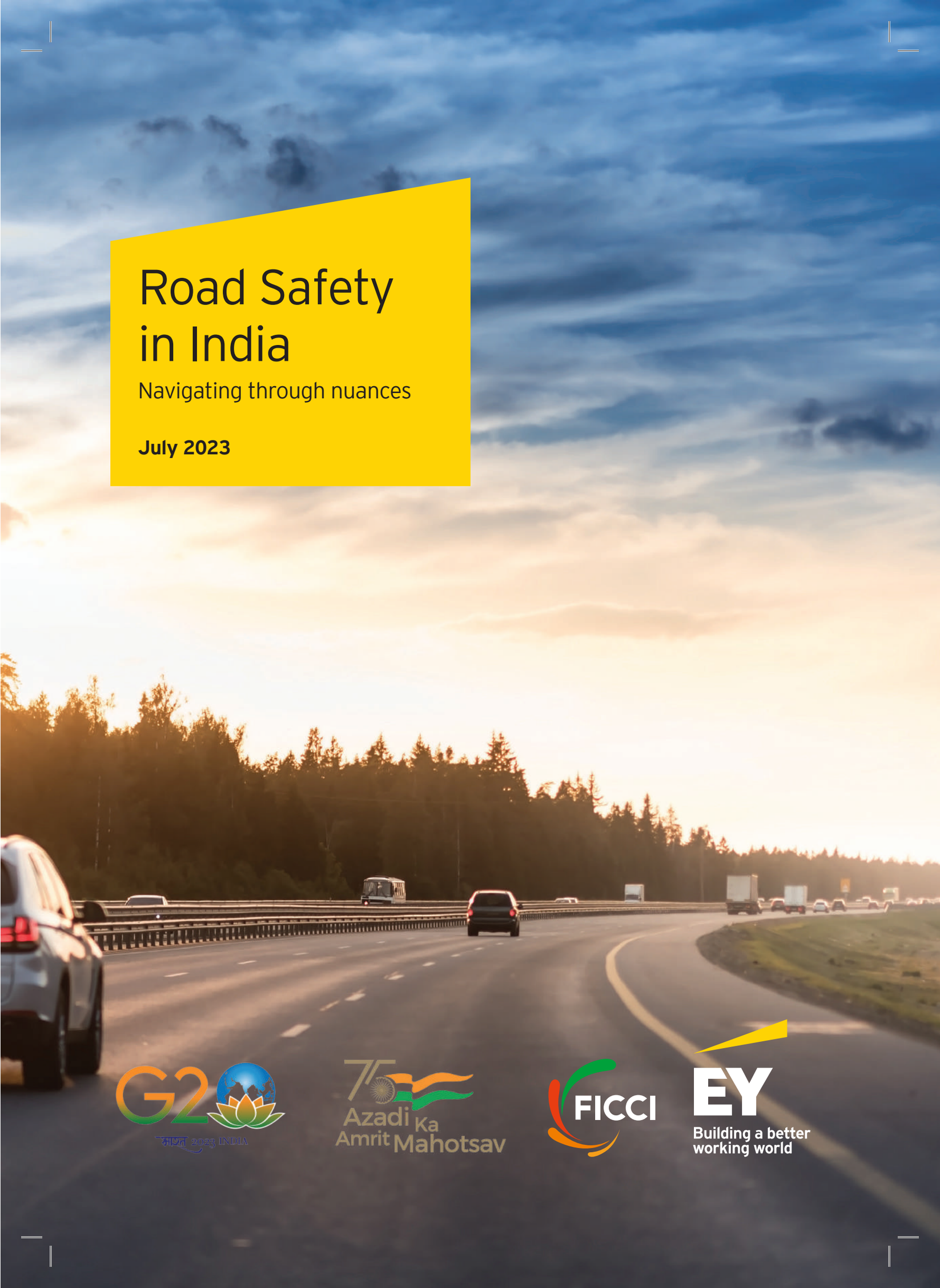
Road Safety in India

Navigating through nuances

July 2023



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Foreword- FICCI

Road traffic injuries and fatalities have continued to grow in India at an alarming rate. In fact, it is the top cause of fatalities for the age group of 5-29 years in India. Converted to monetary terms, losses from road safety incidents is estimated to be around 3% of India's GDP.

Although, it is a global concern, the quantum and complexity of the problem in India is higher compared to other countries. Multiple stakeholders like government, corporates, citizens, media, the automobile industry, the IT industry, logistics and subject matter experts from various fields need to come together to devise appropriate solutions. While the government manages a broad ecosystem, organizations and corporations would also need to incorporate safe road practices in their strategy and ecosystem.

