CHAPTER 1

ROAD ACCIDENT SCENARIO IN INDIA AND ABROAD

1.1 BACKROUND

An accident is defined as an unplanned and uncontrolled event in which action and reaction of an object or person results in personal injury or damage to the property. A traffic accident may be taken as failure of the road-vehicle-driver system to perform one or more operations necessary for completing a trip without any injury or loss. Road accidents are mainly due to insufficient maintenance of the road network and lack of efficient and systematic enforcement (Yannis, 2007). Necessary and sufficient cause of an accident is a combination of simultaneous and sequential factors, each of which is necessary but none of which is by itself sufficient. The task of ensuring safe traffic on the urban roads in India is difficult mainly due to the mix of slow and fast moving vehicles, sharing the same carriage way.

'Accidents are not natural but they are caused' is a common cliché in the area of traffic safety. Thus, if accidents are caused by some, surely the ones responsible for them could be identified and approximate remedial measures developed and implemented to the extent feasible (Srinivas Rao et al 2005).

Accidents, tragically, are not often due to ignorance, but are due to carelessness, thoughtlessness and over confidence. Road accidents were associated with numerous problems each of which needed to be addressed

separately. Human, vehicle and environment factors play roles before, during and after the trauma event (Haddon, 1974).

The road accident scene in India as in many developing countries is characterised by mixed traffic comprising human powered vehicles such as bicycles, tricycles, animal-drawn carts, and motor vehicles of various sizes, shapes and speeds, without adopting traffic segregation measures. Due to resource constraints, the development of roads in quantity and quality has not kept on par with the growth of vehicles. All these have caused great concern to engineers, planners and administrators.

1.2 ROAD ACCIDENTS IN INDIA

It is a matter of serious concern that about 125,000 people get killed (estimated for the year 2009 by Central Bureau of Health Intelligences) in road traffic accidents in India and more than half a million are injured annually. This is a conservative estimate as not all motor vehicle accidents are reported just to avoid coercive and impractical adjudication system. It is estimated that the country loses around Rs.75,000 crore (estimated for the year 2009 by Central Bureau of Health Intelligences) annually due to road traffic accidents which is 2-3 percent of the GDP.

Figure 1.1 Severity of Road Accident

In India more than 80,000 people are killed and nearly 400,000 persons are injured in about 300,000 road accidents every year. The economic loss to the society on account of road accidents is estimated to be about US Doller 600 million every year (Vivian et al 2004). Road traffic accidents constitute the highest percentage of all deaths due to unnatural accidents (for example major causes of unnatural accidents other than traffic accidents: collapse of structure, drowning, explosion, fire, fire arms, stampede, suffocation, killed by animals etc.), which is around 32 percent. Figure 1.1 shows the severity of road accidents in Indian highway. It may be noted that deaths due to road accidents are several times higher than that due to rail and air traffic accidents. Trend of unnatural accidental deaths in India with special reference to traffic accidents is shown in Figure 1.2.

