

Road Accidents: Public Policy and Ground Realities

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Abstract

Road transport plays a vital role in driving economic integration, labour mobility, and regional development in modern economies. In India, rapid motorization and infrastructure growth have greatly improved connectivity, but these advances have also led to a significant increase in road traffic injuries and deaths. India now reports one of the highest numbers of road crash fatalities worldwide, disproportionately affecting people aged 18–45, who are economically active. Recent data shows a continuing rise in accidents, deaths, and injuries, highlighting systemic issues in enforcement, infrastructure design, vehicle safety standards, and post-crash response systems. This study examines the scale, underlying causes, and multidimensional impacts of road accidents in India, situating the problem within broader public health and governance frameworks. It analyses systemic risk factors including overspeeding, behavioural non-compliance, infrastructure vulnerabilities, fragmented institutional coordination, and enforcement limitations. The paper further evaluates India's evolving road safety initiatives, encompassing legislative reforms, technology-enabled enforcement, engineering interventions, digital data systems, and emergency response strengthening. By adopting a comprehensive perspective grounded in the Safe System approach, the study highlights the need for integrated, data-driven, and accountability-oriented strategies to achieve sustainable reductions in road traffic mortality and injury burden.

Keywords: Road Accidents, Road Safety, fatalities, institutional issues, etc.

1. Introduction

Road transport constitutes a foundational pillar of economic growth, labour mobility, and spatial integration within modern economies. Efficient road networks facilitate trade, access to education and healthcare, and regional development. However, the expansion of motorised mobility has been accompanied by a significant public health burden. Road traffic injuries are now widely recognised as a major cause of premature mortality and long-term disability globally. According to the World Health Organization (2018), road crashes account for approximately 1.19 million deaths annually and rank among the leading causes of death, particularly for individuals aged 5–29 years. The burden is disproportionately concentrated in low- and middle-income countries, which account for over 90% of global fatalities despite possessing roughly 60% of the world's registered vehicles. Over the past three decades, rapid urbanisation and economic expansion have fundamentally reshaped India's transport landscape. The country now possesses one of the

largest road networks globally, extending over 6 million kilometres and connecting diverse geographic regions and populations. However, the sharp rise in motorisation and personal vehicle ownership has significantly intensified traffic exposure and roadway risk. Despite progressive legislative reforms and infrastructure expansion, accident-related fatalities have continued to increase. In absolute terms, India records the highest number of road traffic deaths worldwide, and its fatality rates remain substantially higher than those observed in many technologically advanced and better-regulated transport systems. As reported by the Ministry of Road Transport and Highways (2023), States and Union Territories recorded 4,61,312 road accidents in 2022, resulting in 1,68,491 fatalities and 4,43,366 injuries. Compared with the preceding year, this reflects a rise of 11.9% in total accidents, 9.4% in deaths, and 15.3% in reported injuries. The upward trajectory persisted in 2023, with more than 4.80 lakh road crashes and over 1.72 lakh fatalities nationwide. On a daily basis, this translates to approximately 1,317 accidents

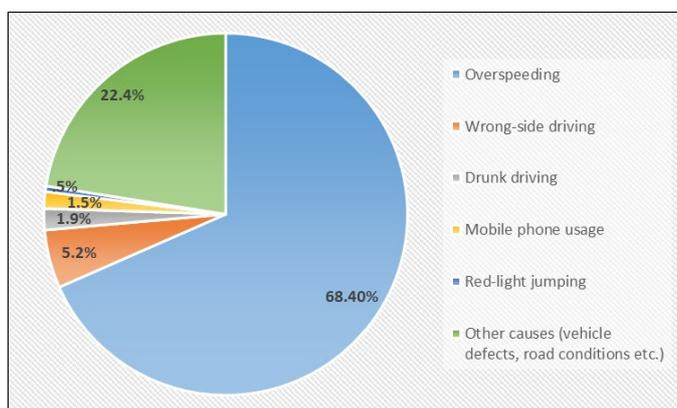
and 474 deaths—nearly 55 crashes and 20 fatalities every hour. A substantial proportion of victims fall within the 18–45 age bracket, the economically productive segment of the population, amplifying the long-term socio-economic repercussions for households and the national economy.