Collaboration of all stakeholders is the key to a fast-track implementation approach. FICCI has been compiling best practices under various categories each year and sharing those case studies for them to get replicated by individuals/ organizations. This report attempts to bring out analytics of data available publicly, and global and Indian best practices, so that various government bodies and private organizations can benefit from them and incorporate these into their policies or guidelines or practices.

As they say, charity begins at home! When every corporates and businesses adopts safe road practices for people in their own ecosystem comprising employees, suppliers and transport operators, others will be inspired to bring change.

Let's #BeTheChange what we want to see on our roads.

#JabHumBadlengeTohDeshBadlega

Mr. Ramashankar Pandey

Chair, FICCI Road Safety Sub-Committee and CEO, TATA Green Batteries

Foreword EY

Road safety has been recognized as one of the serious concerns globally and is at epidemic levels given the number of annual fatalities and grievous injuries caused to the people. Globally, conscious efforts are being made towards reducing the number of fatalities to half in a time bound manner. India too is making steady progress through various initiatives taken up by the Central ministries, state governments and district levels organizations with strong participation from the industry and NGOs.

Given that India is in a hyper growth mode, mobility infrastructure development is a key priority for the government. However, we will need to ensure that road safety is at the center of the mobility infrastructure development initiatives and we lay greater emphasis on embedding road safety by design as the principle. Road safety is not just an engineering problem to solve but needs to be looked at more holistically from the perspective of "Sarkar, Samaj aur Sadak" and bring three most important elements together to solve road safety in a manner that permeates our society to embed road safety as a way of life. We need to bring road safety as a subject very early on in the minds of young population, infrastructure development agencies, society at large and make road safety as a non-negotiable agenda at the highest level of governance. The government is supportive and has put road safety at the centre stage, while making a strong push towards achieving the goal it signed up to at the second high level conference on road safety held in Brazil in 2015, known as the Brasillia Declaration.

This report attempts to discuss the primary causes of road crashes in India, highlights best practices of road safety and picks a few cases of crashes to delve into the reasons for their occurrence. It also discusses a roadmap ahead.

While we focus on building safe mobility infrastructure, technology can play a pivotal role in building mitigation measure to avoid the risks and also to provide adequate responses in the event of accidents or disasters.

Implementing road safety program across diverse stakeholder ecosystem in India including governments, society, infrastructure, industries etc. will require coordinated efforts in multiple directions to ensure that a programmatic approach is adopted to bring enabling policy, adequate funding measures, social outreach programs, industry participation and innovation ecosystem together to bring Samaj Sarkar and Sadak together to solve this problem in a sustainable manner.

Vivek Ogra
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Executive Summary

Road crashes are the 8th leading cause of death globally as per the World Health Organisation (WHO) report published in 2004. Taking cognizance of this, the first Global High-Level Conference on Road Safety was held in Russia and various initiatives were undertaken at the global level by the United Nations. The 2nd Global High-Level Conference on Road Safety was held in Brazil, that declared 2011-2020 as the 1st decade of action for Road Safety. In the Brasillia Declaration, the participating countries set targets under the Sustainable Development Goals and pledged to reduce road crash fatalities by 50% in the next 5 years.

About 93% of these crashes take place in low- or middle-income countries. With 11% share in total fatalities due to road crashes, India ranks 3rd globally for road crashes. India was one of the first few countries to have signed the Brasillia Declaration in 2015 where it pledged to reduce fatalities by 50% by 2020. However, like many other countries India was unable to achieve that target. The country started its own interventions such as formulation of National Road Safety Policy, 2010, and establishing the Supreme Court Committee on Road Safety (SCCoRS) in 2014. However, the complexity and quantum of problems in India is huge. Countries, such as Sweden and Denmark have achieved 50% reduction in their road crashes during the second decade of Road Safety Action (2011-2020). However, the problem in India is larger as compared to those countries.

