A Review Study on Types of Fire Accidents and their Management in India: 2014 to 2018

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ABSTRACT

Fires in India are a very common occurrence and witnessed every year in large numbers. The places of occurrence of these vary from structural fires to vehicles to forest and vast open lands. Accidental fires cannot be prevented and hence, steps need to be undertaken for minimizing the losses incurred in terms of lives, livestock and property. Understanding causes for fires through proper investigation, will help in mitigation of future incidents and save the government valuable money lost on fighting these blazing fires. This review paper focuses on the management and response towards accidental fires in India and will highlight statistical data for accidental fires over a period of time. The trends in numbers of fire accidents have been studied over five years from 2014 to 2018 by collating data from the annual publications of "Accidental Deaths and Suicides in India" published by the National Crime Records Bureau, Government of India every year. The paper was aimed to discover the most frequent type of accidental fires in India and create awareness of the risk of fire disasters and better strategies for safety and incident management.

Introduction

India witnesses a large number of fire incidents every year. According to World Health Organization data in 2012, India ranked first in the number of deaths resulting from fires and hot substances (Centre of Fire Statistics, 2016). In 2017, in a 195-nation analysis conducted by Global Diseases Burden and published in their journal, it was seen that every fifth fire-related death in the world occurred in India (Iyer, 2019). On average, there are more than 10,000 fire related deaths annually in our country, followed closely by Pakistan and China.

Last year 2019, our country witnessed many deadly accidental fires caused by various factors. Some examples of these infernos included (i) The Surat coaching centre fire on 24th May 2019: This deadly blaze caused by human negligence claimed the lives of 23 students. It was found that the involved party had violated major guidelines of the National Building Code. (ii) The Aero India show fire on 23rd February 2019 at Bengaluru: This inferno engulfed around 300 vehicles in the parking lot near the Yelahanka Air Force Station. It was reported to have been caused by a disposed cigarette butt by an unknown person into the dry grass surrounding the area. (iii) The Factory fire in Delhi on 8th December 2019 at Anaj Mandi: This deadly fire claimed the lives of at least 43 factory workers in the illegal factory unit. The unit had no permissions for operation and also, had flouted fire safety regulations for the building. (iv) Major Fire accident in a parking lot opposite to Ramachandra Medical College on 23rd February 2019 in Porur: This accident gutted around 170 cars in a private car parking space causing large losses. The fire was believed to have occurred due to an overheated silencer from one parked car. (v) Delhi hotel fire at Karol Bagh on 12th February 2019: This resulted from an electrical short-circuit late at night killing

around17 persons of a marriage party and injuring several others. While the short circuit was the cause of the incident, the investigation revealed that many regulatory policies were not followed, illegal extensions had been constructed and the fire extinguishers were out of gas (Beyond Carlton, 2019), (Deccan Herald, 2019), (The Hindu, 2020) & (The News Minute, 2019). Have we learned our lessons from these incidents?

While fire accidents cannot be predicted, the losses from these disasters can be minimized effectively. Fires result in loss of lives and destruction of property. Every year we lose valuable resources and fiscal expenditure on fighting fires which may have been minimized or all prevented. This paper focuses on the trend of fire accidents in India between 2014 and 2018 and how effective management of fire services can contribute to minimizing economic losses. It also helps create awareness about the risks of fire and management of man-made fire disasters in India.

Methods

All data has been collected from open data sets of the annual publications of "Accidental Deaths and Suicides in India" released by the National Crime Records Bureau, Government of India. The statistical data for accidental fires have been collated for the period from 2014 to 2018 with the purview of understanding current trends in incidence occurrence, their management and predicting future patterns.The data for the given period from 2014 to 2018 has been collected from Open Government Data (ODG) Platform India available for non-commercial and research purposes.

