

ROAD ACCIDENTS IN INDIA AND MAJOR CAUSES : AN OVERVIEW

INTRODUCTION

India is home to the second largest road network in the world with a total road length of approximately 62.1 lakh kilometres. This massive network serves as the nation's lifeline transporting over 64.5% of all goods within the country in addition to being the preferred option for move of over 90% of India's passenger traffic. While roads remain synonymous with development and growth in the country, they have also been a nemesis for users with India also carrying the dubious distinction of leading the global tally of annual deaths and injuries on account of road accidents. An asymmetry exists between number of vehicles and deaths due to road accidents with India's one percent global share of number of vehicles accounting for almost 11% deaths due to road accidents. Road accidents continue to remain the leading cause of deaths, disabilities and hospitalisations in the country despite concerted efforts at all levels to contain these.

ROAD ACCIDENTS IN INDIA

India's road network, besides being the lifeline of the Nation and a major contributor to socio-economic growth and development, also has the largest contribution to accidental deaths in the country with road accidents accounting for 36-38% (average of 1,50,000 each year) deaths due to other causes during the period from 2015-19.

Global Trends and India.

Road accidents have been the leading cause of deaths worldwide with the last three decades seeing a substantial increase in this regard. The WHO's World Report on Road Traffic Injury Prevention lists Road Accidents as the third leading contributor to the global burden of disease, up from ninth position in 1990¹. India's contribution in this regard is amongst the highest in the world with the country accounting for

the second highest number of road accidents globally and the highest number of deaths. A total of 1,51,113 people were killed in India in 4,80,652 road accidents as against China whose figures of 63,093 deaths from 2,12,846 place it a distant second².

Change in rank order of DALYs for the 10 leading causes of the global burden of disease

1990		2020	
Rank	Disease or injury	Rank	Disease or injury
1	Lower respiratory infections	1	Ischaemic heart disease
2	Diarrhoeal diseases	2	Unipolar major depression
3	Perinatal conditions	3	Road traffic injuries
4	Unipolar major depression	4	Cerebrovascular disease
5	Ischaemic heart disease	5	Chronic obstructive pulmonary disease
6	Cerebrovascular disease	6	Lower respiratory infections
7	Tuberculosis	7	Tuberculosis
8	Measles	8	War
9	Road traffic injuries	9	Diarrhoeal diseases
10	Congenital abnormalities	10	HIV

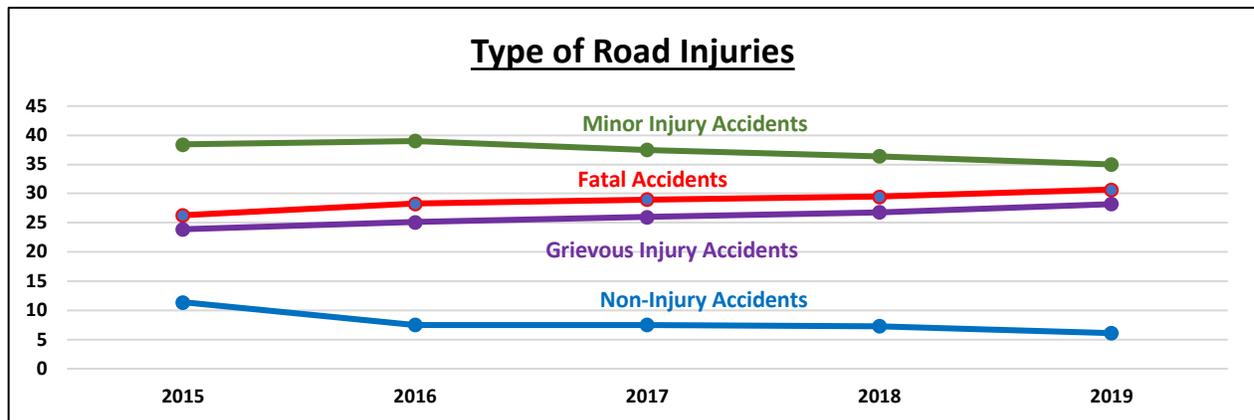
¹WHO World Report on Road Traffic Injury Prevention. <https://apps.who.int/iris/bitstream/handle/10665/42871/9241562609.pdf;jsessionid=ED6CF555069CF5DDBFD93362A181BA8D?sequence=1>

²India Had Most Deaths in Road Accidents in 2019 : Report. <https://www.hindustantimes.com/mumbai-news/india-had-most-deaths-in-road-accidents-in-2019-report/story-pikRXxsS4hptNVvf6J2g9O.html>

Historical Overview. Statistical data available from 1970 onwards brings out the trend with respect to road accidents based on various parameters such as increase in road length over the years, number of vehicles registered as also the population growth. The trend indicates a consistent increase in the number of road accidents, accident-related deaths and injuries upto 2010 following which the figures have been relatively stable with marginal fluctuations. While increase in population has shown a resultant increase in the risks rate for road accidents and deaths, the increase in the number of vehicles surprisingly shown a downward trend during the same period.

