensional phenomenon of fire safety and evacuation management practices in vogue. A comprehensive survey questionnaire was developed for meeting the required objectives of the study.

**Results, Analysis and Interpretation**

**Buildings Profile.** Five buildings were considered for study from different locations of Lahore. All are multistory buildings with basements of which three are commercial business markets, one is hotel and one is educational institute. Following table shows the profile of buildings:

Table 1

S.N.	Location	Area covered	Type	Details
B1	Lower Mall	4 canals	Educational institute	7-storey building including 01 basement
B2	Egerton Road	3,60,000 sq. ft.	Commercial business center	11-storey building including 02 basements
B3	Abbott road	2.5 canals	Hotel	8-storey building including 01 basement with 80 rooms
B4	Dhani road	Ram canals	Commercial business center	8-storey building including
B5	Shah Alam market		Wholesale business market	12-storey including two basements with 150 shops

**Management Planning and Procedures**

As per management planning and procedure is concerned, there is found little existence of related activities and policies. Acquired responses reveal that in most of the buildings, negligibly exists (i.e. 40%) the documented SOPs, Regular Drills, drill results review, Emergency plan, Fire Marshals, Provision Table 2

to Contact 1122 whereas Fire safety policy, risks informed, and Direct Control representative are found non-existent in more than 80% of observed buildings. As a whole it can be derived from given statistics that fire safety related management practices and policies are miserably non-existent. Following Table 2 shows the acquired results.

Category	Yes	No
Fire safety policy	20%	80%
Documented SOPs	40%	60%
Regular Review	20%	80%
Regular Drills	40%	60%
Drill results review	40%	60%
Risks informed	20%	80%
Emergency plan	40%	60%
Assembly point	40%	60%
Fire Marshals	40%	60%
Provision to Contact 1122	40%	60%

**Level of Staff Awareness and Responsiveness**

As far as level of staff awareness and responsiveness was sought, the results were found mixed. Only 40% of employees were found informed regarding fire safety measures while it was found that staff is totally unaware of exit routes. None of the staff were trained for fire prevention as well as for risk assessment. Only 20% safety specialists were found in surveyed

buildings. There is negligence in properly communication of exit routes if they are found in the buildings. Overall there is very much poor condition regarding staff awareness and responsiveness about fire safety measures and training to assess and prevent any emergency situation. Following Table 3 shows the gathered results.

Table 3

Category	Yes	No
Employees informed	40%	60%
Staff informed	40%	60%
Safety specialist	20%	80%
Staff Trained for risk assess	0%	100%
Staff Trained for Fire Prev	0%	100%
Exit routs known to staff	20%	80%
Location of Extingcomm	20%	80%

**Visitors, Vendors and Disabled Safety Measures**

As per visitors, vendors, and disabled safety measures, situation is also miserable. 60% buildings studied have evacuation places for disabled persons and vendors were asked to

complete the fire safety requirements. There is total negligence regarding fire situation SOPs and instructions to staff regarding the safety of disabled persons. Following Table 4 shows the gathered results.

Table 4

	Yes	No
Fire Situation SOPs	20%	80%
Hazard controls for vendors	40%	60%
Evacuation of Disabilities	60%	40%
Evacuation root for Disabilities	60%	40%

### Fire Fighting Equipment

As per staff exit and emergency lighting, results show that there were none exits to safety places found in any building. Situation regarding exit signs, clear exit routes, exit is hazard free, emergency lights are tested, and stairs and steps are OK was very poor. Only 40% buildings were

found with sufficient exits and OK emergency lights. Exit doors condition was OK in 60% buildings. In sum overall condition was found very poor regarding emergency lights and safety exits. Following Table 5 shows the gathered responses.

Table 5

	Yes	No
FFA sufficient	20%	80%
FFA positioned properly	0%	100%
Extinguishers coded properly	0%	100%
FFA are certified	40%	60%
FFA Tested regularly	20%	80%
Trained use of equipment	0%	100%
Trained use of right equipment	20%	80%

### Discussion

The results reveal that besides various critical incidents, no proper measures are taken on scientific grounds to ensure prevention or at least taking rapid response to minimize losses. There exist no fire safety risk assessments, zero ongoing monitoring, no ongoing fire safety training or awareness program, inadequate or dysfunctional fire extinguishing instruments, no building fire safety control, no automatic fire detection and alarm system, no ongoing fire evacuation drills, and the access of fire brigade to the fire sight is inadequate besides being located at nearest point of the two markets due to small streets full of people and encroachment by the hawkers, and improper parking of vehicles.

Many investigated factors have great impact on the fire and evacuation safety specially in case of building fires. From the beginning of construction of building i.e. design phase, installation of fire prevention equipment, inspection of the building by fire professionals and other concerned professionals, implementation of building construction related rules & regulations etc. have remarkable influence on the evacuation safety. To understand the trend of common problems of evacuation safety, the real problems of the building design and different aspects of building construction related rules & regulations, various types of analysis were done. Since, Japan is a highly developed country which faced a lot of significant building fires from the very beginning of economic development and Pakistan is also a developing country with rapid urbanization and

mass population, these two countries concerned fire safety related information were utilized for this analysis. This analysis result can be used to address the common problems of evacuation safety, the impact of rules and regulations on evacuation safety, the common problems of building design plan concerning evacuation safety and the overview of important factors related to evacuation safety.

