

Fatal Road Accident Characteristics in Metro-Plus Cities of India

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Abstract: Rapid growth of population and increasing economic activities have resulted in the tremendous growth of motor vehicles which is considered one of the primary factors responsible for increasing road accidents in many metropolitan cities of India. In this paper an assessment of the current level of road safety in metro cities in India is made utilizing data obtained from secondary sources. The road safety level in metro cities is assessed considering parameter accident severity index. The study is primarily confined to the accident characteristics of passenger vehicles in metro plus cities. This paper can be used to measure the effectiveness of future safety improvements implemented in the cities.

Keywords: Road safety, Accident severity, Vehicles, India.

1. Introduction

Reports from the World Health Organization indicate that India has the highest number of traffic accident fatalities in the world. Therefore, there is an urgent need to understand road safety issues and develop immediate measures to mitigate accidents and injuries on Indian roads. This calls for in-depth accident data to be collected in a standardized format which can then be analyzed to identify major problem areas and determine feasible solutions.

Many developed countries have their own ongoing in-depth accident data collection programs. These data sets are used not only to understand the real world accidents and injury causation, but also to develop safety strategies aimed towards improving vehicle safety and road infrastructure. India currently has only one mechanism of collecting road accident data and that is from the police accident investigations. This data is similar to those collected by police in many other countries and is also used for similar purposes. The police data is analyzed by two government organizations to publish two annual reports - The National Crime Record Bureau's "Accidental Deaths and Suicides in India" [2], and the Transport Research Wing, Ministry of Road Transport and Highways' "Road Accidents in India" report [3]. These reports provide an understanding of fatal road traffic accidents at a national level and information such as type of road users (age, sex, and vehicle type), incidence rates for states and cities, road type, etc. Data from these reports clearly shows that the number of fatal accidents has been increasing over the last 8 years as shown in Figure 1.

Figure 2 shows the percentage distribution of fatalities by road user type for all India. Of the 123,093 fatalities M2W riders constitute 21% followed by heavy truck occupants at 16%. These statistics indicate a stark difference from developed countries where occupants of passenger vehicles (cars and light trucks) are the highest in fatalities.

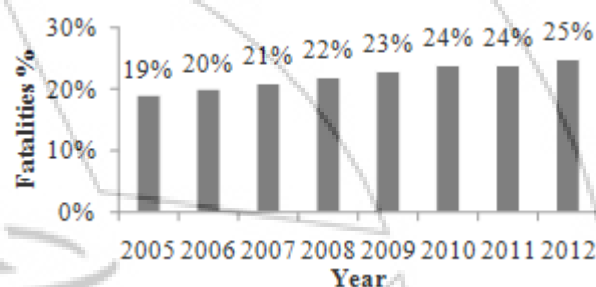


Figure 1: Fatalities in India as a percentage of total accidents for the last 8 years

(Source: MORTH, Transport Research wing-New Delhi)

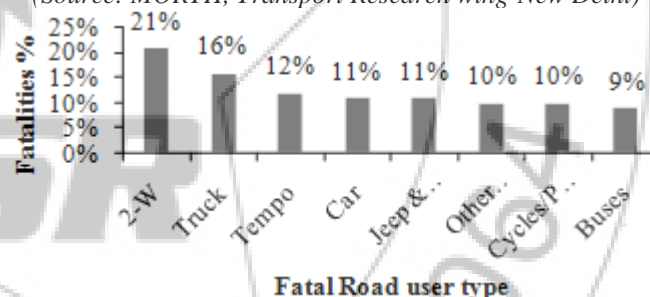


Figure 2: Percentage distribution of fatalities in India by road user type (2012)

(Source: MORTH, Transport Research wing-New Delhi)

The increasing trend of accidents raises concerns and the urgent need to address road safety issues immediately. The accelerating economic growth in India has given rise to an increasing and changing vehicle population mix on Indian roads. Therefore, it becomes important to obtain an in-depth or deeper understanding of fatal road accidents. Currently, in-depth accident investigation data at a national level is not available and therefore it is not possible to obtain a focused understanding of fatal accidents. However, some in-depth investigations of road traffic accidents have been carried out over the last few years on major cities in India. These studies focused on contribution of fatal accident rates in metro-plus cities of India (Figure 3). These studies also helped to develop a methodology for in-depth fatal accident investigation in India.

