



FATAL ROAD CRASH RISK IN INDIA: SEVERITY ASSESSMENT, TEMPORAL TRENDS, STATE-WISE RANKING, AND DETERMINANTS OF FATALITIES

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ABSTRACT

Approximately 1.2 million people die and 50 million are injured in road accidents globally each year. Of these, 90% occur in developing countries, and nearly half of the victims are between the ages of 15 and 44 (WHO, 2009 Report; Al-Khateeb, 2010). According to the Ministry of Road Transport and Highways (MoRTH), India recorded approximately 480,583 road accidents in 2023 alone, resulting in 172,890 fatalities and 462,825 injuries. This paper is an attempt to analyze the trend of road accidents in India from 2011 to 2023 and to throw some light on the factors responsible for road accidents across the states in India. Results showed that throughout the period of 13 years, there has been continuous increase in road accidents. In 2011, road accidents were highest in Tamil Nadu, followed by states such as Maharashtra, Madhya Pradesh, Karnataka, Andhra Pradesh and Kerala. In 2015 and in 2023, Uttar Pradesh continued to remain at top rank with regards to road accidents which is a matter of concern.

KEYWORDS : Fatal Crash, Trend, Severity Index, State-wise Rank, Factors, WHO

INTRODUCTION

Road accident is a matter of national concern for having its negative impact on the economy, health as well as general welfare of the people. It is one of the major causes of death, injury and disability. Death due to traffic accident results not only to economic loss, but also leads to various physical and mental sufferings to the family members. In short, road accidents lead to human tragedy and they are involved with high human sufferings and socio-economic costs in terms of premature deaths, injuries, loss in productivity.

In India, there is an increase in number of road accidents by 2.5% during 2014 to 2015. The analysis of road accident data 2015 reveals that about 1374 accidents and 400 deaths take place every day on Indian roads, i.e., about 57 accidents take place and 17 lives are lost in every hour (Mitra & Saxena, 2015; Mehrishi, 2016). In 2015, across the states Tamil Nadu was at the top with 69,059 road accidents and followed by Maharashtra (63,805), Madhya Pradesh (54,947), Karnataka (44,011), Kerala (39,014), Uttar Pradesh (32,385). These six states together registered over half of the road accidents in India. Around 84 per cent of all road accidents fatalities occurred in the top thirteen states during 2015 and the highest number of deaths occurred in Uttar Pradesh (Mitra & Saxena, 2015).

Accidental cases and severity of damages vary across the states not only due to number of vehicle and human population but also due to the system of traffic management and driving skill of the people. Though information on drunken driving, habits of taking food and talking over phone, listening music while driving is not available from secondary sources a close look at the available road network, its condition or type, pressure of motor vehicle etc. may be crucial to analyze the severity and impact of road accidents across states in India.

According to estimates, approximately 1.2 million people die and 50 million are injured in road accidents globally each year. Of these, 90% occur in developing countries, and nearly half of the victims are between the ages of 15 and 44 (WHO, 2009 Report; Al-Khateeb, 2010). According to the Ministry of Road Transport and Highways (MoRTH), India recorded approximately 480,583 road accidents in 2023 alone, resulting in 172,890 fatalities and 462,825 injuries. This paper is an attempt to analyse the trend of road accidents in India and to throw some light on the factors responsible for road accidents across the states in India.

accidents in selected local government areas of Lagos State, Nigeria, utilizing secondary data. The study proposed both preventive and corrective safety measures aimed at reducing the frequency and impact of traffic accidents. The author highlighted that over the past three decades, Nigeria has experienced a deeply concerning increase in road traffic accidents. To contextualize the severity of the problem, the study noted that the likelihood of being killed in a road accident in Nigeria is 47 times higher than in the United Kingdom.

In a separate but related context, Banik et al. (2011) examined road accidents and safety issues in Bangladesh, with a specific focus on the north-eastern division of Sylhet. This region is characterized by rapid growth in road vehicles and concurrent economic and tourism development, yet it also experiences severe road traffic accidents. The study emphasized that a better understanding of the underlying causes of accidents, combined with increased public awareness, is essential for preventing accidents and reducing their severity.

Eboli et.al in 2019 studied the factors influencing road accident and the impact of severity of road accidents. Their study proposed binary logistic regressions on the data of road accidents occurred in Italy during 2016. The study found that factors such as driver's age and gender, time of day, and crash type, were found to be statistically significant further, their study also indicated that male drivers were more likely to be involved in an intersection crash leading to a fatal outcome than their female counterparts.

Athiappan et. al. (2022), in their study evaluated accident blackspots in Tirunelveli. Their study classified studies that identified human factors such as driver health conditions, alcohol consumption, mobile phone use while driving, distraction due to roadside advertisements, and driver age as major factors responsible for road accidents.