Methodology

The data were compiled in Excel and studied for trends in incident occurrence and current practices followed. Data from NCRB publications were gathered from Chapter 1 and the summary Table 1.10 for the years from 2014 to 2018. The NCRB classifies accidental fires based on place of occurrence into the following groups: (i) School buildings (ii) Commercial buildings (iii) Residential/Dwelling buildings (iv) Government buildings (v) Mines (vi) Factory manufacturing combustible materials including cracker/match box factories (vii) other factories (viii) Trains (ix) Vehicles – passenger vehicles (e.g. bus/taxi/auto,etc.), private vehicles, goods carriers and (x) Others.

Data Analysis

Fire accident management relies on old fire fighting techniques and current laws need to be revisited in modern times. The accidental fires during the five years have been classified into four categories as per data available as illustrated in Figure 1. In this study, the categories of accidental fires have been grouped into (a) Building fires (b) Fires in Factories (c) Vehicle fires and (d) Others. "Buildings" have been taken to include school and educational buildings, commercial buildings, government buildings and residential buildings or dwellings. "Factories" include mines, factories manufacturing combustible materials and other factories or workplaces. "Vehicle" includes all automobiles - passenger vehicles, private vehicles and goods carriers and

trains. All accidental fires not listed in the above categories have been classed under the "Other" category.
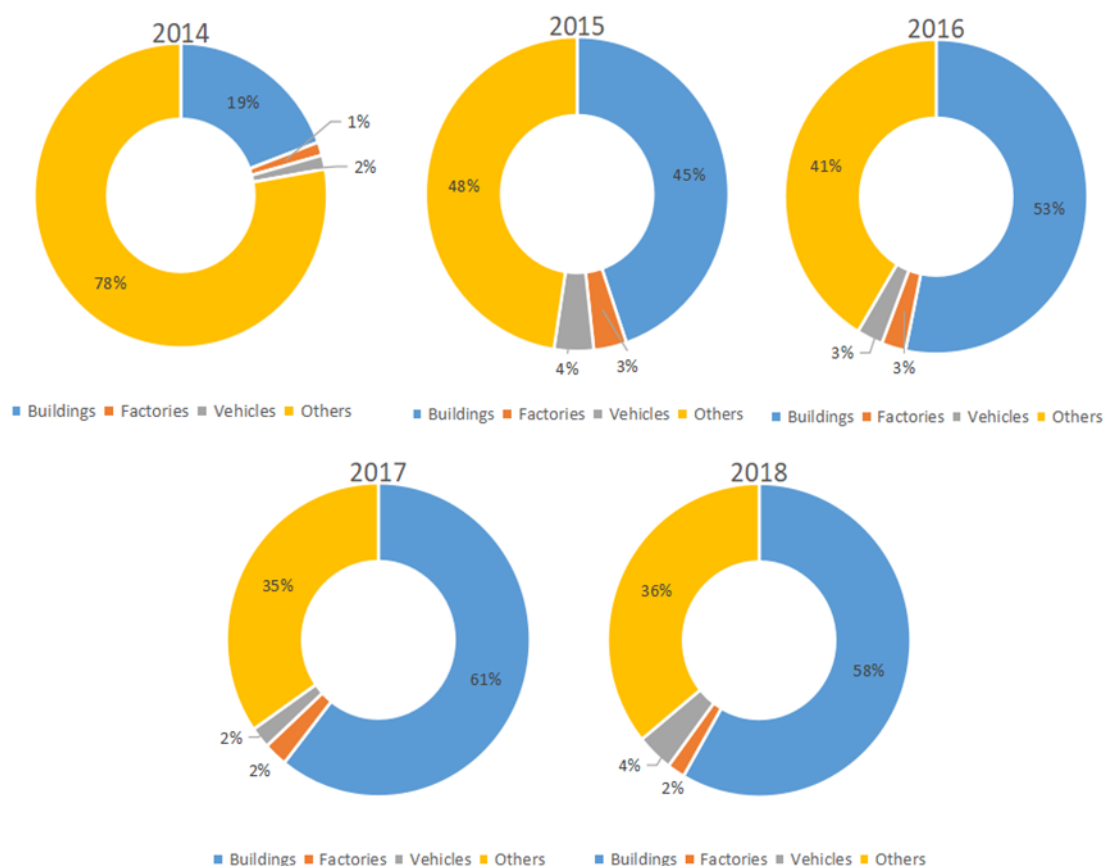

Figure 1. Accidental fire incidents in buildings, factories, vehicles and others for the given period from 2014 to 2018 for comparative purposes.