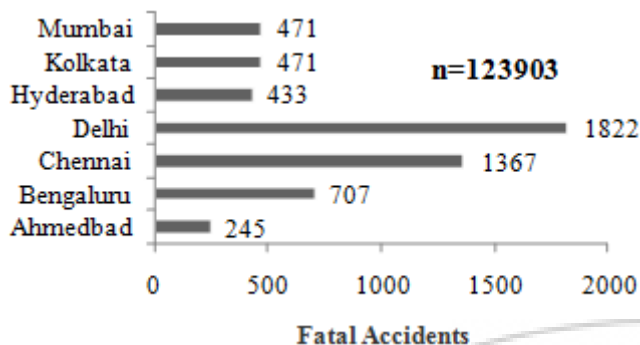


Figure 3: Distribution of fatalities in Metro-plus cities of India (2012)

(Source: MORTH, Transport Research wing-New Delhi)

Many researchers have devoted their work in the area of road accidents and traffic safety aspects. Works have been undertaken on accident characteristics, accident forecasting and better roadway and vehicular design for the improvement of road safety in different traffic and roadway conditions. A number of studies on road safety have also been carried out in India, in different cities such as Delhi, Mumbai, Chennai and Kolkata as well as on some highways. In this article, an assessment of the current level of road safety in selected metro-plus cities has been made.

2. Road Traffic accidents-Indian Scenario

In 2013, India recorded 4,86,476 road accident deaths highest in the world. Of this about 25.2 per cent (1,22,589) were fatal accidents. The number of persons killed in road accidents were 1,37,572 i.e. an average of one fatality per 3.5 accidents. The proportion of fatal accidents in total road accidents has consistently increased since 2003 from 18.1 per cent to 25.2 per cent in 2013. The severity of road accidents measured in terms of persons killed per 100 showing a steady increase since 2003 from 21.1 per cent to 28.1 per cent in 2011. Major contributor to traffic deaths in India is fault of driver and drunk driving, which is responsible for 70 per cent of road fatalities. India accounts for about 10 percent of road accident fatalities worldwide. An estimated 12,75,000 persons are grievously injured on the road every year. Professionalism in driver training is absent, proportion of untrained drivers is continually on the rise and a positive driving culture is lacking.

2.1 Traffic Flow and Travel Demand

Increasing urbanization over the years has resulted in the development of vast areas as urban extensions. Many roads were laid in an incremental manner to cater to the increased traffic demand. The Cities has developed in a disintegrated urban form spreading along major traffic corridors. Congestion on arterial roads is due to haphazard development, narrow streets, congested junction, unorganized parking etc. which creates hindrance to the smooth flow of traffic. Most of the bridges and major corridors are no longer able to cope up with even the present traffic demand. High travel time and congestions have created an adverse effect on the economic and environmental health of this city.

2.2 Accident data collection and analysis

An accurate and comprehensive system of collecting and recording accident data is required for studying the traffic accident characteristics in cities. Such data serve to identify the basic causes of accidents and to suggest means for overcoming the deficiencies that lead to such accidents. For the present accident characteristics study in metro-plus cities, the past accident data for the year 2012 were collected from published reports of the National Crime Records Bureau, Ministry of home affairs-India and MORTH-India. The data obtained were analyzed to calculate various indices that indicated the road safety characteristics of the city.

2.3 Nature of accidents

From the year 2008 to 2012, total number of accidents has been decreased by around 36% (Ahmedabad), 41% (Bengaluru), 21% (Delhi), 30% (Hyderabad) and 21% (Mumbai). While at Kolkata the total number of accidents has been increased by 40% from 2008 to 2012. However the total number of accidents in Chennai decreased by 30% from 2008 to 2011 and there is a sudden rise from 2012. On the other hand in Delhi, Mumbai and Hyderabad, the number of fatal accidents decreased continuously from year to year and in Chennai, Ahmedabad, Kolkata and Bengaluru the number of fatal accidents goes on decreasing and increasing. Figure 4 shows the total number of fatal accidents in Metro-plus cities in India.

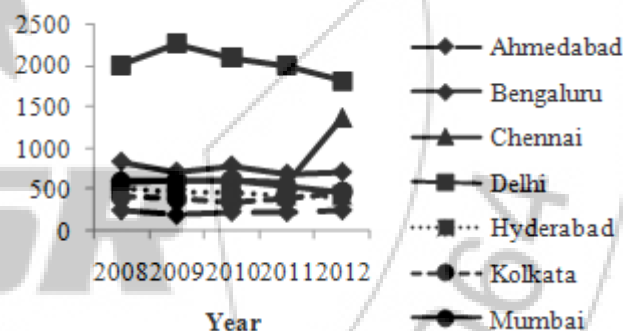


Figure 4: Year-wise fatal accidents in metro-plus cities of India

(Source: MORTH, Transport Research wing-New Delhi)

2.4 Accident severity index

An important accident related parameter is the extent of accident severity (road accident related deaths per 100 accidents). Table 1 shows accident severity in Metro-plus cities in 2012. It varies from a low of 1.9 in Mumbai to a high of 26.6 in Delhi. The other cities reporting accident severity of higher rate included Ahmedabad (13.2), Bengaluru (12.8), Chennai (14.1), Hyderabad (16.8) and Kolkata (11.9). Figure 5 shows Accident severity of Metro-plus cities in 2012.