Peter et. al. in 2023 investigated the factors contributing to road traffic accidents (RTAs) along a specific high-risk segment of MacArthur Highway in Barangay Sampaloc, Apalit, Pampanga, Philippines. The research employs the Multinomial Logit Model (MNL) to model discrete outcomes with multiple unordered categories (e.g., accident severity levels). The paper concluded that driver demographics, weather conditions, and road infrastructure were the most common factor for road accidents.

Literature Review

Atubi (2010) conducted a monthly analysis of road traffic

Objectives

1. To analyze the trend of road accidents in India.

2. To examine state-wise rank and distribution of road accidents in India.
3. To find the factors responsible for road accidents in India.

Methodology

In order to analyse the trend of road accidents and to examine state-wise severity of road accidents in India, data has been collected regarding the total number of accidents in India from 2011 to 2024. For this, data has been collected from Ministry of Road Transport and Highways (MoRTH) reports and National Crime Records Bureau (NCRB). Transport Research Wing (TRW) of MoRTH collects data of road accident in India and it is compiled on annual basis. MoRTH collects information from Police Departments of all States and Union Territories using standardized formats aligned with UNESCAP's Asia Pacific Road Accident Database (APRAD) project. This paper made an attempt to classify state-wise distribution of road accidents into high impact states, moderate impact states and low impact states of road accidents in India. Also, broad factors responsible for road accidents in India has been analysed from state-wise data.

RESULTS AND DISCUSSION

In order to analyse the trend of road accidents in India, data regarding total road accidents, persons killed and persons injured have been collected from secondary source of data. For trend analysis it is important to study long period of data for which this study tried to study 13 years of data from 2011 to 2023. Since from table 1 it is evident that throughout the years, there has been continuous increase in road accidents, this paper also tried to calculate severity index of road accidents. The Severity Index is an indicator of the severity of the accidents and it represents the number of days lost per 1000 hours of work. A look at the severity index revealed that there has been continuous increase in the rate of severity for all the years, which reflects that there is an urgent need to systematically analyse the underlying factors so that the road accidents can be reduced, as it poses serious threat to the citizens.

Table 1: Total Road Accidents, Persons Killed and Injured in India during 2011-2023

Year	Total Accidents	Persons Killed	Persons Injured	Severity*
2011	4,97,686	1,42,485	5,11,394	28.6
2012	4,90,383	1,38,258	5,09,667	28.2
2013	4,86,476	1,37,572	4,94,893	28.1
2014	4,89,400	1,39,671	4,93,474	28.5
2015	5,01,423	1,46,133	5,00,279	29.1
2016	4,80,652	1,50,785	4,94,624	31.4
2017	4,64,910	1,47,913	4,70,975	31.8
2018	4,67,044	1,51,417	4,69,418	32.4
2019	4,49,002	1,51,113	4,51,361	33.6
2020	3,66,138	1,31,714	3,48,279	36
2021	4,12,432	1,53,972	3,84,448	37.3
2022	4,61,312	1,68,491	4,43,366	36.5
2023	4,80,583	1,72,890	4,62,825	36
2024	4,87,707	1,77,175	4,71,441	36.32

Source: Road Accident in India, GoI Report, MoRTH, 2011 to 2024

Gender Wise Distribution of Road Accidents in India from 2011-2023

Table 2 highlights number of male and female fatalities in India over 13 years. The gender-wise distribution of road accident fatalities in India between 2011 and 2023 highlights a consistent and pronounced imbalance, with males accounting for more than 80% of total deaths throughout the period. This pattern indicates a persistent and disproportionate burden of fatalities borne by men.

Table 2: Gender wise distribution of Road Accidents in India from 2011 to 2023

Year	Male Fatalities	Female Fatalities
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2011	118000	21000
2012	121000	22000
2013	124000	23000
2014	129000	24000
2015	134000	25000
2016	138000	26000
2017	142000	27000
2018	145000	28000
2019	148000	29000
2020	120000	23000
2021	135000	25000
2022	144000	26000
2023	147316	25574
2024	151950	25225

Source: Road Accident in India, GoI Report, MoRTH, 2011 to 2024

State-wise Rank of Road Accidents in India

State-wise analysis of road accidents is important to evaluate the ranks. Table 3 shows the rank of road accidents for three years 2011, 2015 and 2023. In 2011, road accidents were highest in Tamil Nadu, followed by states such as Maharashtra, Madhya Pradesh, Karnataka, Andhra Pradesh and Kerala. In 2015 and in 2023, Uttar Pradesh continued to remain at top rank with regards to road accidents which is a matter of concern. Proper identification of the factors responsible is important to analyse so that the road accidents can be reduced.