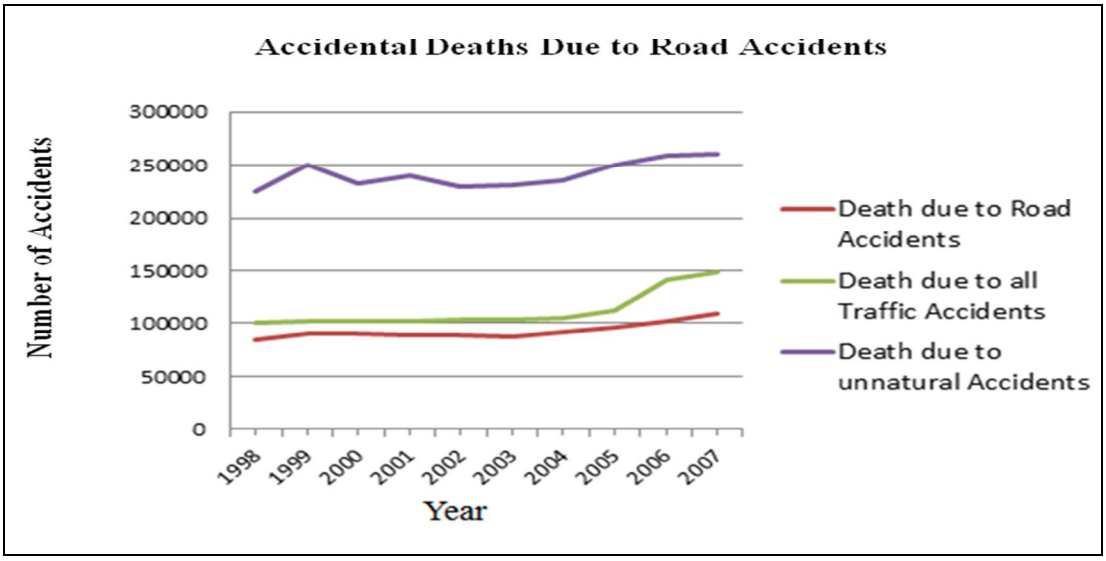

Figure 1.2 Accidental Deaths and those due to Road Accidents

Source: Central Bureau of Health Intelligences, National Crime Records Bureau, GoI and MoRT&H websites

Road traffic injuries are a major but neglected problem and the tragedy behind these attracts less mass media attention than other, less frequent types of tragedy. This problem in India has surely assumed a

proportion of a disaster. Table 1.1 compares road accidents with many such contemporary natural and manmade disasters which are literally belittled by the road accident related deaths and injury every year. Road accident can easily be called a silent disaster, and it needs a national mission to attack this socio- technical problem just like any other epidemic. Therefore, it needs a very professional and penetrating approach (Kapila and Sikdar, 2009).

Table 1.1 Road Accidents- A Silent Disasters

Disaster (Natural and Man-made)	Death	Injured
Bhopal gas tragedy, India 2-3 Dec.1984	20,000	5,30,000
Latur (Killari) earthquake, India, 30 Sep.1993	9000	20,000
Orissa super cyclone, India, 29-30, Oct.1999	20,000	NA
World Trade Centre (9/11), USA, 11 Sep. 2001	3,000+	NA
Bhuj (kuchch) earthquake, India, 26 Jan. 2001	13,800	166,800
Asian Tsunami, many countries, 26 Dec.2004	245,000	1.0 million
Sichuan earthquake, China, 12 May.2008	90,000	375,000
Road accidents in (India), 2007	**115,000per year**	**>0.5 million per year**

Worldwide, more than 0.8 billion motor vehicles are in use (year 2005) and by year 2011 motor vehicles population is going to reach around 1.0 billion. India had only 100 million registered motor vehicles in 2007 and 70 percent were the most vulnerable two-wheelers (in terms of safety of operation). In comparison to developed world, India has very low vehicle ownership of 80 per 1000 population, and so far had extremely low mobility. However, demand for road travel is currently growing faster than the average income of the population or the rate of growth of the developing world and India in particular. The global status report on road safety has put road traffic accidents to be the fifth biggest cause of death and injury to humanity in

2030. The fatality rates per 10,000 vehicles in India are 15-20 times higher as compared to those for developed countries. The World Bank (2002) study also identified the 'poor safety outcomes' as one of the significant transport sector deficiencies in India (Kapila and Sikdar, 2009).

1.2.1 Accidents in Selected Cities

Four metro cities (Delhi, Chennai, Mumbai and Bangalore) except Kolkata contribute 61% of number of road accidents in the selected cities and around 11 percent of total road accidents in the country. As shown in Figure 1.3, Mumbai with highest number of accidents is having the lowest accident severity, while Varanasi with lowest number of accidents has the highest accident severity. Three cities, (Varanasi, Lucknow, and Ludhiana) have much higher accident severity which represents the number of fatalities per 1000 accidents, indicating very poor level of traffic safety among the cities.

