

A Design Thinking Approach On Road Accidents: Statistics And Reasoning

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Abstract: Road accidents continue to be a significant public health concern worldwide, necessitating a comprehensive understanding of their patterns, causes, and potential mitigation strategies. Design thinking approach is applied on this present research where the secondary data are collected from previously published works from various sources covering road accident statistics, highlighting trends, patterns, and key risk factors. In addition to this, the present research covers the Type of Road Accidents, Nature of Road Accidents, State Wise Road Accidents, Sources of Road Accidents in India, and the mitigation measures taken by the Government of India. By analyzing these statistics, researchers have identified key risk factors, enabling the development of targeted interventions. By synthesizing the findings from diverse research endeavors, this literature review contributes a nuanced perspective on road accidents, emphasizing the importance of interdisciplinary approaches. The insights gathered from this review inform policymakers, researchers, and practitioners, guiding evidence-based interventions and policies aimed at reducing road accidents and promoting overall road safety.

Keywords: Road Accident, Traffic, Design Thinking, Mitigation Measures

1. Introduction

"Today, 'Road Safety' emerges as a paramount public health concern nationwide, casting a dark shadow over our society. Annually, lakhs of precious lives succumb to the cruel fate of road accidents, and the relentless ticking of the clock spurs us to take action. We must not underestimate the significance of road safety if we strive to attain sustainable development, prosperity, and growth. Indeed, it stands as a bedrock for a content, healthy, and thriving life, both at the individual level and for the entire nation.

The specter of this issue extends its reach to all manner of road users: pedestrians, motorcyclists, motorists, and even unauthorized roadside vendors and encroachers. The relentless march of motorization and the ever-expanding web of roads exacerbate travel risks and traffic exposure, growing at an alarming pace. The relentless surge in registered vehicles far outpaces population growth and new road construction, tipping the scales towards a concerning scenario. In the present day, road traffic injuries reign as one of the leading culprits behind deaths, disabilities, and hospitalizations, imposing severe socioeconomic costs on a global scale. Such a grim

reality calls for urgent and innovative approaches to tackle this epidemic and pave the way for safer roads and lives.

According to the report on 'Road Accidents in India 2021', there were a staggering 4,12,432 unfortunate incidents of road accidents in the past year, resulting in the tragic loss of 1,53,972 lives and leaving 3,84,448 individuals injured (Parashar, 2022). These figures serve as a stark reminder of the urgency to tackle road safety concerns in our country. Thankfully, India remains steadfast in its commitment to reducing road accident fatalities. It is evident that addressing road accidents requires a comprehensive approach, as they stem from multiple causes. Therefore, a concerted effort from all relevant agencies, both at the Central and State Government levels, is essential.

Recognizing this, the Ministry, in collaboration with various related organizations and stakeholders, has devised a multi-pronged strategy to combat road safety challenges. This strategy revolves around four key pillars: Education, Engineering (focusing on both roads and vehicles), Enforcement, and Emergency Care. By emphasizing education, it is to raise awareness about safe road practices among all road users, encouraging responsible behavior and fostering a culture of road safety. At the same time, engineering plays a vital role in creating safer roads and vehicles, utilizing innovative technologies to prevent accidents and minimize their impact.

Enforcement measures will ensure that traffic laws are diligently upheld, holding accountable those who jeopardize the safety of others through reckless behavior. Simultaneously, strengthening emergency care services will ensure prompt and effective medical assistance to accident victims, potentially saving countless lives. Through this well-rounded approach and the collaborative efforts of all stakeholders, we aspire to make our roads safer, significantly reducing the toll of road accidents and creating a more secure and prosperous future for all citizens.

In the year 2022, a staggering 1,55,622 lives were lost in India due to the grim reality of road accidents, as documented by (Parashar, 2022) in their report. Shockingly, a significant 59.7% of these fatalities were attributed to over-speeding, painting a vivid picture of the need for immediate action to address this perilous issue. What's even more alarming is the concentration of these accidents on a mere 5% stretch of the highways, accounting for a whopping 62% of the recorded incidents. This unsettling pattern signals an urgent call to action, urging authorities to identify similar risky stretches across the nation and implement preventative measures.