Road Accidents in 2019. A total of 4,49,002 road accidents were reported across the country in 2019 resulting in 1,51,113 deaths and 4,51,361 injuries to road users. This averages to almost 1230 accidents 414 deaths daily and 51 accidents and 17 deaths every hour although a marginal decline has been registered when compared to the corresponding figures for 2018.

Trends in Type of Injuries Caused in Road Accidents. Road accident impacts may range from the most severe resulting in death to the relatively negligible involving no injuries. Over the years, the share of fatalities and grievous injuries has increased while that of minor injuries and no injuries have registered a decline.



Accidents as per Road Category. 5.04% of total roads in India comprise of National and State Highways and have cumulatively accounted for almost 54% accidents and 60% deaths in the country with the balance 94% of Indian roads contributing to 45% of road accidents and 39% of deaths. The high number of accidents on highways are indicative of overspeeding being the primary cause for such accidents.

Road Accidents as per Type of Impacting Vehicles and Type of Collision. Two wheeler passengers comprised 37% (56,136) of the total number of people killed in road accidents in 2019 (1,51,113) implying the need for greater control measures in this category of vehicles through legal and penal provisions. Of these, 19,190 died in impacts with another two wheeler while impact with LMV resulted in deaths of 12,480 individuals. An analysis of the type of collision to include hit and run, head on collision, hit from back etc indicate the nature of preventive measures that need to be adopted to ensure reduction in the number of accidents. 2019 saw the 19.5% deaths being attributed to hit

and run accidents while hit from back and head on type of collisions led to 18.4% and 17.7% fatalities respectively.

Road Accidents as per Age and Gender Profile of Fatal Victims. Majority of the fatal victims belong to the age categories between 18-45 years of age with the numbers remaining more or less the same over 2017 to 2019. 69.3% of the fatalities in 2019 were in the age group of 18-45 years while the working group comprising people of ages 18-60 years formed 84.3% of the total fatalities in the same year. Male road users were among 84-85% of the fatalities on account of road accidents.

Accidents as per Road User Category. The degree of vulnerability of a road user to accidents varies over the various categories with the pedestrians and cyclists falling in the most vulnerable group and deaths of these categories of road users in 2019 were 17.1% and 2.8% respectively. Two wheelers accounted for the most number of accident deaths at 37% with LMVs contributing 16%.

Urban and Rural Spread of Road Accidents. Road accidents and related deaths emerge more of a rural phenomenon than an urban one with 67.1% people dying in accidents in rural areas as compared to 32.9% in urban areas. While the higher population in rural areas would most certainly be a contributory factor, the high vehicle density in urban areas offsets this relative edge. Further, urban areas have registered a decline in the number of accidents and deaths as compared to rural areas.

Time-Interval Wise Analysis of Road Accidents. Maximum road accidents in 2019 occurred during the time period of 1800-2100 hours with 86,432 (19.3%) accidents and the period from 1500-1800 hours accounting for the next higher number at 78,513 (17.5%) accidents. Data over a five year period also corroborates these figures indicating that afternoon and early part of the night account are the most dangerous times to be on the road. The least accidents have occurred between 0000-0300 hours.

