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Situation of Road Accidents in India: An GIS Based Analysis

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Abstract – Road Traffic Injuries (RTI) is a leading cause of death, hospitalization, disability and socioeconomic loss in countries. It was estimated that over 1.2 million people died each year on the world roads as a result of road traffic accidents. According to a survey by WHO, more than 3,200 people get killed and over 130 000 injured in traffic every day around the world. Road traffic fatalities constitute 16.6% of all deaths, making this the sixth leading cause of death in India, and a major contributor to socio-economic losses, the disability burden, and hospitalization. During the year 2016, the total 4,80,652 road accidents are reported which causing injuries to 4,94,624 persons and claiming 1,50,785 lives in the country. This means that, on an average 1317 accidents and 413 accident deaths taking place on Indian roads every day; or 55 accidents and 17 deaths every hour (Road Accidents in India, 2016). The purpose of this paper is to analyze the situation of fatal road accidents in India and provide ways to minimize the severity and crash risk of road traffic crashes that may be influenced by the road facility or adjacent environment and to identify the crash potential and safety problems of a road project.

Keywords: Traffic, India, Road Safety, Road Accident, Accident Deaths

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INTRODUCTION

Road traffic accidents deaths and injuries occur worldwide. It was estimated that over 1.2 million people died each year on the world roads as a result of road traffic accidents. According to a survey by WHO, more than 3,200 people get killed and over 130 000 injured in traffic every day around the world. Also almost half of all fatal accidents involve pedestrians, cyclists and power two wheelers, collectively called vulnerable road users. More than 85% of accident fatalities occur in low and middle income countries such as India. Though road fatality rate in high income countries has been decreasing over the last decades, even in these countries road accidents remain one the main causes of death, injury and disability. Road traffic injuries are recognized, globally, as a major public health problem, for being one of the leading causes of deaths, disabilities and hospitalization, imposing huge socio-economic costs. In case of India, road injuries are one of the top four leading causes of death and health loss among persons of age group 15-49 years. To reduce the number of traffic accidents on our roads, we need to understand what causes the accidents in general. In this paper a detailed study has been conducted of Road accidents situation in India in 2016. The data base for this study is taken from Ministry of Road Transport & Highways Transport Research Wing, Government of India.

ANALYSIS:

During the calendar year 2016, number of accidents reported at 4,80,652 is lower by 4.1 per cent as compared with 5,01,423 in 2015. Number of persons injured as a result of road accidents at 4,94,624 in 2016 is also marginally lower by 1.1 per cent from 5,00,279 in 2015. However, the total number of persons killed in accidents increased by 3.2 per cent from 1,46,133 in 2015 to 1,50,785 in 2016. Accident severity (number of persons killed per 100 accidents) has gone up from 29.1 in 2015 to 31.4 in 2016. Table 1. given below shows the trend in the annual percentage change of total number of road accidents, total number of person killed and injured during 1997-2016.

Table 1. Annual percentage change of total number of road accidents, total number of persons killed and injured during 1997- 2016

Years	Percentage change in total number of Road Accidents	Percentage change in total number of persons Killed	Percentage change in Total number of persons Injured
1997	0.66	3.10	2.40
1998	3.04	3.82	3.25
1999	0.37	2.56	-4.00
2000	1.29	-3.73	6.46
2001	3.62	2.51	1.49
2002	0.46	4.68	0.86
2003	-0.19	1.56	6.46
2004	5.70	7.70	6.76
2005	2.17	2.54	0.16
2006	4.93	11.35	6.71
2007	3.97	8.22	3.40
2008	1.15	4.73	1.92
2009	0.35	4.84	-1.48
2010	2.72	7.05	2.34
2011	-0.39	5.93	-3.06
2012	-1.47	-2.97	-0.34
2013	-0.80	-0.50	-2.90
2014	0.60	1.53	-0.29
2015	2.46	4.63	1.38
2016	-4.14	3.18	-1.13

Source: Road Accident in India 2016, Ministry of Road Transport & Highways Transport Research Wing, Government of India

The Table 1. indicates wide variations. However, higher increase in all the three parameters viz road accidents, number of persons killed and injured were taken place in the years 1998, 2004 and 2006 during the period 1997-2006. Higher increase in all three parameters were also taken place in the years of 2007, 2010 and 2015 during the period 2007-2016 For the first time, in the two consecutive years 2012 and 2013, there were decline in all the three parameters i.e the number of road accidents, number persons killed and injured.

