

Road Traffic Accident and its Characteristics in Kathmandu Valley

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Abstract

Road Traffic Accident (RTA) is defined as an accident, which takes place on the road between two or more objects, in which one is any kind of moving vehicle and the other is another vehicle, pedestrian, animal, or stationary object. The major scope of this study is to analyze factors influencing road accident in Kathmandu Valley (i.e. Kathmandu, Bhaktapur and Lalitpur district), Nepal. Data used in this research were collected from Kathmandu Valley Traffic Police for FY 2070/71 to 2079/80 of the Nepalese Calendar. Both quantitative and qualitative analysis of data was performed. There were several variables used to analyze the collected data including age of driver, gender of driver, fatality rate, time of accident, reason of accident, type of vehicle involved in an accident. The result of analysis shows that 76752 accidents took place in FY 2070/71 to 2079/80. Vehicles most involved in accidents were motorcycle/scooters (54675) followed by car/jeep/van (46928) (both combining, contributing total of almost 75%). The number of male deaths was three times more than that of female death, (i.e. male death victims were 1360 and female were 409). Based on the age, 55% of total death victims were of age group 16-35 i.e. 969 deaths were of this age group. Largest number of accidents (31473) took place during 12:00-18:00 and the major cause of accidents was reckless driving. Other cause of road accident includes over speeding, alcohol consumption, pedestrian's carelessness, road condition, physical and mental condition of driver. The objective of this research is to identify the trend of accident, investigate the possible causes of accidents, and suggest countermeasures for reducing road traffic accident.

Keywords: Road Traffic Accident, Kathmandu valley, age, gender, fatality, reckless, cause of accident, time of accident, vehicle involved in accident.

1. Introduction

A road traffic accident, commonly referred to as a traffic collision, is an incident involving at least one vehicle colliding with another vehicle, pedestrian, animal, road debris, or stationary object on a road or highway. Road traffic deaths and injuries remain a major global health and development challenge. As per the Global Status Report on Road Safety 2023, there were an estimated 1.19 million road traffic deaths in 2021; this corresponds to a rate of 15 road traffic deaths per 100,000 population. As of 2019, road traffic crashes are the leading killer of children and youth aged 5 to 29 years and are the 12th leading cause of death when all ages are considered (World Health Organization, 2023). Two-thirds of deaths occur among people of working age (18-59 years), causing huge health, social and economic harm throughout society. 92% of deaths occur in low and middle-income countries and the risk of death is three times higher in low-income countries than in high-income countries despite these countries having less than 1% of all motor vehicles (World Health Organization, 2023).

Road transportation is the most used mode of transportation in Nepal. According to the Economic Survey 2020/21 published by the Ministry of Finance, Nepal, as of mid-March 2021 the total length of road in Nepal has reached 33,528 kilometers including 15,974 kilometers of blacktop (including strategic and local road networks), 5,585 kilometers of graveled and 9,972 kilometers fair weather. There has been an exponential increase in the number of vehicles recently, including all types, the total number of vehicles registered was 3,836,502 as of mid-July 2020 (Durbar, n.d., 2020). Of the total registered vehicles, the share of two-wheelers motorcycle is 79.3%, and buses, an important medium of public transportation is 1.4% (Durbar, n.d., 2020).

As the number of vehicles is increasing, the cases of accidents are also increasing rapidly. On the other hand, the condition of roads is still below standard in most parts of Nepal. According to (Adhikari, 2016) Nepalese roads are the ones that are among the most dangerous roads in the world; and the chances of vehicle crash are more than 100 times higher than in Japan and 10 times higher than in India.

There are several factors associated with road traffic accidents. Globally, the major factors causing accidents vary from country to country, city to city as there is variation in road conditions, condition of weather, legal prosecution, effectiveness of traffic police, types of vehicles used, etc. From the review of the literatures the most mentioned factors that are found to be significant to road traffic accident severity are the speed of vehicle traveled, followed by human characteristics (Ditcharoen et al., 2018). Other factors that are found to be significant are vehicle type, weather, alcohol consumption, driver's fatigue, etc. (Ditcharoen et al., 2018) In the case of Kathmandu Valley, reckless driving and careless behavior of the driver is the major cause of RTA. Careless behavior includes ignoring traffic signals, paying less attention on the road, and using mobile phones while driving.