It was seen that the number of accidental fires witnessed is gradually decreasing in Table 1. While this positive trend is a result of good management strategies and practices, the number of deaths recorded is still larger when compared to other parts of the world. The deaths resulting from accidental fires may also be attributed to the lack of timely medical facilities in areas and the delayed response time of fire fighting personnel in urban areas. On average, Maharashtra and Madhya Pradesh accounted for the highest number of cases during this period (National Crime Records Bureau, 2014), (National Crime Records Bureau, 2015) (National Crime Records Bureau, 2016), (National Crime Records Bureau, 2017) & (National Crime Records Bureau, 2018). Analysis of deaths showed that young kids and senior citizens are more likely victims of accidental fires; while electrical short circuits and gas leakages at homes are fairly common sources for fire accidents (Kukreti, 2012).

Table 1. At a glance – Annual number of fire accidents, persons injured and deaths recorded between 2014 and 2018.

Year	Total number of accidental fires	Number of Persons Injured	Number of Deaths
2014	20377	1889	19513
2015	18450	1193	17700
2016	16695	998	16900
2017	13397	348	13159
2018	13099	777	12748

Between 2014 and 2015, the number of fires occurring in buildings increased two-fold with the highest number of cases seen in 2016 as seen in Figure 2. According to the NCRB data, the number of dwelling or residential fires were found to be the most recurrent type of accidental fire and accounted for more than 50% of building fires seen annually. These were most likely to have been caused due to short circuits, gas leakages, and faulty electrical equipment as seen from reports.
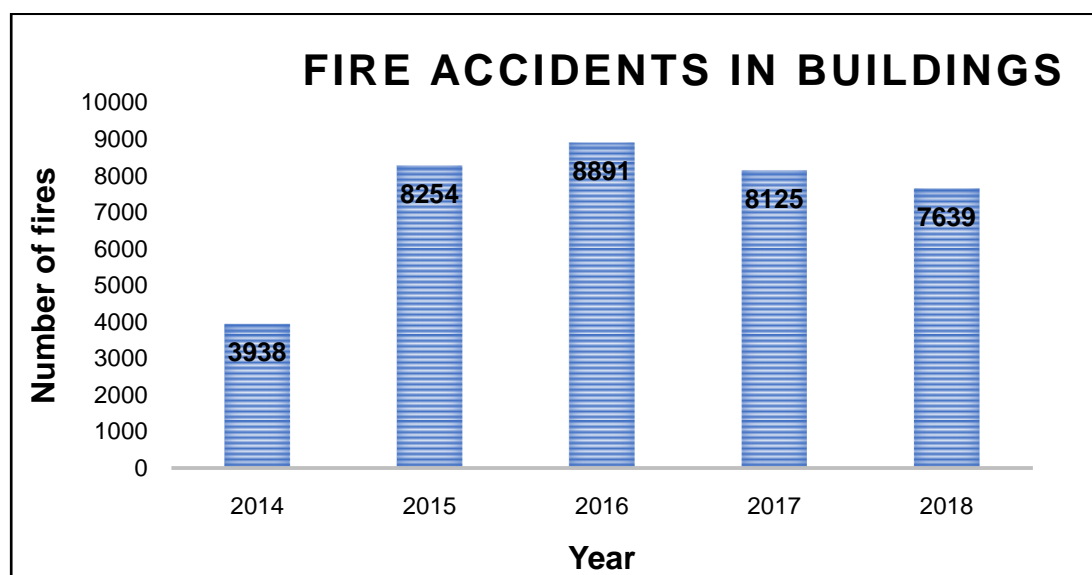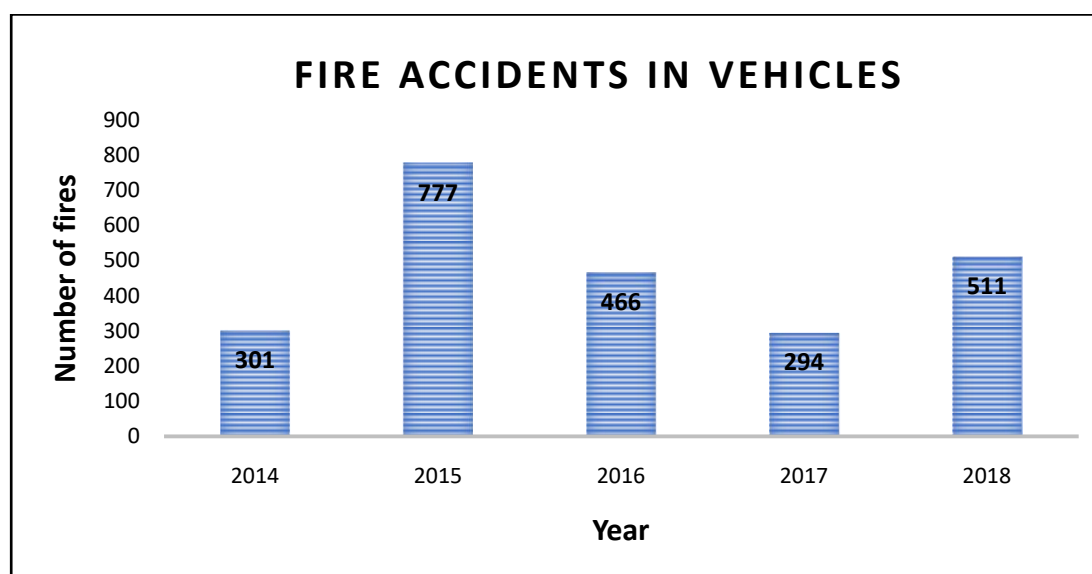