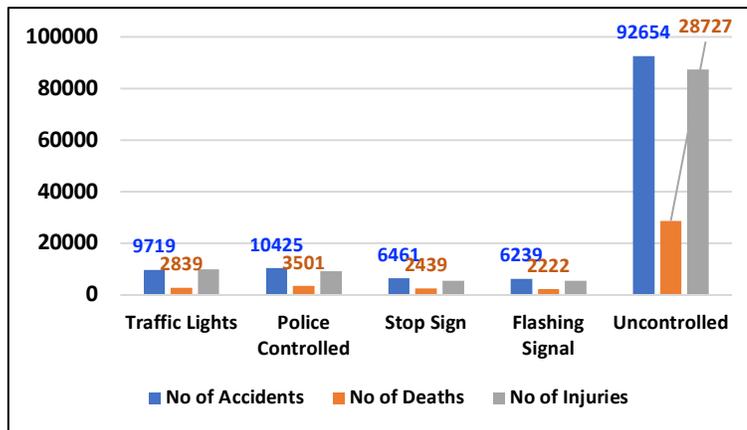
CAUSES OF ROAD ACCIDENTS IN INDIA

Road traffic injuries are the eighth leading cause of death globally. In its study highlighting the larger share of Low and Middle Income Countries in road accident fatalities, the World Bank underscores a distinct co-relation between socio-economic status and road use patterns in low and middle income countries such as India. The report states that daily wage workers and those employed as casual labourers in informal activities are more prone to be defined as vulnerable as compared to workers engaged in regular activities. It is often the poor, especially male road-users of working age that constitute the vulnerable road users (VRU) in India where VRUs share road space with other less vulnerable users with their income level having a direct bearing on the mode of transportation used and resultant risk faced by them on that account. Numerous factors can be attributed to be the causative factors of road accidents and can be broadly classified into road environment factors, human factors and vehicular factors.

Accidents on Account of Road Environment Factors.

Road Features. The various road features such as straight stretches, curved roads, location of culverts, bridges, potholes etc also cause accidents. Straight road stretches, which allow for movement of vehicles at high speeds, have accounted for the highest number of accidents (64-66%) in 2018 and 2019. Categories such as curved roads, culverts, potholes and ongoing works have shown an increase in 2019 vis-à-vis the figures obtaining in 2018.

Road Junctions and Type of Traffic Control.



Road junctions, by virtue of being traffic merging points, are theoretically prone to more accidents. However, an analysis of the data from 2019 reveals that various types of road junctions accounted for only 28% of road accidents with 72% falling in the Others category. Within the road junction categories, T-junctions account for the

largest share in road accidents, deaths and injuries. As regards traffic control, the largest number of accidents (92,654), deaths (28,727) and injuries (87,489) have taken place at uncontrolled crossing places in the year 2019.

Ongoing Construction Works. Ongoing road and other construction works on or astride the road result in availability of restricted space to the road user. Improper road markings, lack of traffic control etc at such sites further complicates the safety environment around these construction sites.

Speed Breakers. Presence or absence of speed breakers are amongst a major cause of road accidents. Incorrect location, poor construction and possibility to avoid the speed breaker result in a large number of accidents.

Weather Conditions. Weather impacts not just the road surface condition but also the visibility of the road user thereby increasing chances of road accidents. Heavy rain, dense fog and hail storms reduce visibility and make the road surface slippery thus posing serious risks to the road users.

Poor Lighting. Lack of lighting on roads is a major cause for accidents. Dim lighting, particularly during night and in adverse weather conditions, impinges on visibility and increases the chances of road accidents.

Lack of Adequate Road Signs. Correctly placed road signs are necessary to provide road users with advance warnings wrt road conditions, ongoing works,

road features such as turns and sharp bends etc. Absence of such road signs results in the road users being unaware of the requirement of reducing speed or taking additional care in driving.

Sidewalks. Constructed for use by pedestrians, poor maintenance and encroachment by residents and street vendors has resulted in the sidewalks not being available for pedestrian use who then move on the roads thereby becoming vulnerable to accidents.

Neighbourhood Environment. Residential, institutional and market/commercial areas tend to have higher amounts of traffic congestion and are therefore more prone to road accidents. However, the data received showed larger share of accidents and persons killed in open areas in both 2018 and 2019, perhaps as open areas have lower enforcement presence and may be prone to driving and traffic rule violations.

Accidents on Account of Human Factors

Violation of Traffic Rules. Overspeeding remains the major cause of road accidents in the country with almost 71% (3,19,028) accidents in 2019 occurring due to high speeds and resulting in the death of 1,01,723 (67.3% of total deaths) persons while causing injuries to another 3,26,850 (72.4% of total injuries) individuals. Lane indiscipline was the next major human factor accounting for 5.4% (27,431) of road accidents, 6.1% (9,201) of total deaths and 5.5% (24,628) of total injuries. Balance violations like drunk driving, jumping of traffic signal and use of mobile phones together accounted for 6% of total accidents and 8% of total deaths although these factors have shown an increase in 2019 from the corresponding figures of 2018 highlighting the need for stricter enforcement measures. Traffic accidents, deaths and injuries on account of other causes such as road environment, vehicular condition etc accounted for 17-18% of the total figures with the figures for 2019 showing a substantial reduction as compared to those caused by human factors.