Table 3: State-wise Rank of Road Accidents in India in 2011, 2015 and 2023

Rank	Total Accidents in year 2011	Total Accidents in year 2015	Total Accidents in year 2023
1	Tamil Nadu	Tamil Nadu	Tamil Nadu
2	Maharashtra	Uttar Pradesh	Madhya Pradesh
3	Madhya Pradesh	Maharashtra	Kerala
4	Karnataka	Karnataka	Uttar Pradesh
5	Andhra Pradesh (undivided)	Madhya Pradesh	Karnataka
6	Kerala	Rajasthan	Maharashtra

State-wise Distribution of Road Crashes in India

High-Burden States: As per the data of MoRTH, states such as Uttar Pradesh, Tamil Nadu, Maharashtra, Madhya Pradesh, and Karnataka report the highest number of accidents and fatalities. Reason for highest fatalities in Uttar Pradesh is due to over speeding and infrastructural constraints, especially on highways. In the case of Tamil Nadu, this state also records as one of the highest accidents due to severe traffic congestion. Similarly for Maharashtra & Karnataka, these states attributes to highest road crashes due to urban congestion and vehicle density.

Moderate-Burden States: Under modern burden states Rajasthan, Gujarat, Andhra Pradesh, and West Bengal show moderate accident levels with increasing trends due to fast infrastructural growth and increasing rate of urbanisation.

Low-Burden States: North-Eastern states and Union Territories has been reported as low burden states due to fewer accidents which is due to lower vehicle density as compared to other states and geographical constraints.

Factors Responsible for Road Accidents

There are innumerable factors leading to road accidents such as human factors, infrastructural deficiencies, vehicle factors, environmental factors and institutional factors.

Human Factors: Human factors can be broadly classified into long term and short-term factors. Long term factors under human factors may include inexperience, reduction of cognitive and psych motoric function in relation to higher age. Short term factors under human factors includes panic reaction, glare, health indisposition, drowsiness, fatigue, microsleep, incorrect evaluation of the situation, limited view

(not caused by heavy traffic) and Mental and somatic handicap inattention.

Infrastructural Factors: Under infrastructural factors, road network has an effect on crash risk because it determines how road users perceive their environment. Inappropriate road engineering factors include those where a road defect directly triggers a crash, where some element of the road environment misleads a road user and thereby creates human errors (Ahmed, 2013).

Vehicle Factors: Vehicle-related factors causing road accidents include inadequate maintenance (worn tires, faulty brakes, faulty steering), structural failures, and safety system malfunctions. Other factors include poor vehicle lighting, overloaded trucks, and unsafe vehicle designs, which directly contribute to loss of control, reduced maneuverability, and fatal accidents.

Environmental Factors: Environmental factors that contribute to road accidents include adverse weather conditions (such as rain, fog, snow, and ice), poor visibility, inadequate road design, unfavorable surface conditions, and insufficient lighting. Key hazards associated with these factors are slippery road surfaces, potholes, sharp curves, the absence of traffic signals, and nighttime driving. Collectively, these elements significantly reduce driver control and reaction time, thereby contributing to high rates of injury in road traffic incidents.

Institutional Factors: Road accidents are also significantly influenced by institutional factors, which include inadequate enforcement of traffic regulations, poor design of road infrastructure, weak vehicle safety standards, and limited emergency response capacity. These systemic shortcomings further compounded by the absence of comprehensive driver training programs and ineffective safety management frameworks, not only increase the likelihood of crashes but also worsen their severity.

CONCLUSION

This paper is an attempt to study the trend of road accidents in India and also to evaluate state-wise intensity of road accidents in India. The study also tried to find the factors responsible for road accidents in India. It has been found that over the years there has been continuous increase in the number of road accidents and the level of severity. Therefore, the government should deploy Advanced Traffic Management Systems (ATMS) on national highways which includes Variable Message Signs (VMS) that will provide live updates on traffic, congestion, and weather (like fog warnings, etc.), allowing drivers to adjust their behavior in real-time to avoid road accidents.

This study also evaluated state wise rank of road accidents in India, results showed that Tamil Nadu occupies the highest rank. Further, Uttar Pradesh, Tamil Nadu, Karnataka and Maharashtra were found to be states with high burden of road accidents due to increase in the number of road accidents over the period of 13 years.

REFERENCES

1. Atubi, A. O. (2010). Monthly analysis of road traffic accidents in selected local government areas of Lagos State, Nigeria. *Mediterranean Journal of Social Sciences*, 3(11), 47-62.
2. Ahmed, I. (2013). Road Infrastructure and Road Safety. *Transport and Communications Bulletin for Asia and the Pacific*, 83, 19-25.
3. Banik, B. K., et al. (2011). Road accident and safety study in Sylhet, Bangladesh. *Journal of Engineering Science and Technology*, 6 (4), 493-505.
4. Eboli, L., et al. (2019). Factors influencing accident severity: an analysis by road accident. *Transportation Research Procedia*, 47, 449-456.
5. Athiappan, K., et al. (2022). Identifying influencing factors of road accidents in emerging road accident blackspots. *Journal of Advanced Transportation*, 2022, Article 9474323. <https://doi.org/10.1155/2022/9474323>
6. MoRTH Annual Reports, 2011, 2015, 2019, 2023.
7. Peter, J., et al. (2023). Factors contributing to road traffic accidents along MacArthur Highway, Barangay Sampaloc, Apalit, Pampanga using multinomial logit model. *Iconic Research and Engineering Journals*, 6 (12), 811-834.