

# A Public Health Perspective of Road Traffic Accidents

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## Abstract

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Road traffic accidents (RTAs) have emerged as an important public health issue which needs to be tackled by a multi-disciplinary approach. The trend in RTA injuries and death is becoming alarming in countries like India. The number of fatal and disabling road accident happening is increasing day by day and is a real public health challenge for all the concerned agencies to prevent it. The approach to implement the rules and regulations available to prevent road accidents is often ineffective and half-hearted. Awareness creation, strict implementation of traffic rules, and scientific engineering measures are the need of the hour to prevent this public health catastrophe. This article is intended to create awareness among the health professionals about the various modalities available to prevent road accidents and also to inculcate a sense of responsibility toward spreading the message of road safety as a good citizen of our country.

**Keywords:** Road accidents, road safety, preventive measures

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## Introduction

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Motorization has enhanced the lives of many individuals and societies, but the benefits have come with a price. Although the number of lives lost in road accidents in high-income countries indicate a downward trend in recent decades, for most of the world's population, the burden of road-traffic injury—in terms of societal and economic costs—is rising substantially.[1] Injury and deaths due to road traffic accidents (RTA) are a major public health problem in developing countries where more than 85% of all deaths and 90% of disability-adjusted life years were lost from road traffic injuries.[2]

As a developing country, India is no exception. Not a day passes without RTA happening in the roads in India in which countless number of people are killed or disabled. Often members of the whole family are wiped out. Those who are affected or killed are mostly

people in their prime productive age. The highest burden of injuries and fatalities is borne disproportionately by poor people, as they are mostly pedestrians, cyclists, and passengers of buses and minibuses.[2]

The data for fatal accidents presented to the Parliament by the Ministry of Road Transport and Highways for year 2008 shows that 119,860 people perished in mishaps that year and the national and state highways accounted for nearly half of all road accidents.[3] Deaths due to road accidents in 2009 were reported to be 126,896 and in 2010 it increased to 133,938 which is about 5.5% over and above the previous year's deaths. Tamil Nadu, Andhra Pradesh, Maharashtra, Karnataka, and Rajasthan have accounted for 11.5%, 10.5%, 7.1%, and 6.8%, respectively, of total "Road Accident" deaths in the country.[4] The trend is alarming and is leading to a frightening situation day by day.

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## **India Tops Global List of Fatalities from Road Crashes**

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1. More than 1.3 lakh people died on Indian roads, giving India the dubious honor of topping the list of road deaths across the world.
2. Until 2 years ago, the International Road Federation placed India second behind China.
3. China has managed to reduce the number of road deaths from over 100,000 to 90,000 or so, and in India the situation has worsened.
4. With just 1% of the world's vehicles, India manages to account for 10% of its road fatalities, up from 8% at last count.
5. In India the situation is exacerbated by poor enforcement of traffic laws and myopic policies on the part of our policy makers.
6. In the United States, which has close to 300 million people and more than 250 million vehicles, the number of deaths per 10,000 vehicles is 1.6, while in India this number, known as the "road fatality rate," is as high as 14.
7. In comparison, China has a road fatality rate of about 5 with almost twice as many vehicles. Besides, in China, the fatality rate has seen a downward trend, while in India it is raising.[5]

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## **Alarming Trend in Tamil Nadu**

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In 2007, in Tamil Nadu, 12,036 persons died on the roads out of 59,140 accidents. During the same period, 1146 people were killed in the Chennai city roads out of 7570 accidents. During 2009 over 12,000 people lost their lives in the State, while in Chennai city alone

611 people died. During 2010, Tamil Nadu has reported maximum number (64,996) of road accidents accounting for 15.1% of such accidents in the country while in Chennai 1408 persons were killed out of 9521 accidents. During 2011, a total of 13,119 persons were killed out of 55,592 accidents [Table 1]. Now Tamil Nadu seems to be topping the list of most number of road accidents happening in the Country with Chennai city having the deadliest roads among India's six metropolises. On an average, 35 persons die in road mishaps every day in Tamil Nadu while it is about 2 persons per day in the Chennai city. [3,6]

**Table 1**

Number of fatal and nonfatal accidents reported in Tamil Nadu

Year	Fatal accidents	Nonfatal accidents	Total accidents
2007	12,036	47,104	59,140
2008	11,813	48,596	60,409
2009	12,727	48,067	60,794
2010	14,241	50,755	64,996
2011*	13,119	42,473	55,592

Source: Report of transport department for the state road safety council 2012. \*Up to October 2011

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## Contributing Factors

The road accidents are happening most often due to the reckless and speedy driving of the vehicles, not obeying or following traffic rules, the attitudes of the “right of the mighty” bigger vehicles toward the smaller vehicles, overburdened or overcapacity hauling of public and transport vehicles, poor maintenance of the vehicles, drunk and driving, driver fatigue, and above all the appalling condition of the already choked roads with every inch encroached by unauthorized persons and properties [Table 2].