Invalid Driving License. Vehicles driven by untrained and unqualified drivers are a serious traffic hazard and can cause accidents, death and injuries. Though the problem is basically an enforcement issue, it must also be addressed with better facilities and opportunities for training/skilling and evaluation/ testing. While the number of accidents by owner's with valid/ learner's license has shown a decline, the corresponding figure for individuals without a license has shown an increase from 8% in 2018 to 9.9% in 2019 despite a decrease from 2017 (10.4%).

Non-Use of Safety Devices – Helmets and Seat Belts. While safety devices such as helmets and seat belts do not cause accidents by themselves, they are instrumental in reducing the number of fatal and grievous injuries. 29.82% (44,666) of the total road accident related fatalities in 2019 were on account of the driver/passenger not wearing safety helmets and indicates a callous attitude amongst the population as well as inadequate enforcement measures.

Triple Riding. This is a major factor accounting for the large number of two wheeler accidents. Besides being illegal, triple riding amounts to contributory negligence as it renders the vehicle unstable and more accident prone.

Distracted Driving. A distracted driver is a motorist who diverts his or her attention from the road, usually to talk on a cell phone, talk to the passengers, send a text message or eat food or even applying makeup. Distracted driving is especially dangerous because, unlike cases of drunk driving which usually occur at night, automobile accidents caused by distracted drivers can occur at any time of the day. Teens and young adults tend to engage in cell phone tasks much more frequently, in riskier situations than adults and therefore are more likely to indulge in distracted driving.

Negligent Parking. Vehicles are usually parked negligently on the side of the roads without any kind of warning or reflectors thus causing inconvenience for the easy plying of other vehicles. Also, the vehicle which break down are also left unattended / carelessly parked leading to accidents, fatalities and injuries.

Not Crossing Roads at Pedestrian Crossings. The high quantum of fatalities and injuries to pedestrians are on account of non-use of designated crossing places along the roads.

Road Rage. Road rage is aggressive behaviour by a motorist towards other road users. This behaviour includes rude gestures, verbal insults, physical threats or dangerous driving methods targeted toward another driver in an effort to intimidate or release frustration. Road rage can lead to assaults and collisions that result in serious physical injuries or even death.

Overloading/ Overcrowding of Passenger Vehicles. Overloaded luggage and passengers beyond the mandated capacity of the vehicle are also reasons that lead to road accidents and cause fatalities and injuries. Such overloading/ overcrowding disturbs the centre of gravity of the vehicle and causes accidents due to loss of balance. Hindrance to the driver's view of the rear is also a result of overloaded passenger vehicles.

Improper Use of Headlights. High-beam from headlights, particularly used during low visibility, is one of the causes of traffic accidents at night. Though the high-beam lights in cars are prohibited within city limits, people continue to use them even when not required.

Accidents on Account of Vehicular Factors

Accidents in Over-Age Vehicles. Old vehicles are relatively more prone to breakdown and malfunction and therefore require greater care and maintenance on the part of the owner. A study of the data for 2019 reveals that vehicles in the

10-15 year age range accounted for 12.5% of total accidents and 12.6% of total deaths while those above 15 years of age were involved in 11% accidents and 12.3% deaths.

Overloading. Overloaded vehicles, those with improperly secured loads and vehicles with loads protruding beyond their body structure pose a serious hazards to themselves as well as other road users. Overloaded trucks can be the cause of accidents on account of various effects of the excess load which include bursting of tyres due to excess weight, wearing out of brakes due to excessive friction, road collapse due to extra weight, overturning/ roll-over of the vehicle due to shifting of the centre of gravity and increase/ decrease of speed/ momentum while going downhill/ uphill due to the excessive load. 7.9% of the total accidents, 9.5% of deaths and 8.2% of injuries in 2019 were attributable to overloaded vehicles.

A study and listing of the causes of accidents in India indicate that the reasons for the large numbers fall primarily in two categories namely road conditions/ features and human factors. Even the aspect of road environment/ features is finally influenced by human factors in terms of the road user's adherence to laws, level of awareness and alertness etc. Mitigatory steps therefore have to address the human factor to a much greater level while simultaneously ensuring that contributory factors in terms of suitability of the roads are also taken care off with the seriousness they require.

RECOMMENDATIONS

Most of the causative factors are indicative of the fact that the road accidents in India are caused due to either road environment related issues or due to human factors. Accordingly, the recommendations have been limited to addressing these factors through incorporating certain corrective measures in the construction norms for BRO roads as also proposing measures towards improving road safety awareness amongst the road users.