Over time, India's road safety situation has deteriorated rather than stabilized. During the past two decades, crash-related mortality has risen sharply, with fatalities increasing by more than 80% between 2005 and 2023, even though the overall growth in reported accidents has been comparatively moderate. Preliminary estimates for 2024 indicate that the country remains off track in achieving road safety targets, with approximately 1.77 lakh deaths—slightly exceeding the previous year's figures.

A structural imbalance is evident in the distribution of fatalities. National highways, which comprise roughly 2% of the total road network, account for more than 30% of total road deaths, highlighting the heightened risk associated with high-speed corridors. Disaggregated data further shows that vulnerable road users bear a disproportionate burden. In 2022, two-wheeler riders constituted about 44.5% of total fatalities, while pedestrians represented nearly 19.5%. Alarming, a significant number of minors also lose their lives each year in traffic-related incidents.

2. Root Causes of Road Accidents in India

Road crashes in India cannot be reduced to isolated acts of driver negligence; rather, they reflect systemic vulnerabilities embedded within transport governance, infrastructure planning, behavioural norms, and enforcement architecture. Contemporary safety scholarship recognises accidents as multi-causal events shaped by interactions among human error, vehicle condition, road environment, and institutional regulation. Structural weaknesses—such as unsafe intersection design, inadequate pedestrian infrastructure, insufficient illumination, substandard road geometry, and lack of protective barriers—intensify crash severity.



Source: “Road Accidents in India 2023” Report of Road Transport and Highways (MoRTH)

Graph 1: Causes of Road Accidents in India

The Safe System approach, articulated within Sweden's Vision Zero model (Belin *et al.*, 2012), reframes responsibility by acknowledging that human error is inevitable and that transport systems must therefore be engineered to prevent fatal outcomes. Empirical research demonstrates that improvements in road design and enforcement reliability significantly reduce mortality (Peden *et al.*, 2004).

Overspeeding and Risk Amplification: Official data consistently identifies excessive speed as the dominant

contributor to fatal crashes (MoRTH, 2023). Nilsson's Power Model (Nilsson, 2004) establishes a nonlinear relationship between speed and fatalities, indicating that marginal increases in average speed produce disproportionately higher mortality rates. This theoretical insight is particularly relevant for high-speed national highways, where fatality concentration is significant.

Behaviour Deteriments: Traffic non-compliance—including helmet non-use, seatbelt neglect, distracted driving, and risky overtaking—remains widespread. Research confirms that protective device non-usage significantly elevates injury severity (Elvik and Vaa, 2004). From a deterrence perspective, behaviour responds not only to statutory penalties but to the perceived certainty of enforcement (Becker, 1968), underscoring the importance of consistent monitoring mechanisms.

Infrastructure Deficiencies: Infrastructure design remains uneven, particularly in urban and peri-urban corridors. Inadequate pedestrian crossings, poor signage, insufficient lighting, and hazardous curve alignments increase exposure to severe collisions. Studies of Indian mixed-traffic conditions demonstrate that infrastructure often prioritizes vehicular throughput over user safety, disproportionately affecting pedestrians and cyclists (Tiwari *et al.*, 2011)

Many roads suffer from “black spots” like 35 kms stretch between Ramgarh and Ranchi, the Nathula pass of Sikkim, way to Venkatesh Mandir on the mountains of Tirumala, the Jojila pass between Srinagar and Leh, and many other such identified spots.

