ISSN : 2394-2975 (Online)
ISSN : 2394-6814 (Print)

Review Paper on "A Detailed Analysis on Accident Case Studies for NH 1, India"

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Abstract
Accidents are a human tragedy which involve high human suffering and monetary costs in terms of untimely deaths, injuries and loss of finance. Although we have taken many initiatives and are implementing various road safety improvement program the overall situation as revealed by data is far from satisfactory. During the calendar year 2010, there were close to 5 lakh road accidents in India, which resulted in more than 1.3 lakh persons. These numbers translate intone road accident every minute, and one road accident death every 4 minutes. For this project stretch of NH-1 has been selected.Panipat- Jalandhar Section of NH-1 from 96.000Km to 387.100Km is 291.1 Km long. First 116.161 kms fall under Haryana while the remaining 174.939 km fall under Punjab and was upgraded to four lanes in the last decade. The project from 96.000Km to 387.100 Kmwidened up from 4- Laning to 6- Laning on NH-1started from 11 May 2009. The Project is awarded to M/s Soma- Isolux NH-1 Toll way Pvt Ltd as Concessionaire. Soma Enterprise Ltd is the EPC Contractor. During Construction Period there is huge rise in the number of accidents. Prior to start of up gradation (with four laning) during 2007 and 2008 the number of accidents on NH-1 is only 433 & 408 respectively. Accidents during up-gradation of NH1" Monthly Accident data on NH1 from Km 96.000 to KM 387.100, for the years 2007 to 2011 is collected from NHAI, Ambala. Locations prone to accidents during construction/up-gradation activity are identified. The collected data were analyzed to evaluate the effect of influencing parameters on accident rate. The main objectives of the study are to minimize the number of accidents on the road and provide a safer journey to the road users.

Keywords
Accidents, NH1, road safety, accident prevention, accident study.

I. Introduction

Each year nearly 1.3 million people die as a result of a road traffic collision, more than 3000 deaths each day and more than half of these people are not travelling in a car. So for minimizing the rate of accident and studying the cause of these accidents, I thought of working on NH-1.NH1 commences from Wagah border at village named Atari and you have to cruise thirty kilometers in the core of Punjab to reach Amritsar from Atari. The only town it passes through is Rajpura, when we set foot in the state of Haryana. The first district we encounter along NH1 is Ambala. Then, we move on through the districts of Kurukshetra, Karnal, Panipat and Sonipat. Kurukshetra city is very near to NH1. In Ambala district, when we go on NH 1, it takes us to Ambala Cantonment Junction, which is proximate to the Ambala City. After taking a lap to Sonipat, NH1 step into its last lap to reach NCR. This part of NH1 is developing rapidly and it seems like a dense chaos of concrete with multiple-storied buildings sprinkled all around. We enter the NCR at the Singhu Border in North Delhi before getting through to Inter State Bus Terminal at Kashmiri Gate. Going further it becomes Ring Road and as we relocate down to south in the Delhi, it becomes NH 2, which takes us to Bangladesh Border in the east.NH1 has been stretched into further four spurroads which are called as 1A, 1B, 1C, and1D. NH1 A starts from Jalandhar and passes through Madhopur, Jammu, Banihal, Srinagar, Baramula and then it finally reaches Uri. Rest of the three stimulate routes are completely in the inner sides of Jammu and Kashmir. NH1 B starts from Batote, Doda, Kistwar and reaches Khanaval along with Symthan pass. NH1 C is from Domel to Katra. NH 1D Srinagar – Kargil – Leh

II. Literature Review

In India mobile phones and personalized vehicles are increasing with the same growth rate. As an estimate India have that number of cars only if put them together in a single lane, it will reach from New Delhi to New York.

External causes are among the main causes of morbidity and mortality in the world, and the number of deaths as a result of traffic accidents in 2005 in Brazil was 35,763, which corresponds to an average of 98 deaths per day.