Several people die due to accidents and many more get permanently disabled each year. The disability not only affect the survivors of road traffic accident but also their family members and relatives. They may end up becoming a financial burden to family and relatives. To minimize such accidents, traffic police conduct various campaign, awareness programs, street rallies, educational songs, each year. These kinds of programs are found to be somewhat effective but they are not able to fully control accident cases. The government should be able draft laws to penalize heavily so that people pay extra attention in the upcoming days.

An attempt has been made in this paper to present data on basis of different factors associated with accident such as age group, gender of driver, time of the day at which accident occurred, factors causing the road accident.

2. Material and Methodology

This research employes a methodological framework that integrated data collection, literature review, and statistical analysis to investigate road traffic accidents and their characteristics in Kathmandu Valley. The study commenced with the acquisition of data from the Kathmandu Valley Traffic Police, facilitated by written applications submitted by the authors to the Traffic Office. Permission was sought and obtained from the authorities to access, analyze, and publish the data encompassing the districts of Kathmandu, Bhaktapur, and Lalitpur.

A comprehensive literature review was conducted to synthesize existing knowledge from previously published articles, books, and papers related to road traffic accidents and their determinants. This phase of the research aimed to contextualize the findings within the broader scholarly discourse and identify gaps in the current understanding.

Data collection spanned a ten-year period, from fiscal years 2070/071 to 2079/080, and encompassed various parameters, including the yearly incidence of accidents, types of vehicles involved, fatalities, and timestamps of accidents. Analysis of the collected data involved categorizing fatalities based on the gender and age of the victims, as well as segmenting accident data based on the age of the drivers.

A statistical approach was employed to analyze trends in accident occurrences and fatalities over the specified timeframe. Key variables examined during the analysis included the timing of accidents, types of vehicles involved, drivers' demographics, primary causes of accidents, and demographic profiles of deceased victims.

Data management tasks were executed using Excel, while MATLAB facilitated statistical computations and trend analyses. To ensure data integrity and accuracy, the information provided by the Traffic Office was cross-referenced with data published by the Government of Nepal on various official websites. The study refrained from incorporating additional third-party sources, thereby maintaining methodological rigor and enhancing the reliability of the findings.

3. Result

3.1. Total road accident trend

During the FY 2070/071-2079/080, the total number of accidents was 76752, among which the recorded fatality was around 2.30% and approximately 3.2% were seriously injured. The maximum number of accidents was recorded in FY 2078/79 which amounts to 10733 whereas the minimum number was 4672 in FY 2070/071. The highest number of deaths 254 was recorded in FY 2075/076 which was around 2.98% of the recorded accident in the same year and the minimum number of deaths was 133 in FY 2071/072. From figure 1 we can see the increasing trend in the total number of accidents each year.