Governance-related Issues: In India, road safety governance is dispersed across multiple institutions, including the Central Government, state transport departments, traffic police authorities, the National Highways Authority of India, the judiciary, and municipal bodies. This fragmented structure often leads to jurisdictional overlap, limited inter-agency coordination, inadequate data sharing, diffused accountability, and inconsistent policy implementation, thereby reducing the overall effectiveness and coherence of road safety interventions across regions.

Enforcement Gaps: Enforcement gaps remain a critical weakness in India's road safety framework. Weak and inconsistent implementation of traffic regulations allows violations such as drunk driving, mobile phone usage while driving, speeding, and underage driving to persist with limited deterrence. Low conviction rates, procedural delays, and inadequate follow-up further reduce accountability. Additionally, instances of corruption and informal on-the-spot settlements undermine the credibility of enforcement mechanisms. Inconsistent application of amended penalties across states also weakens the intended deterrent effect of strengthened traffic laws.

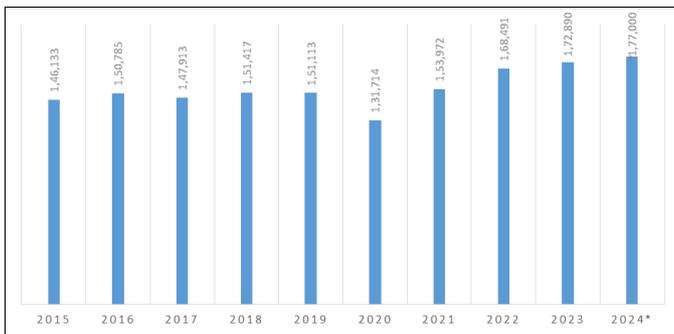
Vehicle-related Factors: Rising road fatalities linked to vehicle-related factors reflect systemic weaknesses in maintenance, regulation, and safety standards. Poor vehicle upkeep, worn-out tyres, brake failures, and malfunctioning lights significantly increase crash risk. Weak enforcement of periodic fitness inspections allows mechanically unfit vehicles to operate on public roads. Overloaded commercial vehicles compromise stability and braking efficiency, leading to severe accidents. Additionally, inadequate safety features in lower-cost vehicles, such as limited structural reinforcement and absence of advanced safety systems, contribute to higher fatality rates during collisions.

Post-crash Care Gaps: Post-crash care gaps significantly increase road accident mortality in India. The absence of

adequately equipped trauma centres in rural regions delays critical treatment during the golden hour. Slow ambulance response times further reduce survival chances. Additionally, public hesitation to assist victims-often due to fear of legal complications-limits immediate emergency support.

3. Impact of Road Accidents

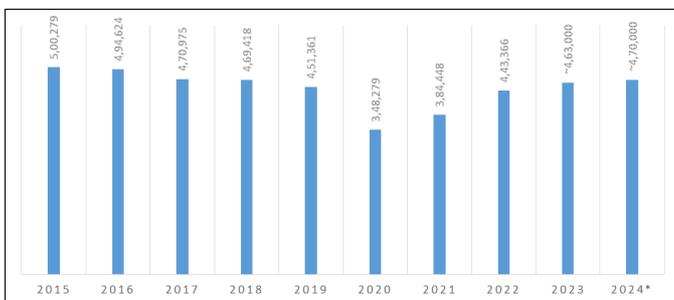
Loss of Human Life: Road accidents result in a substantial number of preventable deaths each year, particularly among individuals in the 18–45 age group. The loss of young and economically active citizens not only devastates families emotionally but also weakens the nation’s human capital base, affecting long-term demographic and economic stability.



Source: Reports of the Ministry of Road Transport and Highways (MoRTH). *2024 are estimated figures based on government reports.

Graph 2: Road Accident Deaths in India (2015–2024)

Serious Injuries and Disability: Beyond fatalities, road crashes cause severe injuries such as spinal cord damage, head trauma, and permanent disabilities. Survivors often require prolonged medical treatment, rehabilitation, and psychological support. Many are unable to return to work, leading to reduced earning capacity and long-term dependency on family members or social assistance.