**Table 2**

Main causes of road traffic accidents[7]

Causes of road accidents	%
Fault of the driver	78.5
Fault of the pedestrian	02.2
Defect of motor cycle	01.8
Defect of the road	01.3
Fault of the cyclist	01.2
Weather condition	00.8
All other causes	14.2

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## Human Factors in RTA

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Human factor contribute significantly to increasing number of road accidents in India. Most drivers continue to be acting like maniacs in a tearing hurry and error in judgment often leads to major accidents. Reckless driving, over speeding, decline to follow traffic rules, and drunken driving are main reasons for road accidents.

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## Drunken Driving

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Drunken driving is one of the major causes of road accidents. The statistics also show that most of the road accidents in the highways are due to drunken driving only. Globally, some 480,000 deaths and 20 million of people get injured by drunken driving every year. In most high-income countries about 20% of fatally injured drivers have excess alcohol in their blood, i.e., blood alcohol concentration (BAC) in excess of the legal limit. In contrast, studies in low- and middle-income countries like India have shown that between 33% and 69% of fatally injured drivers and between 8% and 29% of nonfatally injured drivers had consumed alcohol before their crash.[8]

In India, drunken driving is customary in commercial vehicle drivers. Private car owners and youngsters are also major players in the game. Small bars along the Indian highways are of prime concern to control drunken driving. India has laws to check the drunken driving but its effective implementation is still to be worked upon. In Bangalore, 28% of crashes involving males over 15 years were attributable to alcohol. Drunken driving has been responsible for 70% of road fatalities in Mumbai and Delhi.[9]

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## Driver Fatigue

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Driver fatigue is a very dangerous condition created when a person is suffering symptoms of fatigue while driving, often resulting from the hypnotic effect especially during nighttime driving either falling asleep at the wheel or so exhausted to make serious- and

fatal-driving errors. The increasing number of traffic accidents due to a diminished driver's vigilance level has become a serious problem for society. Statistics show that 20% of all the traffic accidents and up to one-quarter of fatal and serious accidents are due to drivers with a diminished vigilance level. Furthermore, accidents related to driver's hypovigilance are more serious than other types of accidents, since sleepy drivers often do not take correct action prior to a collision.[10]

Realizing this serious Public Health Issue happening globally, the WHO in 2004 came out with a theme of “Road Safety is No Accidents” to highlight the urgency to tackle the issue on a priority basis.[11] It is high time for us to look into the various issues of the RTA in this perspective so that corrective and preventive measures can be undertaken in an urgent manner so that further damages can be lessened.

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## **Road Safety—A Public Health Issue**

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World's first RTA is supposed to have occurred in 1896. Everybody concerned at that time reported to have said, “this should never happen again.” But more than a century later, 1.2 million people were killed on roads every year and up to 50 million more are injured. For every one killed, injured, or disabled by RTA, there are countless others deeply affected by the cost of prolonged medical care, loss of a family bread winner, or the extra funds needed to care for the people with disabilities. RTA survivors, their families, friends, and other care givers often suffer adverse social, physical, and psychological effects. If the current trends continue, the number of people killed and injured on the world's roads will rise by more than 60% by 2020.[11]

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## **Some Facts on RTAs**

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1. Worldwide an estimated 3247 people are killed every day and it is the second leading cause of death among people aged 5–29 years.
2. RTA injures or disables between 20 million and 50 million people a year.
3. RTA ranks as the 11<sup>th</sup> leading cause of death and accounts for 2.1% of all deaths globally.
4. 90% of the RTA deaths occur in the low income and middle income countries.
5. More than half of all RTA deaths among young adults between 15 and 44 years of age and 73% of all the RTA fatalities are males.
6. The most vulnerable road users are pedestrians, cyclists, two-wheeler riders, and passengers on public transport.

7. RTA injuries are becoming the third largest contributor to the global burden of diseases by 2020.
8. RTA deaths are predicted to increase by 83% in developing countries and to decrease by 27% in the developed countries.
9. It is estimated that every year RTA costs billions of rupees globally and nationally. An RTA injury puts significant strain on health care budgets.