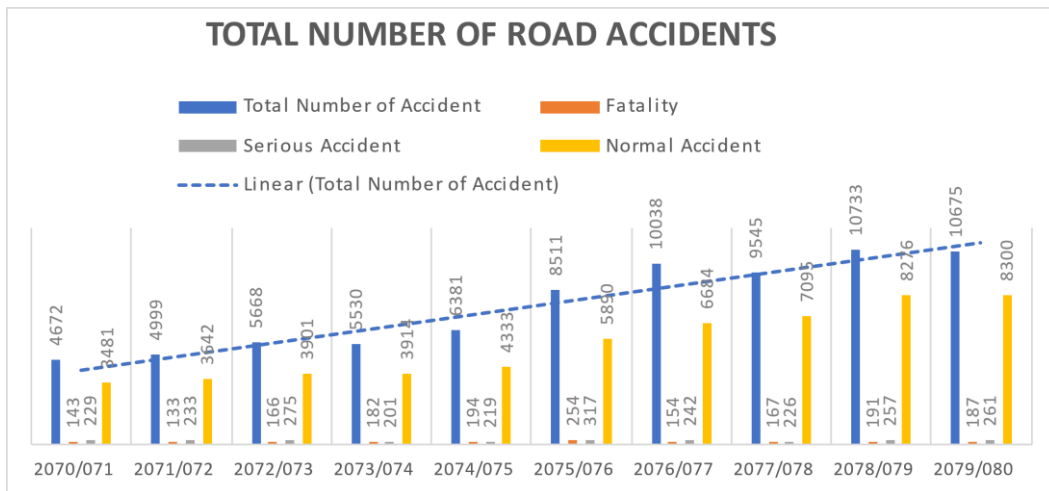


Figure 1. Total number of road accidents

3.2. Types of vehicles involved in an accident

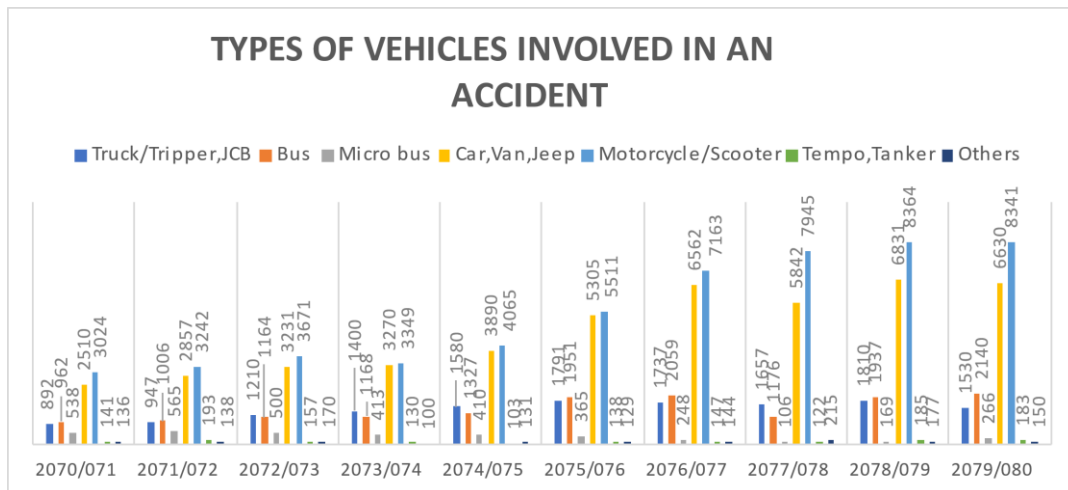


Figure 2. Types of vehicles involved in an accident

Based on the variations in size, the vehicles that were involved in the collision were divided into multiple groups. Figure 2 clearly shows that the vehicle most involved in the accident was a motorcycle/scooter followed by a car/jeep/van. There seems to be a need of an awareness campaign to two-wheel users as they are most prone to be involved in an accident. Motorcycle/scooter and car/jeep/van combined contribute to almost 74% cases of accident in total. During the last 10 years, 54675 motorcycles/ scooter were involved in road accident and number of car/van/jeeps involved in accident was 46928. During these years, 14890 buses were involved in accident and 14554 truck/tipper/JC were also involved in accident.

3.3. Trend of death toll

During the FY 2070/071 to 2079/080, the total death toll was recorded to be 1769, among which 1360 were male and 409 were female. The maximum number of deaths was recorded in FY 2075/076 which amounts to 254 (196 male and 58 female) whereas the minimum number of deaths of 133 was recorded in FY 2071/072. In the total record of last 10-year, rate of male fatality is more than 3 times the female fatality.

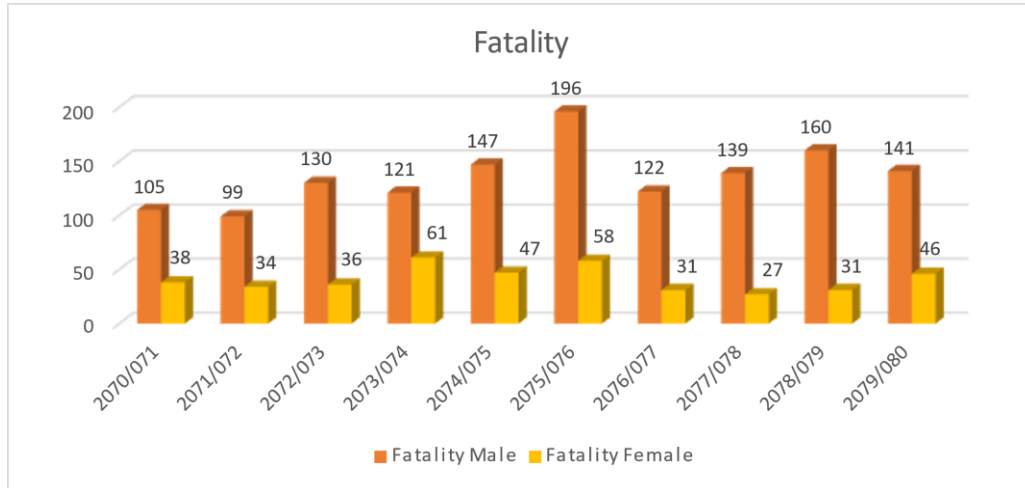


Figure 3. Trend of death toll (by gender)

The death toll was also categorized into three categories, below age 16, Aged 16-35, and above age 36. The number of deaths was maximum in the age group of 16-35. The total number of deaths in each group in 10 years was 123, 969, and 677 respectively. Figure 4 depicts the variation in road accident deaths among the age groups in the last 10 years.