Source: Reports of the Ministry of Road Transport and Highways (MoRTH). *2024 are estimated figures based on government reports.

Graph 3: Injuries and Disability (Persons Injured) in Road Accidents in India (2015–2024)

Economic Burden: Road accidents generate substantial financial losses for the Indian economy through direct and indirect costs, including emergency medical treatment, hospitalization, long-term disability care, vehicle repairs, property damage, insurance claims, and legal expenses. Beyond the immediate human suffering, traffic crashes represent a significant macroeconomic burden by reducing workforce productivity and increasing public health expenditure. According to the World Bank (2019), the overall economic cost of road accidents in India is estimated to range between 3–5% of GDP annually. Such losses divert critical financial resources away from developmental investments, thereby constraining economic growth and social welfare advancement.

Household Vulnerability: When the primary earning member of a family is killed or permanently disabled, households face sudden income shocks. This may result in debt accumulation, sale of assets, withdrawal of children from school, and long-term poverty. Road accidents thus contribute to intergenerational socioeconomic instability.

Public Health Pressure: High accident rates place significant strain on hospitals, trauma centres, and emergency medical services. Overcrowding in emergency wards, shortage of trained trauma specialists, and resource diversion from other health needs reduce overall healthcare system efficiency and preparedness.

Social Consequences: Road accidents often leave families emotionally shattered. Children may lose parental support, leading to psychological trauma and disrupted education. Widows and elderly dependents may face social insecurity. Communities also experience reduced social cohesion due to repeated incidents and unsafe environments.

Infrastructure Damage: Crashes frequently damage roads, traffic signals, guardrails, and public utilities. Repairing such infrastructure requires additional government expenditure and can disrupt traffic flow. Damage to private property and commercial vehicles further increases financial losses at both individual and institutional levels.

Governance Costs: Governments incur substantial expenses related to law enforcement, judicial processing, compensation schemes, and rehabilitation programmes. Administrative resources are diverted toward accident management, reducing efficiency in other governance functions and increasing fiscal pressure on public institutions.

4. Road Safety Initiatives in India

Given the substantial number of fatalities resulting from road traffic accidents, several countries such as Sweden, United Kingdom, and Japan have implemented comprehensive road safety frameworks that have significantly lowered mortality rates over time. These initiatives include stringent enforcement of traffic laws, widespread deployment of automated speed detection systems, establishment of centralized road safety authorities, and cultivation of a strong culture of public compliance. Their long-term, systematic approach has produced measurable reductions in crash-related deaths. India has begun adopting similar measures; however, sustained political commitment, institutional accountability, and consistent enforcement are essential to achieving comparable improvements in road safety outcomes.

12 Global Road Safety Performance targets followed by Member States on request of the United Nations General Assembly, on 22 November, 2017

- **Target 1:** By 2020, all countries establish a comprehensive multispectral national road safety action plan with time-bound targets.
- **Target 2:** By 2030, all countries accede to one or more of the core road safety-related UN legal instruments.
- **Target 3:** By 2030, all new roads achieve technical standards for all road users that take into account road safety, or meet a three-star rating or better.
- **Target 4:** By 2030, more than 75% of travel on existing roads is on roads that meet technical standards for all road users that take into account road safety.
- **Target 5:** By 2030, 100% of new and used vehicles meet high quality safety standards, such as the recommended priority UN Regulations, Global Technical Regulations, or equivalent recognized national performance requirements.