Almost 120,000 hospitalizations occurred in 2005, which represents a rate of 64 hospitalizations for every 100,000 inhabitants by the *Sistema Único de Saúde* (SUS) - the Brazilian national public health system. The number of accidents with victims in 2005 was 383,371, with a total 513,510 victims, which translates to, on average, 1406 accidents/day and 1369 victims/day (1.30 victim per accident)[(1)].

Reports by the World Health Organization about the Mortality Database, referring to the period from 1990 to 2003, revealed that external causes were responsible for about 12% of the deaths in the world, which corresponds to, approximately, 8 million deaths per year, and traffic accidents were responsible for a large proportion of these deaths (3.9 million).

Early in this decade, some 20 to 50 million people in the world became totally or partially incapacitated due to injuries caused by traffic accidents. Injured and trauma victims took 10% of all hospital beds that year.

In Latin America, the approximate cost associated with incapacities and death due to these events was 18.9 billion dollars; in highly motorized countries, it was 453.3 billion. In Brazil, in 2004, traffic accidents caused a total of 117,155 hospitalizations. This means that 15.5% of hospitalizations were due to injuries, which shows the impact of these injuries.

A large number of patients remain for weeks, months, or even years in rehabilitation programs and physiotherapy, losing salaries and their jobs due to these events. These pointslead to the economic-social dimension of the problem.

The inquietudes in view of this sad situation, showing external causes as the third highest cause of unclear deaths, as well as

the urgency and necessity of measures to help better understand the consequences of trauma and implement assistance programs to individuals involved in these occurrences, led to the present inquiry about whether there are similarities in the injuries of traffic accident victims.

To organize these possibilities and inquiries, systematic reviews can be useful in their identification. Within this context, the purpose of this study was to identify the existence of specific and common characteristic between the body regions and injuries in traffic accident victims, considering their frequency and severity.

According to the World Health Organization, road traffic injury estimated 1.26 million deaths were caused worldwide in the year 2000. The average rate was 20.8 per 100,000 people, 30.8 for males, 11.0 for females, 90% occurred in low and middle income countries, with South-East Asia and Africa having the highest rates.

A comparison between different countries in terms of vehicles density and fatalities due to road accidents are shown in Table1. India draws a special attention that having only 7 vehicles per 100 persons. It is ranked lowest in the shown category but the number of fatalities due to road accidents is high.

For preliminary assessment of current situation of the road fatalities worldwide Fig.1 can be referred, this shows that we are at level of around 1million deaths per year alone due to road accidents, and this figure will grow exponentially if we do not act from the present day.

Fig. 1: Projection of Fatalities in the World

A comparison between different countries in terms of vehicles density and fatalities due to road accidents are shown in Table1. India draws a special attention that having only 7 vehicles per 100 persons. It is ranked lowest in the shown category but the number of fatalities due to road accidents is high.

Table1: Fatality Rates in Selected Countries

Country	Vehicles per 100 persons	Fatalities per 100,000 persons
Sweden	51	4.9
Netherlands	48	4.9
United Kingdom	51	5.3
Switzerland	56	5.5
Norway	55	5.6
Denmark	44	6.1
Iceland	72	6.4
Germany	58	6.5
Japan	59	6.6
India*	7	9.5

*Estimates for 2006

III. Traffic Accidents in Developing Countries

Traffic accidents are a major problem in both developed and developing countries. The single clear feature is the impact caused by the use of the automobile. In the industrialized countries, the traffic accident problem started to become serious in the first decades of the century. After WorldWarII, the problem became serious in most European countries and Japan. In developing nations, the traffic accident problem has been increasing since 1970s, when several countries became dependent on motorized transportation in general and on automobile transportation in particular. Road accidents are reaching epidemic proportions.

The current traffic safety conditions in developing countries are already extremely serious and it will undoubtedly worsen in the near future.

Enforcement is the key-element in road safety management and its importance is dependent upon road and traffic engineering, driver training, public awareness, road traffic legislation and vehicle technology. These subjects are the most important elements in creating a global catastrophe in the near future. Add to this the fact that there are over 1.5 billion registered vehicles on the roads worldwide, weaving through a population of over 6 billion, with the number of registered vehicles increasing annually by a minimum of 10%. According to the latest figures of the World Bank and WHO, the result of unsafe behavior on the roads can be expected within 15 years to be killer number three in the world. Table 2 shows that road traffic accidents were 9th most prominent reason for injuries in the year 1990, but looking into current trend by the year 2020 road accidents will be at 3rd position.

