WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Review Paper on Accident Analysis of Urban-Rural Roads (Narsipatnam-Krishnapuram Road)

Tatikonda Srinivas

GMRIT, India

ABSTRACT:

The combination of economic activity and population growth has led to a steady increase in the number of motor vehicles, and as a result, traffic accidents are on the rise every day. Significant economic losses as well as severe physical and mental suffering are brought on by traffic-related deaths and injuries. Due to the increasing number of fatalities and human suffering caused by traffic accidents, social issues have also arisen. Due to the high number of road accidents on Narsipatnam-Krishnapuram Road, it was crucial to assess "Accident Analysis of Narsipatnam,-Krishnapuram" in order to recommend corrective actions for the accidents there, in accordance with data on traffic volume and vehicle types, accident data, accident types, accident causes, and vehicles involved in the accidents.

Introduction:

Road transport is the most cost-effective means of transportation in India for both freight and passengers, particularly given its extensive coverage across densely populated areas. However, India faces significant challenges due to its high exposure to adverse traffic conditions, primarily stemming from the rapid increase in motorization and urbanization, driven by robust economic growth. Consequently, India has experienced unacceptably high rates of road accidents, traffic injuries, and fatalities. Globally, road traffic injuries are the leading cause of death, particularly affecting individuals aged 15 to 49 years.

In the year 2022 alone, road crashes in India resulted in approximately 1.4 lakh lives lost and injuries to over 3.5 lakh people. These figures underscore the urgent need for comprehensive measures to reduce accidents and fatalities. Therefore, the Ministry of Road Transport and Highways has taken a proactive policy approach, encouraging active participation from all stakeholders across the country to enhance road safety.

In total, there were 4,12,432 reported road accidents in 2021 across various States and Union Territories, leading to 1,52,972 fatalities and 3,84,448 injuries. Compared to the previous year (2020), road accidents increased by an average of 12.6 percent, with fatalities rising by 16.9 percent and injuries by 10.39 percent. This translates to an average of 1,530 accidents and 458 deaths occurring daily, or roughly 49 accidents and 28 deaths every hour in the country.

In the preceding year, 2020, India witnessed a remarkable reduction in accidents and fatalities. This sharp decline can be attributed to the unprecedented outbreak of the Covid-19 pandemic and the resulting nationwide lockdown, particularly in March-April 2020, followed by a gradual easing of containment measures. Prior to 2020, accident parameters followed a relatively consistent trend. However, the sudden and significant decrease in accidents during 2020 can be attributed to the Covid-19 pandemic.

It's worth noting that key indicators for accidents showed improvement in 2021 when compared to 2019. On average, road accidents decreased by 8.1 percent, and injuries decreased by 14.8 percent in 2021 compared to 2019. However, fatalities on account of road accidents increased by only 1.9 percent in 2021 compared to the same period in 2019.

Among the states, Andhra Pradesh recorded the highest number of road accidents in 2021, with 55,682 accidents, constituting 13.5 percent of the total. Madhya Pradesh followed with 48,877 accidents, accounting for 11.8 percent. In terms of fatalities, Uttar Pradesh topped the list with 21,227 deaths, representing 13.8 percent of the total, while Tamil Nadu reported 15,384 fatalities, making up 10 percent of the total.

Year	**Accidents**	**% Change Over Previous Period**	**Fatalities**	**% Change Over Previous Period**	**Persons Injured**	**% Change Over Previous Period**
2017	4,80,652	-	1,50,785	-	4,94,624	-
2018	4,64,910	-3.28	1,47,913	-1.9	4,70,975	-4.78
2019	4,67,044	0.46	1,51,417	2.37	4,69,418	-0.33
2020	4,49,002	-3.86	1,51,113	-0.2	4,51,361	-3.85
2021	3,66,138	-18.46	1,31,714	12.84	3,48,279	-22.84
2022	4,12,432	12.64	1,53,972	16.9	3,84,448	10.39

Total No: of Accidents, Fatalities and Persons Injured during 2017 to 2022

Category of Road	**Accidents**	**Killed**	**Injured**
NH	1,28,825	56,007	1,17,765
SH	96,382	37,963	92,583
OR	1,87,225	60,002	1,74,100
All Roads	4,12,432	1,53,972	3,84,448

Total No: of Accidents, Deaths and Injured by categories of Roads (2022)