Figure 2. Number of fires with the place of occurrence "Buildings".

In the case of workplaces and fire accidents, it was seen in Figure 3 that fire accidents in factories were highest in 2015, almost double the number of cases seen in 2018. Between 2016 and 2018, there is a gradual decrease in the number of accidental fires in factories which may be attributed to better management of fire risks and awareness of fire safety devices and equipment. Workplaces like MNC's, IT industries and others have been adopting the installation of fire safety systems like sprinklers and alarms to promote better practices. The number of fire in mines ranged between 10 and 30 for the same period thus, better safety approaches in this industry needs to be delved upon.
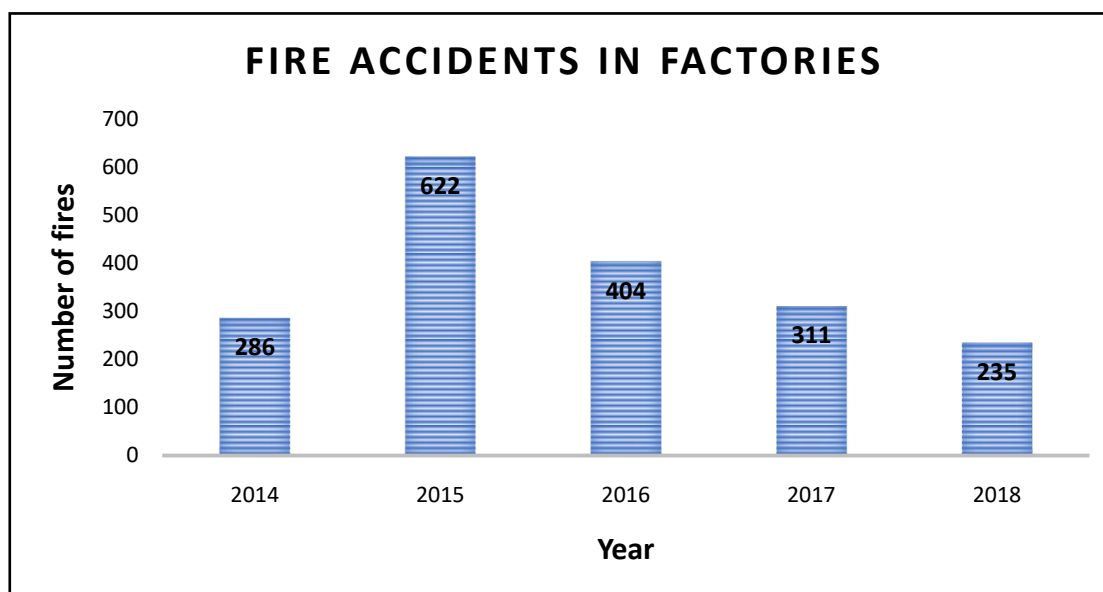
Figure 3. Number of fires with the place of occurrence "Factories".