More than one-half of all road traffic deaths globally occur among people ages 15 to 44—their most productive earning years. Moreover, the disability burden for this age group accounts for 60 percent of all daily lost because of road traffic accidents. The costs and consequences of these losses are significant. Three-quarters of all poor families who lost a member to road traffic death reported a decrease in their standard of living, and 61 percent reported they had to borrow money to cover expenses following their loss.[6]The World Bank estimates that road traffic injuries cost 1 percent to 2 percent of the gross national product (GNP) of developing countries, or twice the total amount of development aid received worldwide by developing countries.In general, pedestrians, cyclists, and moped and motorcycle riders are the most vulnerable road users as well as the heaviest users of roads in poor countries. Most people who use public transportation, bicycles, or mopeds and motorcycles or who habitually walk are poor, illuminating the higher risk borne by those from less privilege.[8] In Asia, for instance, motorized two- and three-wheelers (such as motorized rickshaws) will make up the anticipated growth in numbers

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of motor vehicles.[9] Figure 2 shows the higher proportion of deaths among these groups in developing countries.

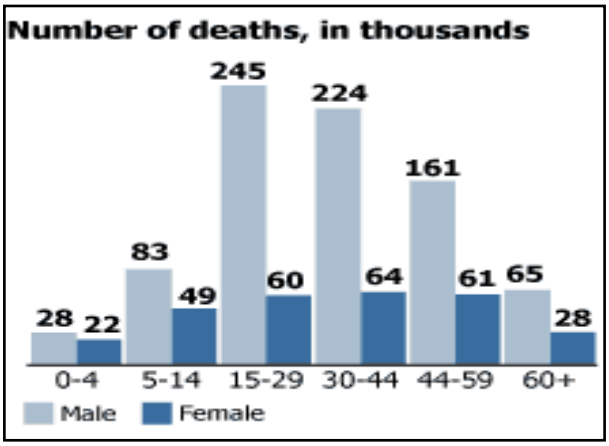

Fig. 2: Road traffic deaths of world-wide by gender and age group.

Table2: Change in rank order of Disability-adjusted life year (DALYs) for the 10 leading causes of the global burden of disease:

1990		2020	
Rank	Disease or injury	Rank	Disease or injury
1	Lower respiratory infections	1	Ischaemic heart disease
2	Diarrhoeal disease	2	Unipolar major depression
3	Prenatal conditions	3	Road traffic injuries
4	Unipolar major depression	4	Cerebrovascular disease
5	Ischaemic heart disease	5	Chronic obstructive pulmonary disease
6	Cerebrovascular disease	6	Lower respiratory infections
7	Tuberculosis	7	Tuberculosis
8	Measles	8	War
9	Road traffic injuries	9	Diarrhoeal diseases
10	Congenital abnormalities	10	HIV

IV. Road Accidents Statistics in India

Statistics show that 85% of all road accident fatalities all over the world occur in developing countries and Asia-Pacific region contributes to nearly 50% of road fatalities occurring all over the world. India accounts for about 10 percent of road accident fatalities worldwide. An estimated 1,275,000 persons are grievously injured on the road every year. Social cost of annual accidents in India has been estimated at $11,000.

The total deaths estimated by WHO for 2014 are 207,551, the deaths reported under Accidental Deaths and Suicides in India (ADSI) by National Crime Records Bureau of India (NCRB) for the year 2014 are 141,526. In India, there has been a continuous increase in road crash deaths since 2007, with a brief annual reduction in 2012.

"The report states that the Indian road safety laws do not meet the best practice requirements for four out of five risk factors: enforcing speed limits, prevention of drunk driving, and safety of children and use of helmets. Even for seat-belts, where the Motor Vehicles Act, 1988, is in consonance with the WHO standards, the enforcement is poor and India has a pathetic score of four out 10. With respect to vehicle safety, India meets only two out of the seven vehicle safety standards," said PiyushTewari, Founder and CEO of SaveLIFE Foundation..