The first line of defense is to reevaluate speed limits on these high-risk roads, imposing safer constraints to curb reckless speeding. Additionally, addressing blind spots along these routes is crucial, as enhanced visibility can help avert potential collisions and save lives. Another critical factor contributing to accidents on these treacherous stretches is extreme undulations on the roads. Flattening out these irregularities or employing engineering solutions to mitigate their impact can significantly reduce the likelihood of accidents. It's evident that a multifaceted approach is essential to combat the devastating toll of road accidents. By implementing these proactive measures, we can pave the way for safer highways and a future where precious lives are safeguarded from the tragic consequences of reckless driving.

The goal of this study is to provide a comprehensive analysis and overview of road accidents in India using Design Thinking methodology. This volume's data and analysis on traffic accidents will aid in raising awareness, developing appropriate legislation, implementing practical safety measures, and making well-informed choices related to traffic safety. All stakeholders must actively cooperate and participate for road safety measures to be successful. The statistics on traffic accidents and the fundamental analysis presented in this study effort will be helpful in analysing traffic safety concerns and in determining the most effective policy measures to reduce traffic accidents and the fatalities they cause. Administrators, policy makers, civil society organisations, researchers, and other parties with an interest in road safety could all benefit from the research work in the future.

2. Design Thinking Approach

A method to problem-solving called "design thinking" places a strong emphasis on empathy, creativity, and teamwork. It is frequently used to provide original solutions to challenging challenges in a variety of sectors, including product design, business, and social innovation. Empathize, Define, Ideate, Prototype, and Testing are the phases of the Design Thinking approach. The scope has now been expanded to include the implementation phase as well. Design thinking promotes an attitude of constant tweaking and development. It appreciates risk-

taking, collaboration, and experimentation. Design thinking has demonstrated to be a potent tool for innovation in a variety of contexts by concentrating on user needs and treating issues with creativity and empathy.

The present study has adapted this concept, by emphatically collected the data from the existing review done by the Government of India, Ministry of Road Transport & Highways, Transport Research Wing. This research work is purely the literature study of previously published research works from various sources like, government report, news report, articles published in various sources, etc. The consolidated report about Road Accidents in India during 2021, Types of Road Accidents, Nature of Road Accidents, Sources of Road Accidents and Mitigation Measures Taken are presented in this research work.

3. Road Accidents In India

During the calendar year 2021, States and Union Territories (UTs) recorded a total of 4,12,432 traffic accidents, which resulted in 1,53,972 fatalities and 3,84,448 injuries. In 2021, there were an average of 12.6% more traffic accidents than there were in 2020. Similar to this, the number of fatalities and injuries from traffic accidents rose by 16.9% and 10.39%, respectively. In 2020, the nation experienced a historically low level of accidents and fatalities. This is mainly because of the unique Covid-19 pandemic breakout and the strict nationwide lockdown that followed, especially in March and April of 2020, before the containment restrictions were gradually lifted. The Covid-19 epidemic is to blame for the unexpected, significant drop in accident parameters that happened in 2020 after following a similar trend up until 2019. Table 1 shows that compared to 2019, main accident indicators performed better in 2021. When compared to 2019, the average number of traffic accidents declined by 8.1 percent, while the number of injuries dropped by 14.8%. However, the number of deaths related to traffic accidents only climbed by 1.9 percent between 2021 and the corresponding period in 2019.

The State with the largest percentage of road accidents in 2021 was Tamil Nadu, with 55,682 incidents (13.5%), followed by Madhya Pradesh (48, 877 incidents, or 11.8%). Tamil Nadu (15,384; 10%) and Uttar Pradesh (21,227; 13.8%) were the States with the highest percentage of fatalities from traffic accidents.

Table 1: Road Accidents In India From 2016 To 2021

Year	Accidents	Fatalities	Persons Injured
2016	4,80,652	1,50,785	4,94,624
2017	4,64,910	1,47,913	4,70,975
2018	4,67,044	1,51,417	4,69,418
2019	4,49,002	1,51,113	4,51,361
2020	3,66,138	1,31,714	3,48,279
2021	4,12,432	1,53,972	3,84,448

Source: (GoI, 2021)

3.1 Type of Road Accidents

Category wise distribution of accidents and fatalities reveals the Highways with around 5% of total road network in the country accounted for more than 54.6% of total accidents and more than 61.1% of fatalities need attention. During 2021, 31.2% of total accidents and 36.4% of total fatalities took place on National Highways. Details of accidents, persons killed & injured are presented in Table 2.