Table 1: Accident severity index

City	No of persons Killed	Total no of road accidents	Accident Severity Index (col.2*100/col.3)
Ahmedabad	245	1850	13.2
Bengaluru	707	5508	12.8
Chennai	1367	9663	14.1
Delhi	1822	6973	26.2
Hyderabad	433	2577	16.8
Kolkata	471	3937	11.9
Mumbai	471	24592	1.9

Source: Road accidents in India 2012, MORTH, Transport Research wing, New Delhi

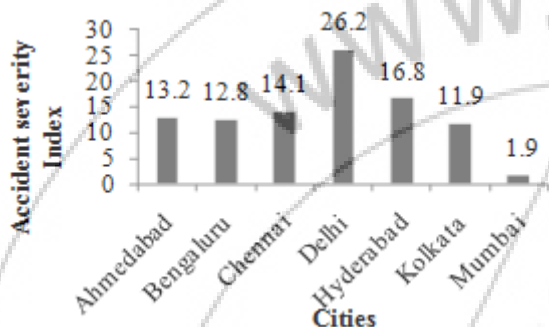


Figure 5: Accident severity Index (persons killed per 100 accidents)

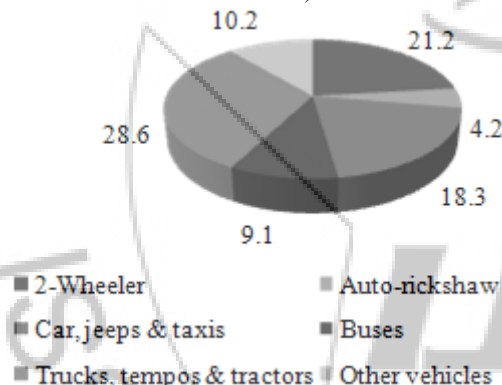


Figure 6: Share of various vehicle wise fatal accidents in 2012

(Source: MORTH, Transport Research wing-New Delhi)

2.5 Vehicle wise accident rate

Motorized vehicle accounted for 93.7 per cent of total road accidents in the year 2012. Amongst the total categories, two wheelers accounted for highest share in the total accidents (25.1 per cent) in 2012, followed by trucks, tempos, tractors and other articulated vehicles (22.7 per cent), car, jeeps and taxis (21.6 per cent), buses (8.8 per cent), other motor vehicles (8.7 per cent) and auto rickshaw (6.8 percent). The category of “trucks, tempos, tractors and other articulated vehicles” accounted for the highest proportion of fatalities (28.8 per cent of the total fatalities in road accidents). The share of various vehicle categories in fatal road accidents is shown in figure 6.

3. Conclusion

In general, the number of fatal accidents in Delhi, Mumbai and Hyderabad decreases year by year. This indicates that traffic operation management in these may have improved. In Chennai, Kolkata, Bengaluru and Ahmedabad there is increase of fatal accidents in some years and decrease of fatal accidents in some years. This indicates that the safety improvement measures undertaken in the city have been ineffective. The accident severity Index of Delhi has higher rate followed by Hyderabad, Chennai and Ahmedabad. Mumbai has the lowest accident severity rate in 2012. It is observed that among all categories of vehicles, trucks, tempos and tractors comprised the highest share of involvement in fatal accidents. This suggests that some studies should be undertaken in the future to investigate the possible causes of involvement of trucks, tempos in fatal accidents in order to find appropriate remedial measures. This would in turn help to improve the overall road safety situation in India.

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Author Profile



C. Vigneshkumar received the B.E degree in Civil Engineering from University College of Engineering-Dindigul, Anna University in 2013. He has published, since 2012, more than 20 papers in peer-reviewed Journals and also in International and National Conferences. I did this research work from June-October 2014. He now pursues 2nd year M.E degree in Construction Engineering and Management in KLN College of Information Technology-Madurai under Anna University-Chennai.