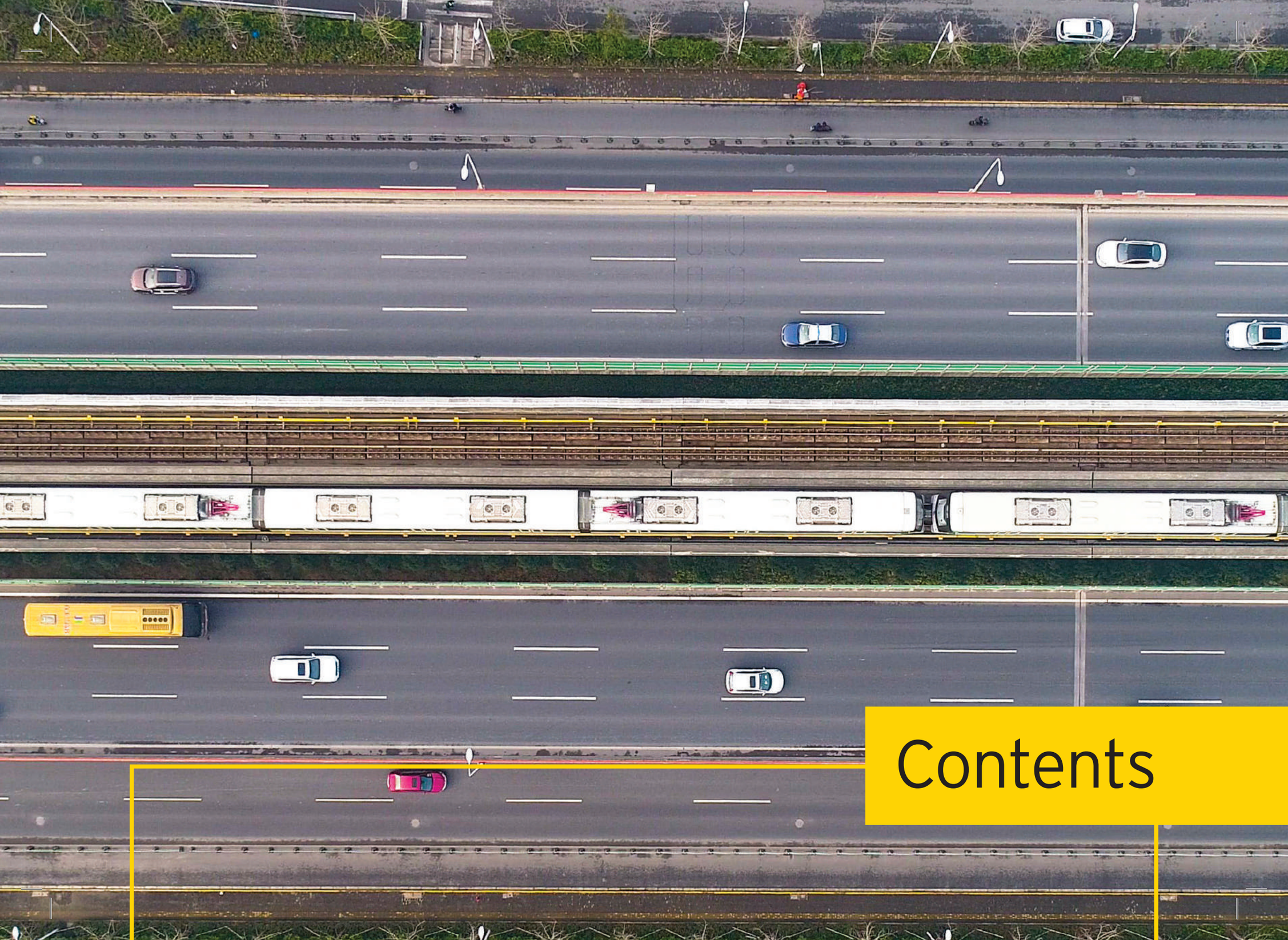
Due to the multipronged nature of road safety, a high level of planning and coordination is required from multiple stakeholder departments. Until a few years back, the only data that was available on road crashes was the First Information Report (FIR), which did not provide any data on road related aspects or detailed cause of crashes or location of crash. In 2021, Ministry of Road Transport and Highways (MoRTH) launched a pilot for digital collection and analysis of detailed data on road crashes which was scaled up in the whole country within a year. Also, SCCoRS issued directives for all states and Union Territories to establish Road Safety Cell/ Authority and separate Road Safety Funds to address road safety concerns systematically.

Data indicates that traffic violations is the cause of road crashes in 90% of incidents in India. Of these, speeding accounts for 70% of the cases. The Accident Severity Index shows that since 2015 fatal road crashes have been on a rise in India. This indicates need of reducing emergency response time and need to focus on enforcement, awareness and sensitization for traffic rule compliance.