Table 2: Category Wise Road Accidents In India During 2021

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

Source: (GoI, 2021)

3.2 Nature of Road Accidents

The national level data shows an increase in accident or collision types in 2021 compared to 2020. In terms of total accidents and fatalities (18.6%), "Hit from Back" (21.2%) had the highest percentage, followed by "Head on Collision" (18.5%) and (17.7%), respectively. On highways with limited lanes, abrupt curves, unseparated lanes for two-way traffic, as well as congested portions, head-on incidents are known to happen. The majority of the time, the roads with the highest risk of head-on collisions are congested single-carriageways outside of urban centres. The addition of a median separation results in the highest risk reduction for head-on collisions.

'Hit & Run' collisions (16.8%) and 'Hit from Side' collisions (11.9%) are the other two primary collision categories that resulted in fatalities. The Motor Vehicle Amendment Act of 2019 increases the charges to Rs. 2,000,000 from Rs. 25,000 in cases of hit-and-run fatalities. When a car collides with the one in front of it, it causes a rear-end collision, also known as a hit from behind. Driver inattentiveness or distraction, tailgating (back to back) at intersections, panic stops, and decreased traction due to slick conditions or worn pavement are all common causes of rearend crashes. Other categories, such as "Run" off the Road, might result from a motorist losing control because of excessive or unsuitable speed, distraction, poor curve judgement, or an attempt to avoid hitting a vehicle, another road user, or an animal.

Table 3: Accidents By Type Of Collision During The Year 2021

Type of collision	Accidents	Killed	Injured
Hit and Run	57,415	25,938	45,355
With parked Vehicle	11,611	4,925	10,302
Hit from Back	87,368	28,712	81,800
Hit from side	60,221	18,299	59,396
Run off Road	19,478	9,150	19,077
Fixed object	14,436	6,600	12,665
Vehicle overturn	19,303	9,122	19,336
Head on collision	76,304	27,248	78,502
Others	66,296	23,978	58,015
Total	4,12,432	1,53,972	3,84,448

Source: (GoI, 2021)

3.3 State wise Road Accidents

Top 10 States listed in the Table 4 are selected based on the number of accidents took place on National Highways as reported by States/UTs during the calendar year 2021. The same set of States which constituted top 10 in 2019 and 2020 constitutes the top 10 in 2021. Tamil Nadu retains its top position in 2021 for the sixth consecutive year with number of accidents 16,869 followed by Uttar Pradesh with 14,540 accidents, Karnataka with 11,462 accidents, and Madhya Pradesh with 11,030 accidents. The state wise accidents compared with 2020 are presented in Table 4.

Table 4: Statewise Accidents

S.No	States/UTs	2020	2021
1	Tamil Nadu	15,269	16,869
2	Uttar Pradesh	13,695	14,540
3	Karnataka	11,230	11,462
4	Madhya Pradesh	9,866	11,030
5	Andhra Pradesh	7,167	8,241
6	Kerala	6,594	8,048
7	Maharashtra	6,501	7,501
8	Telangana	6,820	7,214
9	Rajasthan	5,764	6,424
10	Bihar	4,101	4,349

Total	87,007	95,678
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Source: (GoI, 2021)

3.4 Sources of Road Accidents

Road accidents are multi-cause occasions welcomed on by an intricate connection of factors. These can be extensively separated into three classes: those including human error, road conditions, and vehicle conditions. These components connect to add to auto collisions. Thusly, any arrangement for the prevention of road accident measures ought to be established on a protected frameworks approach that simultaneously recognizes the meaning of transit regulations for empowering safe driving practices, safe street plans, and safe vehicle plans.

3.4.1 Human Error

Accidents caused by human error include traffic rule violations, driving without valid driver license and non-use of safety devices.

A. Traffic Rules Violations

Road accidents linked to various traffic rule breaches show that "over speeding" is the primary infraction linked to accidents, accident-related deaths, and accident-related injuries for the fourth year in a row in 2021. In 2021, "over speeding" was a factor in 71.7% of traffic collisions, 69.6% of fatalities, and 72.9% of injuries. In 2021 compared to the same period in the previous year, the number of accidents caused by "over speeding" grew by 11.0%, fatalities by 17.5%, and injuries by 9.6%. Driving on the wrong side of the road ranks second in importance, accounting for 5.2% of all traffic accidents in 2021.

Any violation of a traffic law is the result of a driver's negligence or human error. However, from the standpoint of a road safety strategy, infractions like speeding and driving on the wrong side may not only be the result of human error but also of a potential flaw in the road's design. The method expands the potential for road engineering solutions to problems that are initially thought to be caused by human error and enforcement challenges. 9.5% of all accidents and 9.8% of all fatalities were caused by drug and alcohol usage while driving, running red lights, and using a cell phone. Nearly 18.8% of accidents, 20.5% of deaths due to accidents, and 17.9% of injuries were attributed to the others group, which would include factors like the road environment and vehicle condition, etc.