"Road traffic fatalities take an unacceptable toll – particularly on poor people in poor countries," said Margaret Chan, Director-General of WHO. A big gap still separates high-income countries from low- and middle- income ones where 90% of road traffic deaths occur in spite of having just 54% of the world's vehicles. The above description show that India is facing the most critical situation regarding the highway safety issues, Fig3 shows the share of various causes of accidental deaths in year 2009, it is observed that road traffic accidents contribute to about 35% of total number of deaths taking place due to natural or unnatural reasons.

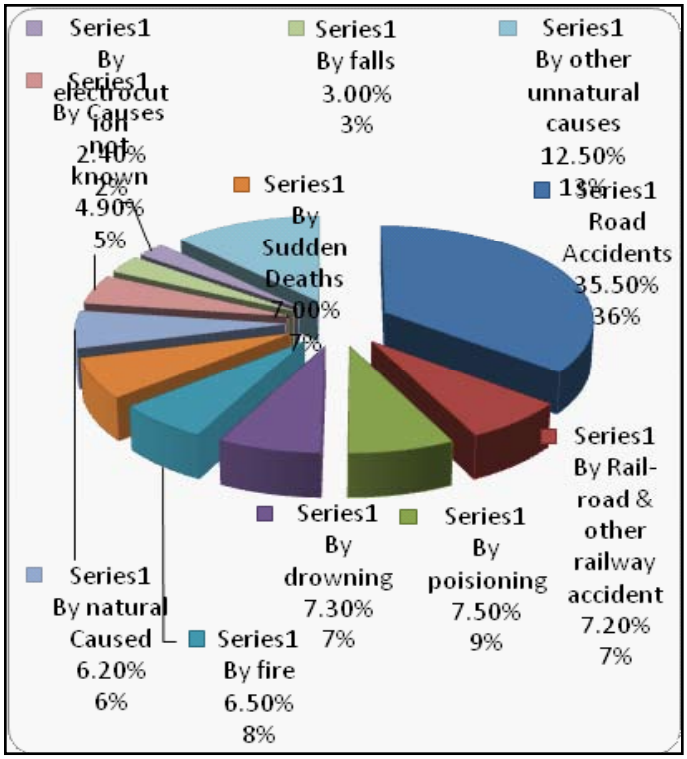

Fig. 3: Percentage Share of Various causes of Accidental Deaths During 2009

Growth in number of accidents, injuries and fatalities during 2001 to 2010 is shown in Figure 4. Number of road accidents per lakh population over a period of 40 years i.e.1970 to 2010 is presented in Figure 5.

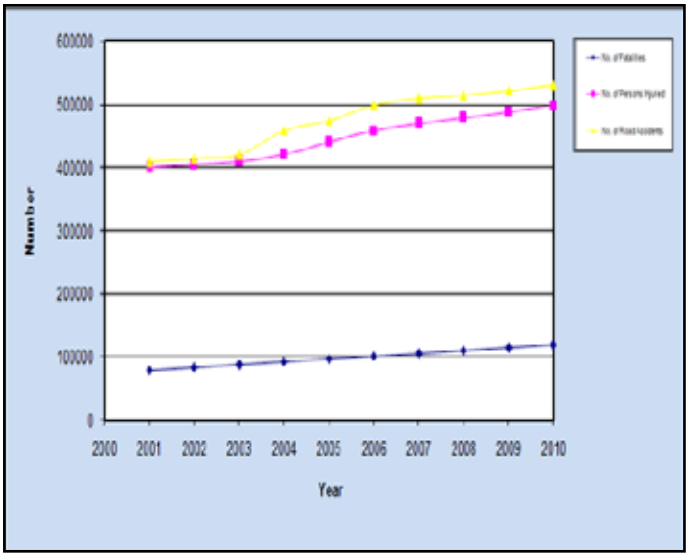

Fig. 4 : Total number of road accidents, persons killed & persons injured during 2001-2010