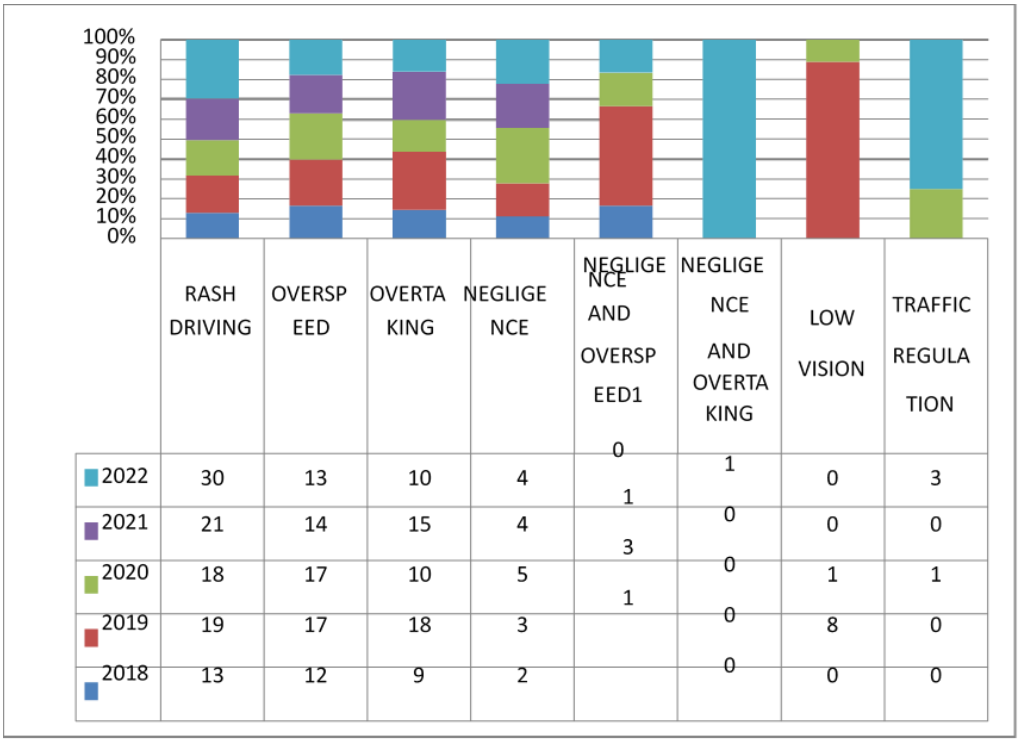
YEAR/TYPE OF ACCIDENTS.	FATAL	SERIOUS	MINOR
2018	46	21	19
2019	40	20	15
2020	26	17	10
2021	25	28	12
2022	19	26	18
TOTAL	156	112	74

Table 1. Analysis of Accidents According to its type

.

YEAR/AGE GROUP	BELOW 20	20-30	31-40	41-50	ABOVE 50
2018	2	44	40	29	7
2019	1	25	37	20	9
2020	5	25	21	28	19
2021	3	25	26	16	2
2022	2	20	22	15	10
TOTAL	7	198	146	102	47

Table 2. Analysis of Accidents According to its type.



	RASH DRIVING	OVERSPEED	OVERTAKING	NEGLIGENCE	NEGLIGENCE AND OVERSPEED1	NEGLIGENCE AND OVERTAKING	LOW VISION	TRAFFIC REGULATION
2022	30	13	10	4	0 1	1	0	3
2021	21	14	15	4	3	0	0	0
2020	18	17	10	5	1	0	1	1
2019	19	17	18	3		0	8	0
2018	13	12	9	2		0	0	0

Graph : Analysis of Reason for Accidents

Literature Review:

According to the assessment, India's small states have a questionable track record when it comes to the number of accident-related fatalities per thousand registered automobiles. 5.7% in Arunachal Pradesh had the highest rate, and 3.6% in Sikkim. In a similar vein, Nagaland had the highest accident rate at 92.1%, followed by Mizoram at 89.7%, compared to a national average of 28.4%. In comparison to all of India, the seven major cities of Ahmadabad, Bangalore, Mumbai, Kolkata, Delhi, Hyderabad, and Chennai saw a total of around 21.5% of all accidents in 1977; this number somewhat decreased to 16.9% in 2001. The number of fatalities and injuries throughout this time period shows a considerable decline, respectively, from 10.52% to 6% and from 23.28%.

Balaji Ponnu et al. (2012): Balaji Ponnu's research aims to assess the condition of Indian roads, especially highways, and come up with innovative solutions to improve traffic flow. The main innovation in their work was the development of a technological model for passenger car (PCU) calculations. This model makes it possible to more accurately and find the capacity of highways and freeways. The ultimate goal is to pull down the PCUs and increase total traffic capacity, which is especially important in densely populated areas with high traffic demand.