Recommendations Relating to Road Environment/ Features.

Road Safety Measures. The roads constructed by BRO fall in mountainous and hilly areas which are also prone to landslides, snowfall, avalanches etc and therefore provision of protective measures such as crash barriers, parapets etc must be a compulsory requirement for all new roads being constructed as also for existing roads where these measures are currently lacking.

Lighting Provision. Street lighting on identified dark stretches must be ensured as part of jobs subject to security considerations of the armed forces. Use of solar powered street lights where feasible may be considered where feasible.

Weather Proof Roads. The riding surface must be so designed that it mitigates the weather related problems a road user is likely to face. Anti-skid surface in areas

of heavy rainfall and snowfall must be catered for even at greater costs than the current specifications.

Provision of Road Safety Mirrors. Provision of large mirrors on sharp curves, blind turns etc must be ensured for better safety.

Accident Audit. A six monthly audit of all roads must be undertaken to identify accident prone zones and ensure provisioning of adequate warning signages.

Signages and Safety Slogans. BRO has been appreciated by the Hon'ble Prime Minister for the innovative and practical road safety slogans on its roads. These must be further improved upon and prominent signboards including, digital ones, displaying road safety slogans must be placed all along the road.

Road Illumination. Extensive use of fluorescent paint for road marking, use of cats eyes etc must be ensured to complement or offset street lighting limitations.

Avalanche/ Slide Protection. Identification of avalanche and landslide zones and construction of protective structures to mitigate their damaging effect must be undertaken through careful scientific study of the terrain and weather. Provisioning of such structures.

Rest Shelters. Provision of suitable shelters as rest locations at carefully chosen places along the road to avoid fatigue to drivers must be catered for since BRO roads are in remote areas and lack adequate infrastructure for such purposes. Such structures can also be created in conjunction with the local state authorities.

Revision of Road Construction Norms. Areas identified as accident prone can be provided with greater road width including surface width in addition to protective structures to reduce the probability of accidents. As far as possible sharp curves and steep gradients be avoided and provisioning of tunnels may be examined to obviate requirement of multiple zigs and steep gradient.

Recommendations Relating to Addressing Human Factors.

BRO Unit Locations to Serve as Road Safety Awareness Hubs. The various detachments located astride the BRO roads can be developed as road safety awareness hubs through placement of large signboards, posters and information boards to make the road users aware of legal and safety requirements.

Road Safety Awareness Campaigns. Road Safety Awareness camps involving road side interaction with road users, visits to population hubs, talks to local taxi and commercial vehicle drivers through the local police/ administration etc are some measures that can be adopted by the BRO units to spread the message of road safety.

Interaction with Schools and Colleges. Regular talks in schools and colleges on road safety awareness issues must be conducted to target school and college children.

Road Safety Cards. All BRO vehicles must be provided with Road Safety Cards which include Do's & Don'ts that need to be adhered to. Placement of such cards in BRO guest rooms at all levels is also recommended.

Demonstrated Adherence to Road Safety Norms. BRO vehicles and work sites must ensure that precautions being taken for road safety are visible to other road users to serve as an example and source of motivation/ encouragement.

Harnessing Social Media. BRO Social Media handles must be extensively utilised to spread the message of Road Safety Awareness. All measures being taken in this regard must be shared through Social Media for a wider reach.

Road Safety Marathon. A run for spreading awareness may be conducted under the aegis of various Projects in conjunction with local State Govt officials. The culmination venue can be used to showcase road safety awareness messages, rules and legal provisions with respect to road safety and accident prevention etc.

Road Safety Seminars. Seminars at local level with an aim to spread awareness and address local issues may be organised by BRO Projects in conjunction with State Transport and Police departments. Multi-agency seminars under the aegis of CoERSA at national and state levels must also be conducted to achieve the aim of reducing the number of accidents.

Road Safety Mela. Conduct of such melas for locals and tourists in important population centres and tourist destinations may be planned. Incorporation of local Transport and Police officials must be ensured for better impact.

Conclusion

Road accidents have become a leading cause for fatalities and injuries globally with India being the leading country in this regards. The huge loss of life and attendant economic losses are highly avoidable and require urgent measures to be adopted for effective mitigation. The BRO, as a premier road construction agency, is responsible to ensure that road safety provisions on all its roads are made to international standards and are aligned towards not just reducing accidents but also preventing them altogether. Spreading awareness on the aspects of road accidents and road safety requirements must become a key agenda for the BRO thereby enhancing the scope of the organisation's contribution to Nation Building.