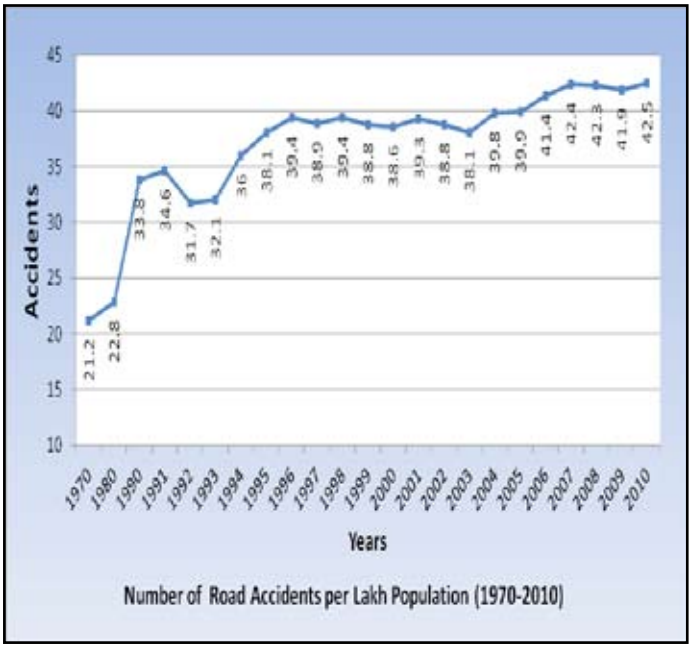

Fig. 5 : Number of Road Accidents per Lakh population (1979-2010)

V. Various points for minimizing accidents

1. **Street lighting**: Street lightning of appropriate standard contributes to safety in urban area during night time due to poor visibility. Installation of good lighting results in 21% reduction in all accidents, 29% reduction in ``all casualty'' accidents, 21% reduction in ``non-pedestrian casualty'' accidents, and 57% reduction in ``pedestrian casualty'' accidents.
2. **Road markings** Road markings ensure proper guidance and control to the traffic on a highway. They serve as supplementary function of road sign. They serve as psychological barrier and delineation of traffic path and its lateral clearance from traffic hazards for the safe movement of traffic. Thus their purpose is to provide smooth and safe traffic flow.
3. **Constructing flyovers and bypass** In areas where local traffic is high bypasses are required to separate through traffic from local traffic to decrease the accident rate. To minimize conflicts at major intersections flyovers are required for better safety and less accident rate
4. **Regular accident studies** Based on the previous records of accidents the preventive measures are taken and after that the data related to accidents are again collected to check the efficiency of the measures and for future implementation of further preventive measures.

VI. Conclusions

1. The road accident data for the years 2007-2011 for the stretch of NH-1(Km 96.000 to Km 387.100) was collected from NHAI and Soma-Isolux, the agency involved in widening of NH-1.
2. During 2010 when construction activity was in full swing on the stretch, accidents in reach 1 & 2 (Haryana portion) were more than 2.5 times and accidents in reach 3 to 5 (Punjab portion) were more than 2.0 times than the number of accidents in the previous year for the same stretch.
3. On the basis of available data it is observed that 80 % cause of the road accident on the stretch is due over speeding.
4. On the basis of nature of accidents it is observed that Head on collision accident is more in day time (49%) as compared to night time (42%).
5. Accident data reveal that on NH-1 during 2007 – 2011 involvement of car & jeep is maximum, 35% followed by heavy truck, and 25%.
6. Out of total 5% accidents are fatal, 30% involve serious injuries and 49% accidents results in no injury.
7. A total of 22 (twenty two) sections of 1 km each are identify out of 291 km stretch where number of accidents increases abnormally high during construction activity. These 22 sections (22km, less than 8% of total stretch) share almost 30% of the total accidents on the stretch during 2011.
8. In general major cause of accidents on identified 22 sections, are over speeding, poor traffic management, diversion not prepared as per IRC- SP 55-2001, poor safety arrangement and improper channelization/arrangement for traffic at toll locations.

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