Since evacuation safety of a building in case of any fire incident is closely related with the design, construction and arrangement of building components/structures; building construction related codes, rules & regulations have great impact on the evacuation safety. It is commonly experienced that after the construction of any structure or building, it is very difficult to incorporate the structural evacuation safety measures. Thus, it is utmost important that the building construction related rules & regulations should be updated to cope with different aspects such as; social, cultural, economic, traditional, geographical and modernization aspects of the country.

### **Conclusion**

Overall the safety status is miserable and there is not fire safety measures implemented in any sort of high rise buildings irrespective of its type, newness or type of business being held there. In this regard, the concerned rules & regulations related with evacuation safety of Building Standard Law and Fire Service Law must be considered. Occupancy type or use of the building, possible hazards, number of exits, width of corridors, width of exits, type of construction with regard to fire resistance, use of materials etc. are considered for the proper design of the buildings. If necessary measures concerning evacuation safety are not taken during the design phase, it is generally very much difficult to modify the evacuation facilities specially the structural part of the building after its construction.

As a whole the study has both theoretical and practical implications as at first it develops the true understanding of confronting a fire incident, and the process through which a small incident can turn into a disaster. True understanding of a phenomenon can help

combat with its negative consequences. In addition, the process approach can facilitate dealing with the unique nature of each stage resulting in restricting fire get into the next phase in an effective way. This study will also extend the unique learning experiences of firefighters that will help new incumbents get prepared in advance. Current study has developed the critical understanding of congested areas further augmented by the embedded challenges linked towards such place specifically within the focused spectrum of fire sciences and evacuation management. This will also instill the need to develop fire safety and evacuation plans on scientific grounds to secure the precious lives and properties from confronting with disasters.

Pakistan is a developing country. Rapid and unplanned urbanization, industrialization, modernization of the society, mass population and mushrooming of the newly constructed buildings specially in one of the mega cities in the world. The ongoing increasing number of fire incidents in Pakistan reflects the vulnerability of fire incidents. Moreover, there were some major building fire incidents in Pakistan. History of the world indicates that most of the mega cities had significant fires at the beginning of the economic development and urbanization. Thus, it is utmost important to take necessary steps from the history of fire incidents before the catastrophe takes place. Since, Pakistan is a developing country and building construction is increasing at high pace, the analysis results of the past major fire incidents might be used for better preparation of evacuation safety in the building fire incidents.

### **Recommendations**

Following recommendations are made for the safety of tall buildings on the basis of conclusions of the study:

1. Requisite procedures and guidelines should be adopted to construct tall buildings.
2. There should be fire safety policy for high rise buildings to avoid any calamities.

3. There should be documented SOPs to ensure the safety of residents and the employees.
4. Buildings should be reviewed on regular basis to check their durability.
5. Risk management factors should be considered before the construction of tall buildings.
6. Emergency plans should be formed properly.
7. Rescue training sessions should be held to make the man power skilled.
8. All standard safety measures should be taken to ensure the protection of life and property.
9. Emergency exits should be constructed.
10. Rescue staff should be deputed to ensure safety of the buildings.

#### References

- Akhtar, S. (2014). Firefighters' view on improving fire emergency response: A case study of Rawalpindi. *International Journal of Humanities and Social Science*. 4 (7), 143-149
- Ali, Mir & Al-Kodmany. (2012). Tall Buildings and Urban Habitat of the 21st Century: A Global Perspective. *Buildings*. 2. 10.3390/buildings2040384.
- Ali, S.S. (2015). Fire protection services in Karachi. *Journal of Basic and Applied Sciences*. 11, 176-183
- Awida, Tarek. (2019). Recent practices of analysis and design of high-rise buildings in Kuwait (Case Study). Conference: Design & Sustainability of Structural Concrete in the Middle East with Emphasis on High Rise Buildings. Kuwait.
- Chou, Shuo-Yan & Chen, Dayjian. (2013). Emergent disaster rescue methods and prevention management. *Disaster Prevention and Management: An International Journal*. 22. 10.1108/DPM-07-2012-0073.
- Craighead, G. (2009). High rise security and fire life safety. Elsevier. USA.
- Farooqui, Arif, F. & Sfa, R. (2008). Safety performance in construction industry of Pakistan. 1st International Conference on Construction in Developing Countries (ICCIDC-I), Karachi. 74-87.
- Minhal, S.M. (2015). A study of health, safety and environment (HSE) practices of multi-storey building projects at Lahore (Pakistan). Unpublished Master Thesis, Superior University Lahore.
- Shahid, S. H., Farooq, S., Maqbool, S. & Haseeb (2014). Structural fire safety measures in developing countries: Pakistan - A Case Study. *International Journal of Engineering and Advanced Technology (IJEAT)*. 4(1), 95-101