- **Target 6:** By 2030, halve the proportion of vehicles travelling over the posted speed limit and achieve a reduction in speed-related injuries and fatalities.
- **Target 7:** By 2030, increase the proportion of motorcycle riders correctly using standard helmets to close to 100%.
- **Target 8:** By 2030, increase the proportion of motor vehicle occupants using safety belts or standard child restraint systems to close to 100%.
- **Target 9:** By 2030, halve the number of road traffic injuries and fatalities related to drivers using alcohol, and/or achieve a reduction in those related to other psychoactive substances.
- **Target 10:** By 2030, all countries have national laws to restrict or prohibit the use of mobile phones while driving.
- **Target 11:** By 2030, all countries to enact regulation for driving time and rest periods for professional drivers, and/or accede to international/regional regulation in this area.
- **Target 12:** By 2030, all countries establish and achieve national targets in order to minimize the time interval between road traffic crash and the provision of first professional emergency care.

Policy and Legal Framework for Road Safety: India’s road safety governance rests upon a legislative and institutional framework that has evolved in response to rising traffic mortality. The Motor Vehicles Act, 1988 provides the foundational regulatory structure governing licensing, vehicle registration, insurance compliance, and traffic enforcement. The Motor Vehicles (Amendment) Act, 2019 introduced substantially enhanced penalties, expanded provisions for electronic enforcement, formalized Good Samaritan protections, and strengthened regulatory oversight mechanisms through proposed road safety boards. At the strategic level, the National Road Safety Policy (2010) articulates a preventive orientation emphasizing safer infrastructure, public education, enforcement modernization, and improved post-crash response systems. Current policy direction also supports digital integration of crash databases, systematic identification of high-risk road segments, and wider adoption of Intelligent Transport Systems. India’s commitments align with international road safety targets under the Brasilia Declaration and the UN Decade of Action framework, reflecting convergence with global best practices.

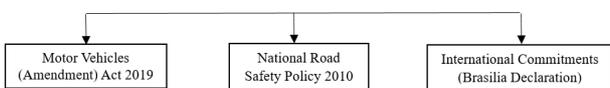


Chart 1: Policy & Legal Initiatives

Infrastructure Upgrades: India’s contemporary road safety strategy increasingly emphasizes engineering-based risk mitigation combined with data-informed planning. The Ministry of Road Transport and Highways has expanded the deployment of Intelligent Transport Systems (ITS), including adaptive signal control, automated speed detection, red-light violation systems, and centralized traffic management centres in metropolitan regions.

The Integrated Road Accident Database (IRAD) facilitates standardized digital recording of crash information from police, medical, and transport authorities, enabling evidence-based prioritization of interventions. FASTag toll analytics and Geographic Information Systems are further utilized to identify traffic flow irregularities and high-fatality corridors requiring targeted engineering correction.

Parallel to digital initiatives, highway modernization programs implemented by the National Highways Authority of India incorporate structured safety audits, improved geometric design, reflective signage, crash barriers, rumble strips, enhanced illumination, and scientifically designed lane demarcation. Pedestrian overpasses, service lanes, grade separators, and non-motorised transport provisions are gradually being integrated into high-density corridors. Mandatory safety audits at planning, construction, and operational stages reinforce compliance and accountability.

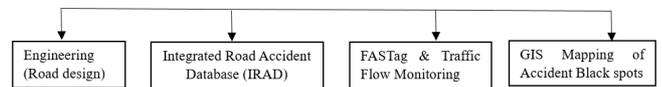


Chart 2: Infrastructure and Data Analytics

Collectively, these measures represent a transition toward a systemic safety model in which infrastructure is proactively designed to reduce crash probability and limit injury severity rather than responding only after fatalities occur. Empirical evidence supports the effectiveness of automated speed enforcement in lowering crash severity (Elvik, 2015).

Enforcement through Technology: Technology-enabled enforcement has emerged as a critical instrument in strengthening compliance and reducing discretionary inconsistencies in traffic regulation. Digital systems such as e-Challan platforms enable real-time issuance of penalties linked to centralized databases, thereby enhancing transparency and reducing informal settlements.

Automated monitoring tools-including speed cameras, red-light detection systems, and Automatic Number Plate Recognition (ANPR) technologies-provide continuous surveillance across high-risk corridors. Integrated command-and-control centres analyze traffic flow patterns and violation data through Intelligent Transport Systems infrastructure.