Table 5: Road Accidents By Type Of Traffic Rules Violation During 2021

Category	Accidents	Fatalities	Injured
Overspeeding	2,95,522	1,07,236	2,80,285
Drunken driving/ consumption of alcohol & drug	9,150	3,314	7,509
Driving on wrong side/Lane indiscipline	21,491	8,122	20,351
Jumping red light	2203	679	1905
Use of mobile phone	6,530	2,982	5,394
Others	77,536	31,639	69,004
All India	4,12,432	1,53,972	3,84,448

Source: (GoI, 2021)

B. Driving without Valid Driver License

Untrained and unqualified drivers are a severe traffic hazard when operating a vehicle. Even though the issue primarily relates to enforcement, it must also be resolved through improved training/skilling, evaluation, and testing facilities and opportunities.

Road incidents in 2021 that involved both learners and drivers with valid licences make up 13.7% of all accidents. Accident cases involving drivers who did not have a valid licence climbed from 34,854 in 2020 to 37,182 in 2021, representing a 6.7% rise over the same period in 2019. Even yet, there is a need for stricter enforcement as well as the creation of reputable driving schools and testing facilities. Learner's licence accidents climbed from 16,977 in 2020 to 19,184 in 2021, representing an increase of around 13% over 2020.

Table 6: Road Accidents By Type Of License

Type of Licence	2020	2021
Valid driving licence	2,63,689	2,90,261
Learner's licence	16,977	19,184
Without valid licence	34,854	37,182
Not known	50,618	65,805
Total	3,66,138	4,12,432

Source: (GoI, 2021)

C. Non-Use of Safety Devices – Helmets and Seatbelts

The failure to utilise safety equipment like seatbelts and helmets does not cause accidents, but it is crucial for preventing fatalities and serious injuries in the case of traffic accidents. Except for a few exceptions, all drivers of two-wheelers must wear a helmet. A total of 46,593 people died in 2021 as a result of not wearing a helmet, including 32,877 drivers and 13,716 passengers. Similar to this, over the same time period, 16,397 people died as a result of not wearing a seatbelt, of which 843 were drivers and the remainder 7959 were passengers. Injuries from not wearing a seat belt or a helmet resulted in 93,763 injuries and 39,231 injuries in 2021, respectively.

Table 7: Persons Killed And Injured Due To Non-Use Of Safety Devices During 2021

Category	Non Wearing of Helmet		Non wearing of Seat Belt	
	Killed	Injured	Killed	Killed
Drivers	32,877	57,264	8,438	16,416
Passenger	13,716	36,499	7,959	22,815
Total	46,593	93,763	16,397	39,231

Source: (GoI, 2021)

3.4.2 Accidents by Road Environment

Accidents that occur in a specific geographic location, those related to the kind of road features, including straight, curved, steep, etc., type of junction & type of traffic control, and weather condition are all included in the category of road environment.

A. Road Accidents Classified by Type of Neighbourhood

Neighbourhood indicators show an overall increase in accidents, fatalities, and injuries in 2021 compared to 2020. Road accidents are more likely to occur in residential, institutional, and market/commercial areas due to traffic congestion. However, the data for 2021 show that 46.9% of accidents, 54.2% of fatalities, and 46.9% of injuries took place in open areas, i.e., places where there are often no nearby human activity. With 18.6% of all accidents, 17.5% of all fatalities, and 18.1% of all injuries, residential areas come in second. 14% of all incidents and 11.5% of fatalities occurred in markets and other commercial areas.

Table 8: Accident Classified By Type Of Neighbourhoods During 2021

Area	Total accidents		Persons killed		Persons Injured	
	2020	2021	2020	2021	2020	2021
Residential Area	68,237	76,791	23,188	26,921	62,516	69,725
Institutional Area	24,102	28,167	8,095	9,754	22,468	26,150
Market/ Commercial area	51,411	57,855	15,514	17,656	47,886	53,237
Open Area	1,73,483	1,93,273	70,739	83,489	1,68,315	1,80,438
Others	48,905	56,346	14,178	16,152	47,094	54,898

Source: (GoI, 2021)

Due to both automotive and pedestrian traffic, areas housing institutions like schools, colleges, hospitals, or significant government buildings frequently experience traffic congestion. The proportion of institutional

accidents among all accidents is lower than anticipated. Better enforcement of traffic laws in residential, institutional, and commercial sectors may help to explain it. Open regions are typically thought to have a lesser enforcement presence, making them more likely to see reckless driving and traffic law breaches.