Table 2. Depicts the percentage share of accidents, persons killed and injured as per road categories over the period 2005-2016

Table 2 : Percentage Share of National Highways, State Highways and Other Roads in Total Road Accidents, Persons Killed and Injured: 2005 to 2016

Year	National Highways			State Highways			Other Roads		
	Road Accidents	Persons Killed	Persons Injured	Road Accidents	Persons Killed	Persons Injured	Road Accidents	Persons Killed	Persons Injured
2005	29.6	37.3	31.3	23.6	27.2	25.7	46.8	35.5	43.0
2006	30.4	37.7	30.8	18.5	26.8	24.9	51.1	35.5	44.3
2007	29.0	35.5	30.2	24.4	27.7	26.2	46.6	36.8	43.6
2008	28.5	35.6	28.6	25.6	28.4	27.5	45.9	36	43.9
2009	29.3	36.0	29.6	23.8	27.1	25.5	46.9	36.9	44.9
2010	30.0	36.1	31.3	24.5	27.3	26.0	45.5	36.6	42.7
2011	30.1	37.1	30.5	24.6	27.4	26.1	45.3	35.5	43.4
2012	29.1	35.3	30.1	24.2	27.3	25.9	46.7	37.4	44.0
2013	28.1	33.2	28.9	25.6	29.6	27.6	46.3	37.2	43.5
2014	28.2	34.1	29.9	25.2	29.1	26.8	46.6	36.8	43.3
2015	28.4	35.0	29.1	24.0	28.0	26.3	47.6	37.0	44.6
2016	29.6	34.5	29.6	25.3	27.9	25.8	45.1	37.6	44.6

Source: Road Accident in India 2016, Ministry of Road Transport & Highways Transport Research Wing, Government of India

The above table reveals that the share of different categories of roads in the number of accidents persons killed and injured had remained largely stable over the years. As compared with the previous year i.e 2015, road accident has gone up on National Highways from 28.4 per cent in 2015 to 29.6 per cent in 2016. It is a matter of concern that persons killed on National Highways is still very high and remains close to 35 per cent in 2016. The share of road accident injuries has marginally increased from 29.1 per cent in 2015 to 29.6 per cent in 2016. Over the years, 2005 to 2016 only marginal changes have taken place in terms of percentage share in number of road accidents, number of persons killed and injured within the various categories of roads. The share of National Highways is very high in terms of all the three parameters, keeping in view its share of about 2 per cent in total road length of the country. Data reveals that National Highways are more accident prone perhaps due to more movement of commercial as well as other vehicles and over speeding etc.

Table 3. Total number of Road Accidents, Number of persons killed and injured based on Junction Type (2016)

	Accidents	Killed	Injured
T-Junction	63,243 (35.9)	19,884 (36.8)	59,923 (35.2)
Y-Junction	41,006 (23.3)	12,706 (23.5)	40,048 (23.5)
Four arm Junction	42,829 (24.3)	12,342 (22.8)	40,704 (23.9)
Round about Junction	25,612 (14.6)	7,771 (14.4)	26,797 (15.7)
Rail Crossing	3,314 (1.9)	1,326 (2.5)	2,915 (1.7)

Source: Road Accident in India 2016, Ministry of Road Transport & Highways Transport Research Wing, Government of India

About 37 per cent of total accidents took place on the junctions itself during the calendar year 2016 as against 49 per cent reported during 2015. The highest number of accidents occurred at T-Junctions during the calendar year 2016 causing 63,243 accidents with a share of 35.9 percent of the total road accidents on Junctions.

Table 4 : Total Number of Road Accidents at various Traffic Controlled Areas/Junctions

	Accident	Killed	Injured
Traffic Light Signal	15,125(8.6)	4,322(8.0)	12,995(7.6)
Police Controlled	11,386(6.4)	3,076(5.7)	11,761(6.9)
Stop Sign	11,221(6.4)	3,609(6.7)	11,002(6.5)
Flashing Signal/Blinker	10,009(5.7)	3,012(5.6)	10,138(6.0)
Uncontrolled	1,28,263(72.9)	40,010(74.0)	1,24,491(73.0)

Source: Road Accident in India 2016, Ministry of Road Transport & Highways Transport Research Wing, Government of India

It may be seen that the maximum number of accidents occurred at uncontrolled areas during the calendar year 2016 which caused 128,263 accidents with a share of 72.9 percent in road accidents at Traffic controlled/Police Controlled areas as against 1,66,158 number of accidents (67.6 per cent) reported in 2015. The details regarding road accidents at Traffic Controlled/ Police controlled areas indicating the number of

accidents; persons killed and injured are given in Table 4.