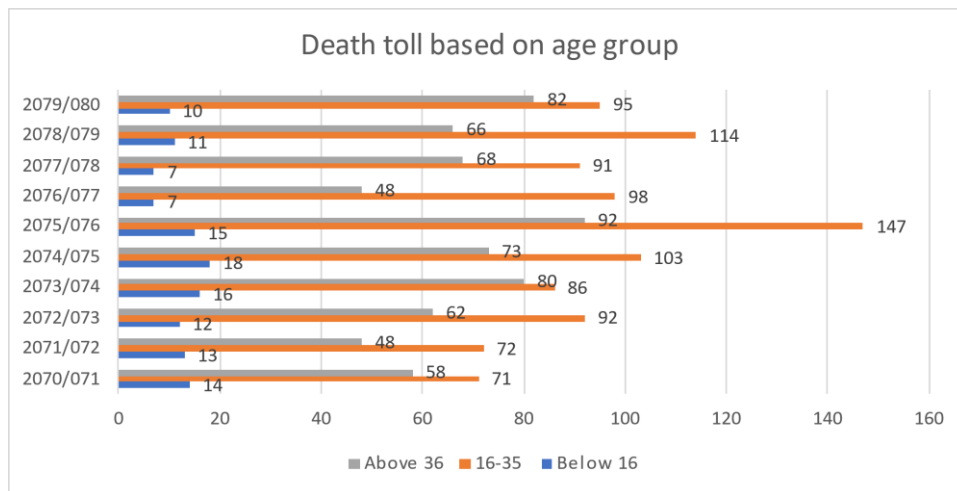


Figure 4. Death toll based on age group

3.4. Variation in Causes of Road Traffic Accident

From the data of the last 10 years, it is seen that the major cause of accidents is the carelessness (reckless driving) of the driver and the second major cause is over-speeding of the vehicle. Reckless driving contributes to almost 81% of accidents while over speeding contributes to 12% of accidents. It is to be suggested that proper awareness and counseling should be provided to the youth of Kathmandu Valley. Despite vigorous efforts from traffic police against driving under the influence of alcohol and drugs, it is the third most common cause of road accidents. Drinking and driving has caused a total number of 3577 accidents over the last 10-

year period. Strict traffic rules and regular traffic checking may further reduce the number of accidents due to alcohol consumption in future periods. Lack of knowledge can lead to ignorance of signals shown by vehicles before malfunction. Not always, the driver is responsible for road accident, pedestrians and other animals also contribute to road accidents.

Table 1. Number of accidents caused by different reasons

Fiscal Year	2070/ 071	2071/ 072	2072/ 073	2073/ 074	2074/ 075	2075/ 076	2076/ 077	2077/ 078	2078/ 079	2079/ 080
Carelessness	4056	4542	5281	5205	5961	7529	8952	7870	6191	6197
Overspeed	154	81	48	41	71	525	460	810	3543	3219
Alcohol Consumption	156	151	183	167	221	283	488	689	589	650
Engine Malfunction /mechanical failure	118	114	77	50	44	67	52	59	152	148
Overtake	126	73	46	33	29	75	60	68	182	248
Pedestrian Negligence	18	13	11	4	3	3	4	1	9	3
Loss due to Vandalization	21	5	0	2	0	0	0	0	0	0
Road Condition	16	14	17	21	48	26	17	22	52	27
Others	7	6	5	7	4	3	5	26	15	183

3.5. Accident trend based on timing

The accidental trend was analyzed by dividing a day into 4 groups (6:00-12:00, 12:00- 18:00, 18:00-24:00, and 24:00-6:00). The majority of accidents occurred during 12:00-18:00 (almost 41%) followed by 6:00-12:00 (almost 30%). The least accident was encountered between 24:00 to 6:00; this pattern is due to less movement of vehicles during the night period. However, if we only see the number of accidents during 24:00 to 6:00, 3560 accidents took place. From general observation, it can be said that the major factor for accidents during nighttime is the lack of proper streetlights and the condition of the headlights of old vehicles. From Figure 4 we can see a clear increase in accidents during time 12:00 to 18:00 (almost a linear trend has been observed).