K. Gunsekaran et al. (2015): K. Gunsekaran and his colleagues investigated innovative methods to measure traffic flow, focusing in particular on the use of GPS technology installed in vehicles. Their research focuses on the installation of GPS devices in cars and probes that represent a small part of the traffic flow when estimating heterogeneous traffic speeds. This approach provides valuable information for understanding traffic dynamics, especially in urban road construction zones.

R. Verma et al. (2017): Geographic information system using this study showed the practical application of GIS technology in traffic accident analysis. By mapping accident locations and visualizing risk areas, the study highlighted how GIS tools can help prevent and respond to accidents.

V. Sharma et al. (2019): This study focuses on a specific road safety measure: helmet use by two-wheel drivers. The study evaluated the effectiveness of regulations requiring the use of helmets and tested the compliance of cyclists. It also analyzes the effect of helmet use on reducing head injuries in crashes and provides empirical evidence on the importance of such safety measures.

S. Jain et al. (2019): This study examines the possibilities of technical solutions to improve road safety. Researchers have explored the use of mobile apps and connected vehicles for real-time monitoring and accident prevention. These findings suggest innovative ways to use technology to improve road safety.

N. Singh et al. (2018): This study examines alcohol-related traffic accidents and estimates the prevalence of drunk driving in India.The researchers also evaluated the impact of strict enforcement of alcohol laws in reducing accidents. Understanding the relationship between alcohol consumption and traffic accidents is essential for developing effective anti-drinking campaigns and law enforcement strategies

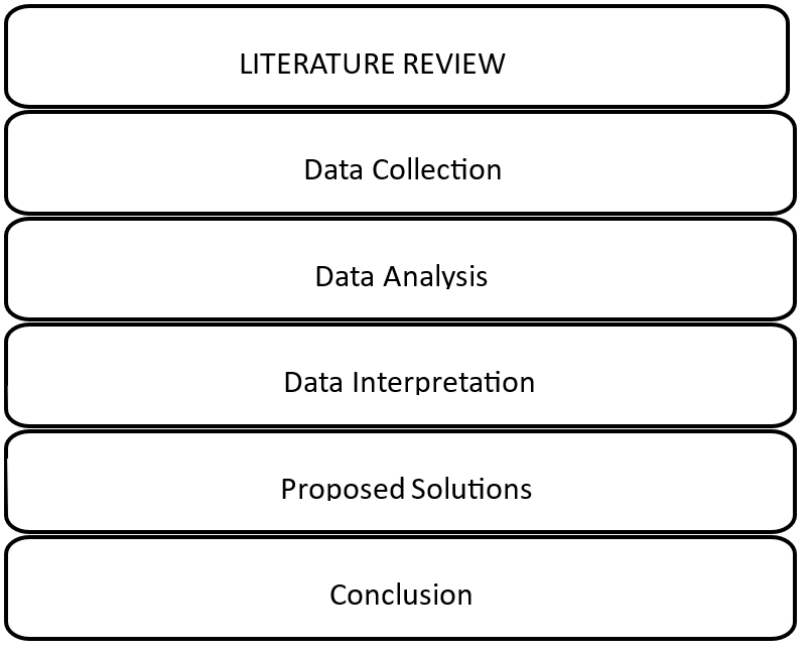
R K Singh, S K Suman (2001) proposed a study on Accident Analysis and Prediction of Model on National Highway-77 aimed at discovering the monthly and annual variation in accident rate, effect of traffic volume on accident rate, and development of model using AADT and road condition. Accidents Km-Year = C0 + C1 (AADT) + C2 (Road Condition Rank) is the equation they use to predict traffic accidents. The result drawn from therefore mentioned equation is that AADT causes a rise in the number of accidents per km-year, whereas an improvement in road shoulder condition causes a drop.

R. Patel et al. (2019): This study focuses on the importance of signs and signals in preventing accidents. Research has discovered how to minimize accidents through proper marking, compliance with traffic rules and signs. By identifying areas where signage and markings may be missing or inadequate, the research sought to improve road safety through improved infrastructure.

R. Sharma et al. (2019): By examining driver fatigue, this study examines the factors contributing to fatigue-related accidents in India. Fatigue is a major road safety issue, especially for long-haul truck drivers. The results of the study can inform strategies to reduce driver fatigue, such as scheduling rest stops and scheduling rules.

Methodology:

The outline of the methodology adopted is described in the flow chart.