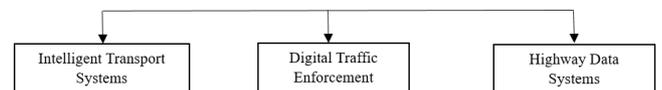


Chart 3: Technology for Road Safety

The 2019 legislative amendments facilitate electronic documentation and monitoring of offences, promoting uniformity in penalty enforcement. FASTag data analytics also support traffic monitoring across national highways. By shifting enforcement from sporadic manual checks to structured digital oversight, the regulatory system seeks to increase deterrence certainty and institutional accountability.

Public Awareness Campaigns: Numerous road safety advocacy organisations, along with coordinated government awareness campaigns such as #WearHelmet and #BuckleUp, are actively working to influence public behaviour and reshape social attitudes toward responsible driving. While structural reforms and institutional enforcement remain critical, behavioural change at the individual level is equally important in reducing accidents. Road users must be aware and strictly adhere to posted speed limits, consistently use helmets and seat belts, and avoid mobile phone usage while driving. Driving under the influence of alcohol or drugs must be strictly avoided. Respect for lane discipline, traffic signals, and road signage is essential. Regular vehicle maintenance-including brakes, tyres, and lighting systems-also enhances safety.

Autonomous and Connected Vehicles: Although fully autonomous vehicles face operational challenges in India's heterogeneous and unpredictable traffic environment, advanced driver-assistance systems offer practical safety benefits. Technologies such as automatic emergency braking, lane-keeping assistance, adaptive cruise control, and collision warning systems can substantially reduce human error, thereby lowering crash risk and improving overall road safety outcomes.

Emergency Response: Strengthening emergency response mechanisms is essential for reducing road accident fatalities. Enhancing trauma care infrastructure, ensuring timely access to well-equipped hospitals, and implementing rapid incident reporting systems can significantly improve survival rates. Coordinated ambulance networks, supported by GPS tracking and centralized control systems, help reduce response time during the critical golden hour. Rah-veer scheme of MoRTH, which rewards Rs. 25000/- for helping victims, is one such initiative implemented in Delhi to encourage citizens to support seriously injured victims of road accident and help them reach the hospital within 60 minutes to increase their chances of survival. Efficient post-crash management directly contributes to lowering mortality and long-term disability.

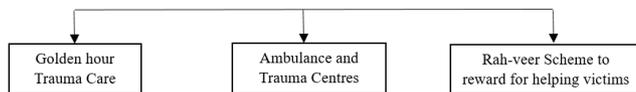


Chart 4: Post-crash Response System

Conclusion

Road accidents in India represent a complex and enduring public policy challenge with far-reaching human, social, and economic consequences. Despite legislative reforms, infrastructure modernization, and technological advancements in enforcement, the scale of fatalities and injuries remains alarmingly high. The concentration of deaths among young and economically productive individuals intensifies long-term socioeconomic repercussions, weakening household stability and national productivity.

The persistence of high mortality levels underscores systemic gaps in governance coordination, behavioural compliance, infrastructure safety design, and post-crash care delivery. Addressing these shortcomings requires a shift from reactive, incident-based responses to a preventive and system-oriented model of road safety management. Stronger and more consistent enforcement, supported by digital surveillance and centralized data integration, is essential to enhance deterrence and institutional credibility. Infrastructure planning must prioritize safety-sensitive engineering solutions, particularly for vulnerable road users.

Equally important is the cultivation of responsible road behaviour through sustained public education and cultural change. Strengthened trauma care systems and rapid emergency response mechanisms can further reduce preventable deaths. Ultimately, achieving meaningful and sustained reductions in road traffic mortality in India demands coordinated multi-sectoral governance, evidence-based policymaking, and long-term political commitment grounded in the principles of accountability, prevention, and systemic resilience.

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