B. Road Accidents Classified by Road Features

Road elements that need skill, extra caution, and vigilance to navigate, such abrupt curves, potholes, and steep grades, are more likely to cause accidents. Curved roads and potholes saw a little increase in accidents, fatalities, and injuries in 2021, whereas bridges, culverts, and steep grades saw a drop from 2020 to 2021. Accident parameters in relation to straight roads show an upward trend. According to data on road accidents for 2021, the percentage share of various collision types in total accidents is largely identical to the percentage share of fatalities and injuries, which followed a similar pattern in 2020.

According to the data for 2021, 67.5% of incidents happened on straight roads, compared to 13.9% of accidents on curves, potholed roads, and steep grades combined. Straight roads with open spaces frequently have high vehicle speeds, which is consistent with the high prevalence of traffic fatalities and injuries (64–65%) on these roads. The research, however, reveals that even straight road segments, which are typically thought of as less dangerous, road safety measures must not be overlooked. 2.2% of all accidents in 2021 occurred on road segments when construction was taking place.

The engineers who maintain these roads at the national, state, and municipal levels need to concentrate on the categories of the Curved Road, Culvert, Potholes, and ongoing road works/works under construction, etc., with safety signage put at the proper areas.

Table 9: Accidents, Persons Killed And Injuries By Road Feature

Road feature	Number of accidents		Persons killed		Persons injured	
	2020	2021	2020	2021	2020	2021
Straight road	2,37,943	2,78,218	85,032	1,02,623	2,26,651	2,59,402
Curved road	47,772	49,581	16,746	19,120	48,213	48,888
Bridge	12,836	12,709	5,049	5,337	12,211	11,546
Culvert	6,724	6,663	2,762	2,960	6,017	6,029
Potholes	3,564	3,625	1,471	1,481	3,064	3,103
Steep grade	4,244	3,967	1,604	1,635	3,977	3,398
Ongoing road works/ Under construction	9,173	9,075	3,894	4,014	8,005	7,539
Others	43,882	48,594	15,157	16,802	40,141	44,543
Total	3,66,138	4,12,432	1,31,714	1,53,972	3,48,279	3,84,448

Source: (GoI, 2021)

C. Accidents by Road Junction Type & Traffic Control

Road intersections are places where traffic merges, making them vulnerable to mishaps. However, according to statistics provided by States/UTs, only 23.7% of incidents in 2021 happened at the various types of intersections listed in Table 10. The remaining 76.1% of accidents fell into the "Others" category. Similar to this, various crossroads were the scene of roughly 20.9% of fatalities in 2021. "T Junction" is the junction type where the majority of accidents, fatalities, and injuries occur.

Table 10: Accidents By Road Junction Type & Traffic Control

Junction Type	Number of accidents		Persons killed		Persons injured	
	2020	2021	2020	2021	2020	2021
T-Junction	36,471	37,020	11,091	11,783	33,735	34,092
Y-Junction	16,438	15,527	5,501	5,384	14,729	13,671
Four arm Junction	17,611	18,703	5,368	5,739	15,206	16,216

Staggered Junction	18,713	14,111	6,204	5,160	16,539	12,678
Round about Junction	11,161	13,210	3,990	4,603	10,083	12,147
Others	2,65,744	3,13,861	99,560	1,21,303	2,57,987	2,95,644
Total	3,66,138	4,12,432	1,31,714	1,53,972	3,48,279	3,84,448

Source: (GoI, 2021)

All junction types contain a variety of traffic control devices, including stop signs, flashing lights, police-controlled signals, traffic lights, and uncontrolled signals. According to Table 11, uncontrolled crossings are where the majority of accidents, fatalities, and injuries occur. In 2021, flashing signal/blinker accidents accounted for 17.7% of all accidents, 16.3% of fatalities, and 17.2% of injuries. Additionally, it should be highlighted that the category of "Flashing signal/blinker" in the accident, fatality, and injury category had the greatest reduction on junctions.