METHODS FOR ROAD ACCIDENT ANALYSIS:

- Police Reports
- Hospital records
- Insurance Claims Data
- CCTV Cameras
- Traffic Flow Data
- Traffic Flow Data
- Spatial Analysis
- Descriptive Statistics
- Regression Analysis
- Driver Surveys
- Accident Databases like India’s National Accident Data and Analysis System (NADAS)

Conclusion:

The country's road accident situation is a serious one. Due to excessive speeding on all types of roads and commercial vehicle overload, the number of deadly accidents rises every year. Data was analysed to identify the features and causes of accidents. The study's findings are summarized as follows:

1. The Variations In Accident Counts Throughout The Day. There May Be Specific Hours When Accidents Are More Likely To Occur. Further Analysis, Such As Identifying Peak Accident Hours, Could Provide Valuable Insights.
2. Non-Motorized Vehicles (Bicycles, Pedestrians, Etc.) Have Relatively Low Accident Rates.
3. The speed limit should be displaced at the accident location of Krishnapuram junction point is 20km/hr.
4. Redesign and increase the width of the road and to control the road accidents in next further 30 to 40 years and minimize the traffic flow.
5. Widening of all the narrow bridges/culverts
6. Improvement of sharp curves
7. Providing speed control device especially on approaching road and avoiding of overloading.
8. The reason for most accidents on this segment include

a) Narrow Roads

b) encroachment of carriageways on T-junction of canal road and this road on corners on the curves by vehicles mostly auto-rickshaws

c) Absence of control devices, absence of speed control devices

d) absence of footpaths for pedestrians.

References

1. Balaji Ponnu et al. (2012): "Innovative Approaches for Enhancing Traffic Flow on Indian Expressways."
2. Dr. M. Ali Ahmed et al. (2013): "Efficient Traffic Solutions for Heterogeneous Traffic Conditions in India."
3. K. P. Tiwari et al. (2013): "Reducing Fuel Wastage and Pollution at Crossings: A Case Study in India."
4. SK Mahajan et al. (2013): "Traffic Rotaries: Improving Traffic Flow and Reducing Fuel Consumption in High Volume Intersections."
5. L.B. Zala et al. (2014): "Comprehensive Analysis of Traffic Parameters for Optimization in a Specific Area."
6. Babitha Elizabeth Philip et al. (2014): "Traffic Flow Modeling and Congestion Reduction Using Queuing Theory: A Novel Approach."
7. S. Yamuna et al. (2014): "Understanding Urban Traffic Flow Patterns: Challenges Posed by Heterogeneous Traffic."
8. K. Gunsekaran et al. (2015): "Measuring Traffic Flow Using GPS Technology: A Case Study in Urban Work Zones."
9. Madhu Errampalli et al. (2015): "Economic Implications of Traffic Congestion: Costs of Reduced Traffic Flow in India."
10. Kumar et al. (2015): "Socioeconomic Factors and Road Accidents in India: An Analysis of Income, Education, and Accident Rates."
11. Sharma et al. (2015): "Predicting Road Accidents in Urban India Using Artificial Neural Networks."
12. N. Mittal et al. (2016): "Effectiveness of Road Safety Education Programs in Indian Schools."
13. P. Gupta et al. (2016): "Road Design and Infrastructure: Impact on Road Accidents in India."
14. P. Das et al. (2016): "Economic Ramifications of Road Accidents in India: Costs and Implications."
15. S. Choudhary et al. (2017): "Driver Behavior and Attitudes: A Study on Perceptions of Road Safety in India."
16. Kumar et al. (2017): "Medical Response and Road Accident Outcomes: The Role of Timely Medical Attention."
17. S. Raj et al. (2017): "Effectiveness of Speed Limits in Reducing Road Accidents: A Case Study in India."
18. R. Verma et al. (2017): "GIS Applications in Road Accident Analysis: Mapping High-Risk Zones in India."
19. V. Reddy et al. (2017): "Impact of Motorcycle Helmet Laws in India: Reducing Head Injuries and Fatalities."
20. N. Singh et al. (2018): "Prevalence of Drunk Driving in India and the Impact of Strict Enforcement on Reducing Road Accidents."
21. M. Chakraborty et al. (2018): "Weather Conditions and Road Accidents in India: Analysing the Impact of Adverse Weather on Road Safety."
22. R.K. Singh et al. (2018): "Data Analytics and Machine Learning for Road Safety: Identifying Accident Hotspots and Predicting Causes."

23. S. Gupta et al. (2018): "Technology-Based Solutions for Road Safety: Mobile Apps and Connected Vehicles."
24. R. Patel et al. (2019): "Road Signage and Signalization: Enhancing Road Safety Through Proper Infrastructure."
25. R. Sharma et al. (2019): "Driver Fatigue and Road Accidents: Factors Contributing to Fatigue-Related Accidents in India."
26. M. Kapoor et al. (2020): "Big Data Analytics for Road Safety: Uncovering Patterns and Trends in Road Accident Data in India."