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## **Preventive Measures for RTA**

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Road deaths and injuries are preventable. A wide range of effective road safety interventions exist and a scientific system approach to road safety is essential to tackle the problem. This approach should address the traffic system as a whole and look into interactions between vehicle, road users, and road infrastructure to identify solution.

### **Vehicles**

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1. Well-maintained vehicles with good breaks, lighting, tyres etc. will reduce accidents.
2. Older vehicles and highly polluting vehicles should be phased out.
3. Vehicles should be provided with seat belts and other necessary safety provisions (like airbags).

### **Condition of roads**

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1. Roads should be well maintained with frequent relaying of road surfaces and markings of road safety signs.
2. Provide proper footpaths for pedestrians and pedestrian crossings at intersections.
3. Provide separate lanes for slow-moving and fast-moving vehicles.
4. Roads and junctions should be wide and well lit so that visibility is good.

### **Human factor**

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1. Drivers can significantly contribute to reducing the accidents.
2. Issuing of the driving license should be strictly based on the minimum proficiency acquired by the learners from designated driving schools.
3. Minimum qualifications should be fixed for different categories of drivers.
4. All drivers should be properly trained and should possess a valid driving license.
5. Educate the drivers and traveling public about traffic rules.

6. Carry out periodic medical checkup especially vision and hearing for the drivers.
7. Training on first aid should be compulsory along with health education and traffic education for the general public to prevent accidents.
8. Indiscriminate honking to be avoided, except as a means of greeting or in dire emergencies.

## **Legislation**

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1. Rules for compulsory wearing of helmets by two wheelers and seat belts by four wheelers must be implemented.
2. Enforce traffic rules by the concerned authorities strictly.
3. Removal of stray animals like cattle and removal of encroachments on footpath and road margins will enable smooth flow of traffic.
4. Preventing haphazard parking of vehicles on busy roads and intersections to ensure free flow of traffic.

## **Management of accident victims**

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1. The importance of the “Golden Hour” in giving adequate treatment to the accident victim in saving the injured should be highlighted to both the health personals and the community.
2. Provision of medical care/first aid care facilities on highways and busy roads.
3. Provision of ambulances and trained health personals in shifting and transporting the injured person to nearby hospitals for treatment.
4. Awareness creation among all sections of the society to treat accident victims with sympathy and without fear so that the morbidity and mortality can be reduced.

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## **First Aid in Road Accidents**

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Many deaths and impact of injuries can be prevented with first aid if casualties are treated immediately.

The basic aims of first aid are

1. To save life,
2. To protect the casualty from getting more harm,
3. To reduce pain and priorities of casualty treatment.

Immediate requirements in a RTA situation are as follows.

### **Critical 4 min**

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One of the most common causes of a road accident death is due to loss of oxygen supply. This is mostly caused by a blocked airway. Normally it takes less than 4 min for a blocked airway to cause death.

### **The “golden hour”**

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The first hour after the trauma is called the “golden hour.”. If proper first aid is given, road accident victims have a greater chance of survival and a reduction in the severity of their injuries.

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## **Multidisciplinary Approach in RTA Prevention**

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### **WHO road safety campaign 2011: World unites to halt death and injury on the road**

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Governments, international agencies, civil society organizations, and private companies from more than 100 countries have launched the Decade of Action for Road Safety 2011 – 2020. The presidents and prime ministers of these countries are expressing their commitment and launching national plans for the Decade, which seeks to save 5 million lives over the 10-year period. India is also a committed partner in this campaign and on May 11 the event was launched with greater commitment to minimize road accidents.[12]

“Road Safety Week” is observed throughout the country every year in the month of January in order to highlight and emphasize the need for safe roads by taking up activities to promote the concept.[13] Prevention of RTA is a responsibility of various agencies and a multi-disciplinary approach will effectively reduce the incidence of RTA and reduction in injuries and deaths on the roads. Effective community participation also plays a key role in the prevention of RTA. Everybody should be concerned and should work toward achieving a safe road travel so that “road accidents should never happen again.”