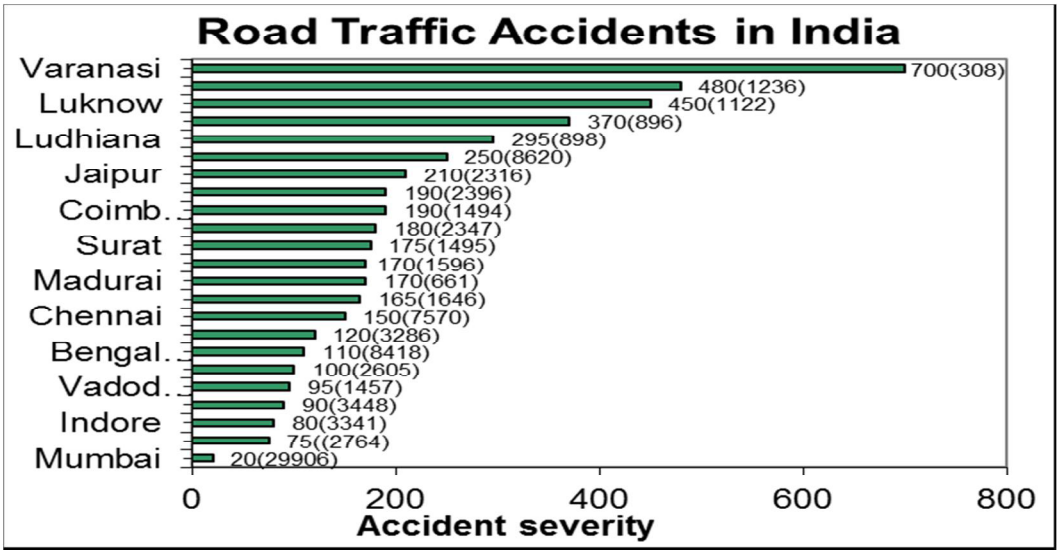

Figure 1.3 Road Traffic Accident Severities for selected Cities in India.

Source: Road Accidents in India 2007; published by transport research wing, MoRT & H.

Note: Accident severity: number of fatalities per 1000 accidents; and values in parenthesis are number of road accidents.

About two-third of the total fatalities in India occur on highways, while in states like Haryana and Bihar, the share is as high as 82 percent and 98 percent respectively.

1.2.2 Accident Distribution Based on Road Type

In 1951, India had only 26,890 registered motor cycles and scooters. However, in 1977 the number motor cycles and scooters swelled to 0.576 million and further to 10.617 million in 1989. The total road length in the country in 1950 to 1951 was about 0.4 million km. (Jeyachandran, 1996). Over the last one decade, the National Highways and State Highways (NH and SH) have seen drastic improvement (although not the entire network of NH and SH) in terms of capacity augmentation (by widening to 4/6 lanes) and in their riding quality. Thus share of fatalities on NH,SH and other roads shows a changing pattern over the years with gradual declining proportions for NH and SH since 2001, possibly due to improvements in these categories of road as seen in Figure 1.4. However, the actual number of fatalities is growing unabated for these roads as well.

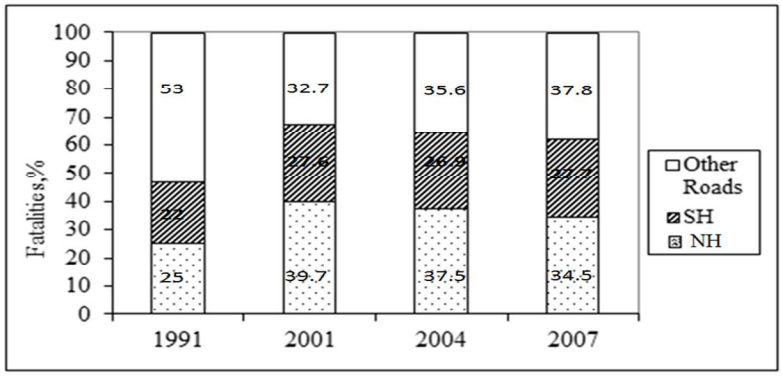

Figure 1.4 Share of Fatalities on different types of Roads.

Source: Road Accidents in India 2007; published by Transport Research Wing, MoRT&H.

1.2.3 Vehicle Type Wise Accident Distribution

In a study sponsored by Ministry of Road Transport and Highways it was revealed that around 19 percent of fatal accidents on 4 lane divided highways were 'head-on-collisions', and in 35 percent of all fatal accidents, pedestrians and bicycles were involved. Figure 1.5 shows that two-wheelers are involved in more accidents than other vehicles.

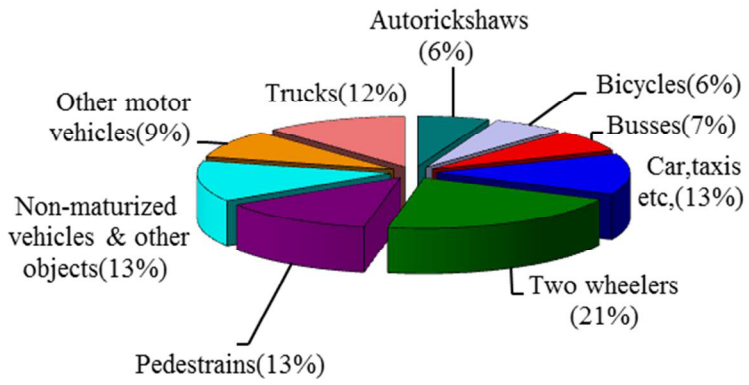

Figure 1.5 Share of Fatalities in Road Accidents by Type of Motor Vehicle user/Occupant (2007)

Source: 'Road accidents in India 2007' Published by Transport Research Wing, MoRT&H.