Fires encountered in vehicles ranged between 300 and 800 for the given period as shown in Figure 4. From the data, it was found that accidental fires in personal or private vehicles were higher than those in trains, passenger vehicles and goods carriers. In some cases, collisions resulted in the ignition of fire; while in others, faulty wiring, overheating and engine problems resulted in vehicle fires. These fires need to be thoroughly investigated to assess the cause of the fires before insurance is compensated, to avoid cases of fraud. In other instances, factory recalls may be required if a pattern is found between vehicle make and model and fire incidents.

Figure 4. Number of fires with the place of occurrence "Vehicles".

Results

While fire accidents can be unpredictable in nature; prevention can help in the avoidance of catastrophic accidental fires. Disasters are considered as improperly managed risks, which depend on vulnerability settings. Overall the data showed a mixed trend for structural fires (Fig. 2) during the period and showed that management of fire accidents in structural buildings needs better practices and methods for combating future instances. Fire accident management is still poor in urban crowded areas where accessibility plays a hindrance to fire fighting activities. Hence, better planning and community awareness strategies need to be put into place for better tackling such situations. Management of fires seen in factories show a gradual decrease in recent years (Fig. 3) showing that there is more focus on workplace safety procedures and employee safety. The companies have been seen to adhere to fire regulations for buildings and sprinkler systems and fire alarms have been put in place in many organized sector workplaces. However, the unorganized work force is still at risk of fire hazards. There is a worry in doubling of vehicle fires between 2017 and 2018 (Fig. 4). More research needs to be done into cause analysis for the accidental fires seen in vehicles and measures taken to mitigate the same. The need for portable fire extinguishers in vehicles may be delved upon and people trained in its usage for emergencies.

Discussion

Ultimately, violation of construction policies due to space constraints, mixed occupancies and human greed for profit are prevalent reasons for most urban fire accidents. Negligence and apathy in the enforcement of building regulations often lead to undesirable workplaces, thus having a high risk for hazards. In cases of dwellings and residential fires, it was seen that our homes are unsafe and have high vulnerability to risk of fires. Residential buildings contain numerous flammable substances like upholstery, electrical items, gas and cooking items, decorative materials, etc. which pose a risk of fire hazard.

Some useful tips for avoiding fire accidents as given by the Delhi Disaster Management Authority include – switching off the gas supply before going to bed at night; switching off electrical appliances when not in use; check overloading of electrical outlets; maintaining safe distance between inflammable items and heat sources; keeping a fire extinguisher in the home/office and learning how to use it (Delhi Greens Blog, 2012).

Conclusion

While fire services play a major role in disaster relief and emergencies, the need for revamping the force still exists. Fire stations in India face a lack of manpower and personnel which adds to the handling of crises (National Disaster Management Authority). There is a need to revitalize our task force in terms of firefighting equipment and vehicles along with better-planned fire stations in neighborhoods to tackle disasters at the community level. Fire station planning should be incorporated into town and development planning in urban settings with an emphasis on the infrastructure and constructions planned, rather than being an afterthought. There is need for inculcating fire preparedness in the community and general public to reduce casualties. Management strategies should include accessible emergency exits, knowledge on using fire extinguishers and sprinklers, marked and designated escape routes to obtain the most logical

approach towards tackling emergencies.

Limitations and Future Studies

Due to unavailability of better classified data on the platform, further in-depth probing was limited. More studies could be done on the reasons for the fire accidents in India.

Acknowledgement

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