Protection is needed for three main vulnerable groups—pedestrians, who in urban areas constitute up to 70% of the fatalities; passengers commuting on buses, trucks, and minibuses, who constitute the next largest population group affected; and cyclists. Addressing the risks of these three groups will require multiple policy initiatives.[14] There is clearly a need for road safety education and it should be directed toward road users, who are frequently involved and injured in RTAs. The real pressure and motivation to improve driving skills can come only through licensing authorities by adopting stricter, more comprehensive, and scientifically based tests, laying a stress on road rules, regulations, and traffic control devices.[15]



The injury profile for road traffic crashes in developing countries differs in important ways from the profile seen in developed countries. The safety on our roads needs to be given the highest priority by governments as well as the public at an all-India level.

### **The national road safety and traffic management board bill, 2010**

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The Bill seeks to establish a National Road Safety and Traffic Management Board for the development and regulation of road safety, traffic management system, and safety standards in highway design and construction. The functions of the Board include recommending minimum standards for design, construction, and maintenance of national highways, recommending minimum standards for trauma and paramedical facilities for traffic-related injuries on the national highway, and conduct safety audits to monitor compliance with the standards notified by the central government.

It also recommends minimum safety standards for the manufacture of mechanically propelled vehicles and other types of vehicles, recommends minimum conditions of safety such as specifying the maximum load bearing and capacity limits, recommends standards for vehicular traffic on the national highways (speed lanes, right of way), conduct research on road safety and management, establish procedure for data collection, involve nongovernment organizations in the promotion of road safety, and provide for special requirement of women, children, and senior citizens.

The legislation was introduced in May 2010 and sought to create separate national and state boards to address road safety issues, including road engineering, awareness campaigns to reduce accidents on national and state highways, and coordination with different agencies on safety issues. Two years after it was rejected by a parliamentary standing committee with a stinging critique, the Ministry of Road Transport and Highways has decided to give another push to National Road Safety and Traffic Management Board Bill in the current financial year.<sup>[16]</sup>

### **Motor vehicle amendment bill 2007 cleared by the cabinet**

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During the post-Budget session in March 2012, a new bill on Motor Vehicle Act was passed in the Parliament and the Union Cabinet has approved the Motor Vehicle Amendment Bill 2007 which will enhance the tooth and power of the traffic enforcing agencies throughout the country, a uniform code of strict traffic rules and enhanced penalties for different types of traffic violations which is expected to act as a deterrent for traffic violations and thereby help to reduce road accidents and deaths.

According to the amendment, the use of mobile phones or iPads while driving could be subjected to a fine of Rs 500 for the first offence, with Rs 2000 and Rs 5000 chargeable for the second time. Now jumping the red light for the first time will fetch you Rs 100 – 500. And a second traffic violation under this will cost Rs 300 – 1500. For overspeeding, a fine ranging between Rs 400 and Rs 1000 can be imposed for the first offence and for the second offence Rs 2000 and Rs 5000. There is no substantial change in the penalty of rash driving. For the first offence you will pay a penalty of Rs 1000 and/or 6 months in jail. While the same offence a second time will cost you between Rs 2000 and Rs 5000.

The bill has categorized driving under influence as follows. In cases where the alcohol level is between 30 and 60 mg per 100 ml of blood, the offender will be subjected to 6 months in jail and/or Rs 2000 fine. In cases where the alcohol level is between 60 and 150 mg per 100 ml of blood, the offender will be subjected to 1 year jail and/or Rs 4000 fine. For alcohol levels of over 150 mg per 100 ml of blood, the offender will get a penalty of 2 years imprisonment and/or Rs 5000 fine. In the case of death in a road accident, the compensation proposed has been hiked from Rs 25,000 to Rs 100,000. In the case of serious injury, the compensation would be Rs 50,000. As per the new bill, motor insurance claims have to be filed within a year of the accident.[17]

## **Emergency medical care to victims of accidents and other emergencies**

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The Supreme Court of India as long back as 1989 observed that when accidents occur and the victims are taken to hospitals or to a medical practitioner, they are not taken care of for giving emergency medical treatment on the ground that the case is a medico-legal case and the injured person should go to a Government Hospital. The Supreme Court emphasized the need for making it obligatory for hospitals and medical practitioners to provide emergency medical care. The Law Commission of India has taken up the subject of “Emergency Medical Care to Victims of Accidents’ and other Emergencies” in the light of the observations of the Supreme Court of India regarding the refusal of hospitals to grant emergency relief to patients who are injured in accidents and are in emergency medical condition.[18]

This law clearly states that it shall be the duty of every hospital and every medical practitioner to immediately attend on every person involved in an accident or who is purportedly in an emergency condition, when such a person has come or has been brought to the hospital or to the private medical practitioner and screen or transfer such person as stated in section 4 and when the screening reveals the existence of an emergency medical condition, to stabilize or transfer such person as stated in section 5 and afford them, such medical treatment as may be urgently called for:

1. Without raising any objection that it is a medico-legal case requiring information to the police authorities,
2. Whether or not such a person is immediately in a position to make payment for screening and emergency medical treatment, and without insisting on payment as a condition precedent,
3. Whether or not such a person has medical insurance or is a member of any medical scheme of the person's employer or to a scheme which otherwise provides for medical reimbursement, and
4. Without raising any other unreasonable objection.