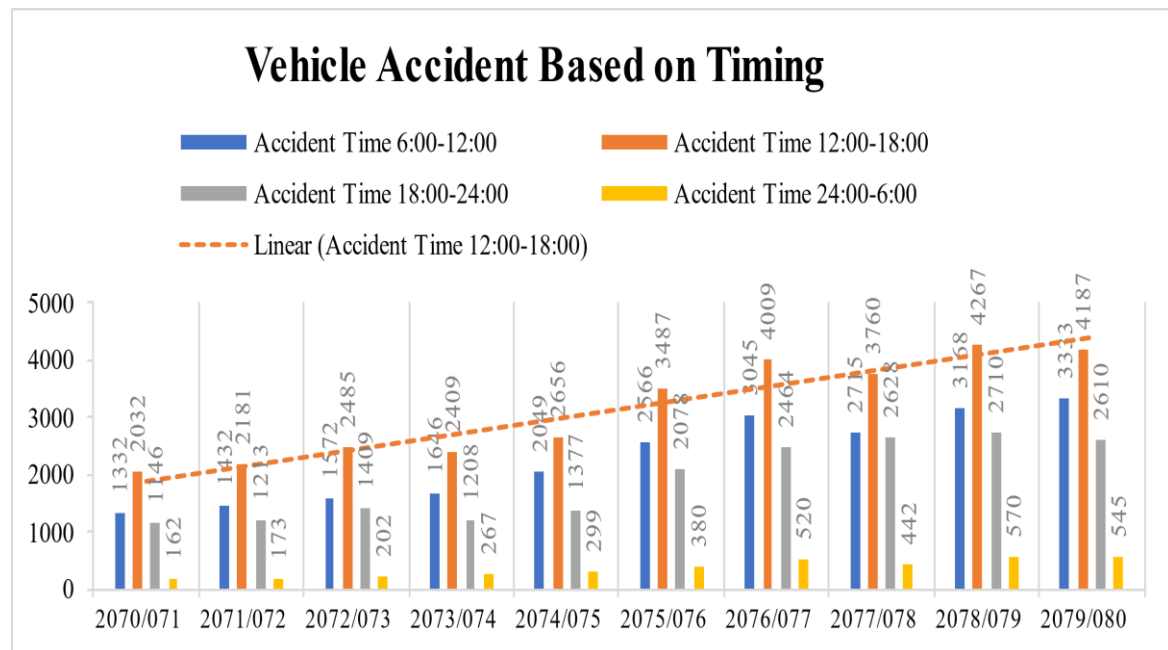


Figure 5. Number of Vehicles Involved in an Accident Based on Timing

3.6. Accident trend based on drivers' age

The data was categorized into three groups, age 16-26, age 26-40, and above 41. During the last 10 years, drivers in the age group 26-40 years mostly encountered accidents followed by drivers of the age group 16-26. Almost 57% of accidents had drivers of age group 26-40.

Table 2. Number of accidents based on drivers' age

SN	Fiscal Year	Age Group		
		16-26	26-40	Above 41
1	70/71	880	5958	1365
2	71/72	1101	6215	1642
3	72/073	1619	6607	1877
4	73/74	2046	5860	1924
5	74/75	993	8224	2190
6	75/76	3215	8650	3325
7	76/77	4991	8331	3352
8	77/78	4951	8666	3446
9	78/79	5395	9784	4294
10	79/80	5520	9217	4503