1.3 STATUS OF ROAD DEVELOPMENT

As per the Annual report 2007-08 given by Department of Road Transport & Highways, the road network of India is 3.3million km, and it is the second largest in the world. As per present estimate, this road network carries nearly 65 percent of freight and 85 percent of passenger traffic. The road traffic is estimated to be growing at a rate of 7 to 10 percent per annum while the vehicle population is growing at a rate of 12 percent per annum. Road length by category of roads is shown in Table 1.2. It may be worthy to

note that, the present length of NH in the country is only 2 percent of the total road network, but it carries over 40 percent of the total road traffic, and also the NH and SH together (6 percent of the network) carries 75-80 percent of road traffic in the country.

Table 1.2 Road Network in India

Category of Road	Length in km
Total Road Network	3,314,754
National Highways/Express ways	66,754
State Highways	128,000
Major and other District Roads	470,000
Rural Roads	2,650,000

Source: Annual Report 2007-08, Department of Road Transport & Highways.

1.4 ROAD ACCIDENT DEATHS

The number of vehicles, number of road accidents along with causalities & injuries there in, their percentage variation over previous year and the rate of accidental deaths per thousand vehicles during the last five years are presented in Table 1.3. The data reveals that the number of fatal accidents is not in proportion with either number of vehicles or the number of accidents. The accidents that occurred in urban areas are more in numbers but less injurious as compared to highways. The reason for this is speed and intensity of traffic. Also the pace of vehicular growth is much faster and the capacity of roads, ie road conditions to contain traffic has not been augmented accordingly. Accidents record of India reveals that ‘Road Accidents’ in the Country have increased by 8.0 percent during 2005 compare to 2004. There have been proportionate increase of 7.5 percent in the causalities in road accidents in the country during 2005 as compare to 2004 (Puntambekar, 2010).

Table 1.3 Incidence and Rate of Deaths due to Road Accidents During 2005 (state, UT and city-wise)

Sl.No	State/UT	No. of cases of Road Accidents	Total Registered Motor Vehicles as on 31.03.2005 (in 1000)	No. of Deaths due to Road Accidents in 2005	Rate of Accidental Death per 1000' Vehicles (col.5/col.6)	Rate of Deaths (col.5/col.6) X 100
1	Madhya Pradesh	21,474	3,460	5,361	1.5	25.0
2	Tamil Nadu	75,480	8,005	13,961	1.7	18.5
3	Maharashtra	46,586	8,134	10,613	1.3	22.8
4	Sikkim	189	14	77	5.5	40.7
	India(States & UT)	3,90,378	66,289	98,254	1.5	25.2

Source: National Crime Records Bureau.

1.5 OBJECTIVES AND SCOPE OF THE INVESTIGATION

The primary objective of this investigation is to investigate the major factors influencing the highway accidents and to assess the variation of the accidents with respect to different traffic conditions and road environment. The overall objectives of this study are

- To extract and understand accident trend
- To understand the variations of average daily traffic (ADT)
- To analyze the 85^{th} percentile speed of light commercial vehicles (LCV)
- To assess the road environment
- To find the major factors causing highway accident
- To estimate the accident rate for the given highway segment
- Finally to suggest suitable recommendations for controlling the accidents.

1.6 ORGANISATION OF THE THESIS

This thesis is organised into seven chapters.

Chapter 1 gives a general introduction with the need for the study and states the objectives and scope of the investigation. Chapter 2 presents the related topics that provide the necessary background for understanding the accident occurrences and different traffic variables and road environment. Chapter 3 describes the study stretch selected for investigation. Chapter 4 gives the brief methodology for building up a model to estimate highway traffic accidents. Chapter 5 is devoted to field investigations related to accident causative factors. Chapter 6 consolidates the results and discussions of the entire field investigations carried out. Chapter 7 deals with summary and conclusion based on analysis.