Table 5: Age profile of Road Accident victims (Passengers as well as drivers) during 2016	
Age - group	Number of Persons Killed
Less than 18	10,622 (7.0)
18-25	31,775 (21.1)
25-35	38,076 (25.3)
35-45	33,558 (22.3)
45-60	22,174 (14.7)
60 & Above	8,814 (5.8)
Age not known	5,766 (3.8)
Total	1,50,785

Source: Road Accident in India 2016, Ministry of Road Transport & Highways Transport Research Wing, Government of India

Young people in the productive age group lose their lives in road accidents every year. Premature deaths of such young people cause substantial loss of productivity to the nation. The detailed age profile of road accidents victims for the calendar year 2016 reveals that the productive age group of 18 to 35 years accounted for the high share of 46.3 per cent (69,851 persons) and the age group of 18-45 accounted for a share of 68.6% (1,03,409 persons) in the total road accident fatalities.

The holder of regular licence were involved in more number of accidents (4,05,079) followed by holder of learners licence (41,405) and persons without licence (32,088) This is depicted in the During 2016, regular licence holder were involved in 4,05,079 accidents, i.e, 84.6 per cent of the total accidents. The share of regular licence holders involved in road accidents in the previous years were also high; 3,89,974 (81.2 per cent) in 2014 and 3,96,381 (79.1 per cent) in 2015.

Table 7 : Total Number of Road Accidents Classified based on Type of Licence during 2016	
Type of Licence	Accidents
Regular Licence	4,05,079 (84.6)
Learner's Licence	41,405 (8.7)
Without Licence	32,088 (6.7)
Note: 1. Total no. of accidents may not tally due to not reporting Chandigarh. 2. Information pertains to Drivers only	

Source: Road Accident in India 2016, Ministry of Road Transport & Highways Transport Research Wing, Government of India

This is because the Licences are issued without proper training and testing of the candidates.

CONCLUSION:

It is clear from the analysis of Report that road accidents are multi-causal which requires multipronged measures to mitigate the problem through concerted efforts of all agencies concerned, both in the Central Government and State Governments. These measures can be broadly divided into road and vehicles engineering; education and awareness for drivers and the general public; enforcement of road safety laws and trauma care facilities.

Road accidents mitigation measures which are within the purview of the Ministry of Road Transport & Highways include road engineering design for safety, proper road marking and signages; safety standards for vehicles like use of seat-belts, helmets etc., education and awareness campaigns and programmes. The various accidents mitigation measures taken up by the Ministry in recent past are as follows:

A. Road engineering measures

i) Identification and rectification of accident black spots:

ii) Road Safety Audits:

iii) Installation of crash barriers:

iv) Road Safety Annual Plans:

v) Safety furniture in road projects:

vi) Assistance for Road Safety Engineering works on State roads:

vii) Training and capacity building:

B. Vehicular safety standards and IT enabled safety measure

i) Vehicular Safety Standards:

ii) Buses with IT enabled safety measures under NIRBHAYA SCHEME:

C. Education and Awareness

i) Model Institutes of Drivers Training and Research (IDTR):

ii) Awareness and Publicity:

D. Post-crash response and trauma care

i) Good Samaritans Guidelines:

ii) Effective Trauma Care:

Enforcement of traffic rules and motor vehicles rules are extremely important components of road safety and accidents mitigation measure which are under the purview of State Police and Transport Departments. The data has unambiguously demonstrated the prevalence of unlawful behaviour on the roads such as drunken driving, over speeding, red light jumping, overloading, lack of lane discipline etc., thereby causing accidents, injuries and fatalities. The Motor Vehicles (Amendment) Bill, 2017 has made provisions for stricter penalties for various traffic rules violations

with the objective of strengthening enforcement and ensuring greater compliance.

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