Even in spite of this legal protection, the emergency care to accident victims is delayed resulting in loss of precious lives.

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## Road Safety Information Systems

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Road Traffic Injuries are one of the leading causes of premature deaths, hospitalizations, disabilities, and socioeconomic losses. The problem is hidden and unrecognized due to the absence of good quality information within the health and related sectors. The currently available data reveal only the number of deaths due to different causes of injuries which is not enough to formulate injury prevention programs. The Injury surveillance system aims at collecting relevant information from a large number of participating organizations in a uniform way to understand injury profiles and characteristics. Reliable and scientific information is one of the basic requisites to plan, implement, and evaluate road safety activities. Information of RTI is primarily collected by the Police department and sufficient information is not available from the health sector and under-reporting is a serious issue undermining the public health burden and impact of RTIs.[19]

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## Road Traffic Injury Surveillance Project

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A Bengaluru study showed that nearly 5 – 10% of deaths and more than 50% of moderate to serious injuries are not included in official reports. In this context, the Bengaluru injury and road traffic injury surveillance program had been initiated in 2007 under the auspices of the Indian Council of Medical Research, World Health Organization India country office and Ministry of Health and Family Welfare, New Delhi. This project was planned to develop a surveillance program with data collection from 25 major hospitals in Bengaluru along with linkages to police records. As a pilot project, this program was initiated in Bengaluru, Pune, and New Delhi. Depending on the experiences and the lessons learnt, the program will be expanded to other parts of India.[20] This RTI surveillance endeavor is a prelude to integration with the Government of India's Integrated Disease Surveillance Project (IDSP). IDSP is a decentralized, state-based surveillance program in the country, which is intended to detect early warning signals of impending outbreaks and help initiate an effective response in a timely manner. RTAs is one among the core conditions under surveillance in IDSP (linkup with police computers).[21]

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## Road Traffic Injury is a Public Health Issue

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The health sector is an important partner in the process of prevention and control of RTA. But the role of the medical professionals in advocacy for the prevention and control of RTA is always under-rated. The role of health sector is to provide appropriate prehospital and hospital care and rehabilitation for victims, improve data collection, contribute to policies, develop prevention activities, conduct advocacy, and contribute to the implementation and evaluation of interventions.

To sum up, the road traffic injury prevention can be achieved by

1. Avoiding overspeeding and following speed limits
2. Avoiding drunken driving
3. Use of helmets by two-wheeler drivers
4. Use of seat belts and child restraints in cars
5. Improving visibility, appropriate headlights and road lightings
6. Obeying traffic rules.

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## Conclusions

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India's Motor Vehicles Act lagging far behind the needs of a fast-motorizing society is painfully evident from its road safety record. In a country witnessing 10% annual growth in vehicles, and boasting a network of 3.3 million km of roads, the Bill for creation of a statutory National Road Safety and Traffic Management Board must be speeded up. Such an agency is vital to set standards for road design, inspect existing roads, and investigate accidents scientifically.

It should take a “zero tolerance” policy toward the most common transgressions—dangerous and reckless driving; disregard for traffic rules; jumping red lights; driving under the influence of liquor; failing to use seatbelts; and driving without a helmet—to bring about a visible change.

But strict implementation of traffic rules and stringent punishments alone will not solve the persisting crisis. Change in the mind set of riders and drivers and road users realizing their responsibilities alone will bring about a change.

Most countries have a multidisciplinary approach to traffic planning and road design. It is done by psychologists, engineers, doctors, sociologists, vehicle experts, etc., In India, road traffic is still a civil engineering issue. Lessons can be learnt from the eminent guidelines and good practices for good behavior on the roads practiced in developed countries where safety, orderliness, and discipline are ingrained in the citizens, come what may. Mere celebration of the annual Road Safety Week during the first week of January does not serve any purpose. Drivers should learn to show consideration and respect to co-vehicle drivers and pedestrians so that our roads become safer. But it looks a long way to go.

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## Footnotes

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