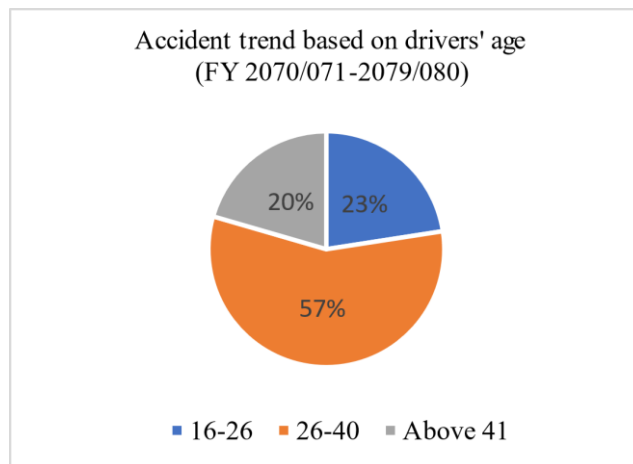


Figure 6. Trend based on drivers' age

4. Discussion

After detail analysis of above presented data using various statistical tools, it can be seen that number of accidents are increasing each year, figure 1 shows almost a linear trend of increase in number of accidents each year. Vehicles most involved in accidents are motorcycle/scooters followed by car/jeep/van (both contributing total of almost 75%) followed by buses and trucks (combined 21%). If we analyze the figure 3, among the total death victim of road traffic accident, 77% of dead victims are male, which is more than 3 times the female death. Among the death victims, 55% of victims belong to age group 16-35 and 38% of the victims are of age group above 36. Kathmandu Valley loses a major portion of its youth in road accident and several youths end up being permanently disabled due to road accident. Table 1 shows that more than two third of road accident i.e. 70736 of registered road accident are caused due to reckless driving combined with

over speed of vehicle. Driving while being intoxicated has been another major cause of road accidents. Irresponsible behavior due to pedestrians has also been a factor contributing road accidents. These days drivers' lack general knowledge of their vehicle due to which they ignore the signals shown by vehicle before malfunction. In the last 10 year almost 881 cases were registered to be caused by mechanical malfunction/failure. The traffic data of last ten years shows that the majority (41%) of road accident occur during 12:00-18:00 followed by 30% of those during 6:00-12:00. Table 2 shows the variation of drivers age who are involved in an accident; the majority of drivers are of age group 26-40.

There seems to be lack of research on the long-term effect of road accident on victim (both physical and psychological effect) and their family. This can be a topic for future research. Future research questions may be of high range, given the dynamic nature of road accident. Some examples of such questions are:

1. What is the long-term psychological effect on a driver who is once involved in an accident? Also, what is the long term psychological effect on victim who survived an accident?
2. What are the short term and long-term financial impacts on family members of victim (i.e. victim of road accident)?
3. What are the effective measures to reduce death rates among the occurring accidents? How effectively are emergency response system on rescuing victims from site of accident?

5. Conclusion and Recommendations

- Road Traffic Accident (RTA) is a serious problem in Kathmandu Valley, as each year number of accidents are increasing rapidly. In last 10 year, from FY 2070/71 to FY 2079/080, the number of road accidents have been increased by 128.48 % (i.e. accident counts have increased from 4672 in FY 2070/71 to 10675 in FY 2079/080).
- Number of deaths have increased by 30.77%, as in FY 2070/71 the death numbers are 143 and in FY 2079/080 the death numbers are 187.
- The analysis above shows that there are several factors affecting road traffic accident, such as type and condition of vehicle, condition of driver (mental, physical and psychological state), condition of road (including pavement, streetlights, traffic signals, blind spot-on road, etc.).
- The majority of death victims of RTA are youths of age group 16-35 (i.e. 969 victims are of age group 16 to 35 among the 1769 total victim deaths recorded in last 10 year)
- Based on gender, male death victims are thrice more than female death victim (i.e. male death victims are 1360 and female are 409)
- Based on time, the majority of accidents occurred during 12:00-18:00 (almost 41%) followed by 6:00-12:00 (almost 30%)

So, to reduce the number of accidents and deaths in Kathmandu valley, the government of Nepal should consider implementing a range of strategies and interventions such as:

1. Improving Road Infrastructure (these includes improvement of existing road, identifying blind spots and eradicating them, fixing and upgrading traffic lights and streetlights)
2. Upgrading basic curriculum in School in terms of traffic awareness so that youths are aware of rules, regulations and seriousness of this issue.
3. Promote Public Awareness Campaigns: Launch public awareness campaigns to educate drivers, pedestrians, and other road users about safe driving practices, the importance of following traffic rules, and the risks associated with speeding, drunk driving, and distracted driving.
4. Develop an emergency response system including highway ambulance, emergency response team, medical facilities. Quick response times and access to medical care can help reduce the severity of injuries and save lives.
5. Implement stricter penalties and proper collaboration with stakeholders and local bodies to implement policies.

6. Upgrade policies and regulations such as such as compulsion of helmets for backseat riders in two-wheelers.

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Ethical Considerations and Conflict of Interest

Confidentiality and data privacy has been maintained. Authors have not shared data from police station to any third parties. During the data collection, authors' have not taken any personal information about the victims involved in road accident, only the statistical numbers were taken by author (i.e. no personal details such as name, photos, identity of victim have been provided to authors').

The authors declare that they have no conflicts of interest associated with the research presented in this paper.

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