Table 11: Accidents, Persons Killed And Injured By Type Of Traffic Control: 2020-2021

Junction type	Number of accidents		Persons killed		Persons injured	
	2020	2021	2020	2021	2020	2021
Traffic light signal	8,465	8,573	2,124	2,226	7,511	7,484
Police Controlled	7,280	7,256	2,157	2,070	6,634	6,496
Stop Sign	5,998	4,494	1,971	1,595	5,197	3,914
Flashing Signal/Blinker	7,344	5,093	2,328	1,705	6,750	4,616
Uncontrolled	71,307	73,155	23,574	25,073	64,200	66,294
Others	2,65,744	3,13,861	99,560	1,21,303	2,57,987	2,95,644
Total	3,66,138	4,12,432	1,31,714	1,53,972	3,48,279	3,84,448

Source: (GoI, 2021)

D. Road Accidents by Weather Condition

The likelihood of accidents rises as a result of how the weather affects the condition of the road surface and motorist visibility. Driving becomes more dangerous in poor driving conditions including heavy rain, dense fog, and hailstorms because visibility is reduced and the road surface becomes slick. However, according to data on road accidents for 2021, about three-quarters of the collisions and fatalities occurred while it was sunny or clear out. Only 16.8% of all traffic incidents in 2021 occurred because of bad weather, such as rain, fog, or hail/sleet.

Table 12: Road Accidents By Weather Condition

Weather condition	Number of accidents		Persons killed		Persons injured	
	2020	2021	2020	2021	2020	2021
Sunny/clear	2,61,046	2,99,305	88,239	1,05,805	2,53,421	2,84,176
Rainy	36,161	36,432	13,283	14,455	34,552	33,416
Foggy & misty	26,541	28,934	12,084	13,372	23,111	25,360
Hail/ sleet	4,752	3,911	2,095	1,872	4,074	3,296
Others	37,638	43,850	16,013	18,468	33,121	38,200
Total	3,66,138	4,12,432	1,31,714	1,53,972	3,48,279	3,84,448

Source: (GoI, 2021)

4. Mitigation Measures Taken

India is dedicated to reducing the number of people killed in auto accidents. Since there are multiple contributing factors to road accidents, there must be a multifaceted approach taken by all departments of the central government and state governments to address the issues. The Ministry has developed a multi-pronged plan based on education, engineering (of both roads and vehicles), enforcement, and emergency care to address the issue of road safety. As a result, a number of recent initiatives undertaken by the Ministry are listed below.

Table 13: Mitigation Measures Taken

Category	Mitigation Measures
Education Measures	Publicity and Awareness Campaigns
Engineering Measures	• Identification and Rectification of Accident Blackspots • Road Safety Audits • Pedestrian Facilities • Pedestrian Facilities • Mandatory fitment of safety technologies • Anti-lock Braking System (ABS) and Combined Braking System (CBS)
Training and Capacity Building	Accredited Driver Training Centre
Enforcement Measures	• The Motor Vehicles Act: Provisions and Penalties • Speedy Assistance to Accident Victims • Simplification and citizen facilitation • Strengthening Public Transport • Automation and Computerization • Empowerment of States
Other Initiatives	• Electronic Monitoring and Enforcement • Incident Management System & Incident Management Services • National Road Safety Board (NRSB) • Supreme Court Committee on Road Safety • Integrated Road Accident Database

Source: (GoI, 2021)

5. Conclusion

The thorough literature review revealed a significant decrease in the number of accidents, fatalities, and injured people between 2016 and 2020. The figure did, however, slightly increase in 2021. Local roads that are not included in state or central roadways are the most accident-prone regions. Additionally, the current study found that "hit from behind" accidents occurred more frequently than "head-on collisions." In terms of accident volume, Tamil Nadu has consistently [6 times] held the top spot in the nation. Though it hard to digest, the fact to be accepted. The survey also identified the primary causes of traffic accidents are traffic rule violations, driving without valid driver license and non-use of safety devices like helmets and seatbelts.

The issue of road accidents in India is a serious one that needs to be addressed right away by a variety of parties, including the government, law enforcement, those in charge of building roads, and the general people. To address the aforementioned top concern, a multifaceted strategy that includes enforcing harsher traffic laws, boosting law enforcement, upgrading road infrastructure, educating the public about road safety, and encouraging responsible driving behavior is necessary. In order to stop the rising trend of road accidents, additional crucial initiatives include improving emergency medical services, utilizing technology for traffic management, and conducting frequent safety audits of roads and cars.

Prioritizing road safety activities is essential, as is allocating enough money for enhancing roads and highways and funding public awareness campaigns that encourage safe driving. A comprehensive and long-lasting framework for road safety must be developed through cooperation between public and commercial institutions.

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