Global best practices show that countries that adopted a Systems Approach have been able to achieve their targets of 50% reduction in fatalities or are close to achieving it. Countries like Australia and Sweden have gone beyond the UN Sustainable Development Goals (SDG) 3.6 and dug deep into the issue. India can, therefore, learn from these global best practices.

India has done substantial research on road safety through premiere institutions like Indian Institute of Technology (IITs) and Central Road Research Institute (CRRI).The government can collaborate with these institutes to improve policies and action plans. The researchers are working on developing models that can help government make quick data based decisions customized for different road stretches.

The corporate sector can play a role in helping strengthen road safety by funding research, spreading awareness, making strict health policies for drivers, or provide roadside infrastructure for resting. Moving forward, India may adopt global best practices, and move forward using the 5 pillar approach suggested by the United Nation.



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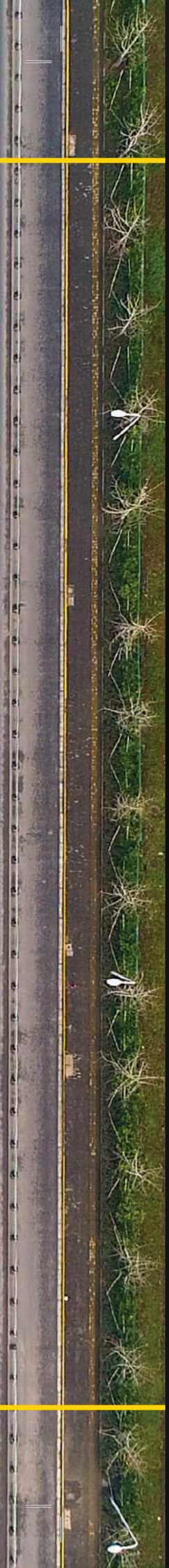


1 Unsafe Roads Carry High Social Costs

1.1 Global scenario

Globally, at least one life is lost every 24 seconds due to road traffic injury. As per WHO, road crash is the 8th leading cause of death, with more than 1.3 million deaths and around 50 million serious injuries. It is also the top leading cause of death amongst youth and kids (age group 5 to 29 years). The scale is that of an epidemic but the resources allocated to mitigate it is way less than other leading causes of deaths like diabetes, heart attacks, etc. in India. The social and economic cost of road crash fatalities and injuries is very high as it affects the most productive age group and the loss is manmade. The money invested in remedial and precautionary measures will be far less than the 'social cost' of road crashes and fatalities.

As of 2016, the fatality rate per lakh population was 18.2 globally, 26.6 in Africa, 20.7 in South-East Asia and the lowest i.e. 9.3 in Europe. It can be observed that the lower and middle income group countries have higher share of crashes fatalities, more than 90%, even though they have lower vehicle population.

High-Income Countries (HICs) have only 7% of crash fatalities when compared globally. However, they face their own set of road safety challenges despite having relatively better infrastructure and resources. Major contributors for road crash fatalities in HICs include distracted driving, speeding and reckless driving, aggressive driving, driving under influence of drugs and alcohol. The share of vulnerable road users in HICs is higher due to aging population. Higher mobility and less congestion gives more scope for speeding and indiscipline which lead to hefty penalties and stricter enforcement.

Low- and Middle-Income Countries (LMICs) face numerous challenges like inadequate road infrastructure, lack of enforcement of traffic laws, poor vehicle safety standards, limited access to emergency medical services, and insufficient road safety awareness and education. LMICs often experience rapid motorization without corresponding improvements in road safety measures, leading to a higher incidence of road traffic crashes and fatalities. Additionally, vulnerable road users, such as pedestrians, cyclists, and motorcyclists, are at increased risk due to limited infrastructure and low compliance with road safety norms. The quantum of loss from road crashes can be as high as 3-5% of their GDP.

Road safety in South Asia is a major concern due to population growth, inadequate infrastructure, and human factors. Governments are focusing on improving infrastructure, raising awareness, and enforcing traffic rules. Efforts include constructing safer roads, conducting awareness campaigns, enhancing driver training, and implementing stricter enforcement. Regional collaboration is vital for sharing best practices and addressing road safety challenges effectively.

Countries like Sweden and Australia have achieved notable success in road safety

3% GDP Loss because of road accidents

The money invested in remedial and precautionary measures will be far less than the 'social cost' of road crashes and fatalities

1.2 Road Safety is a Top Priority for India

1st

Rank in road fatalities is held by India (11% share in world)

2nd

Leading cause of death amongst Indian youth

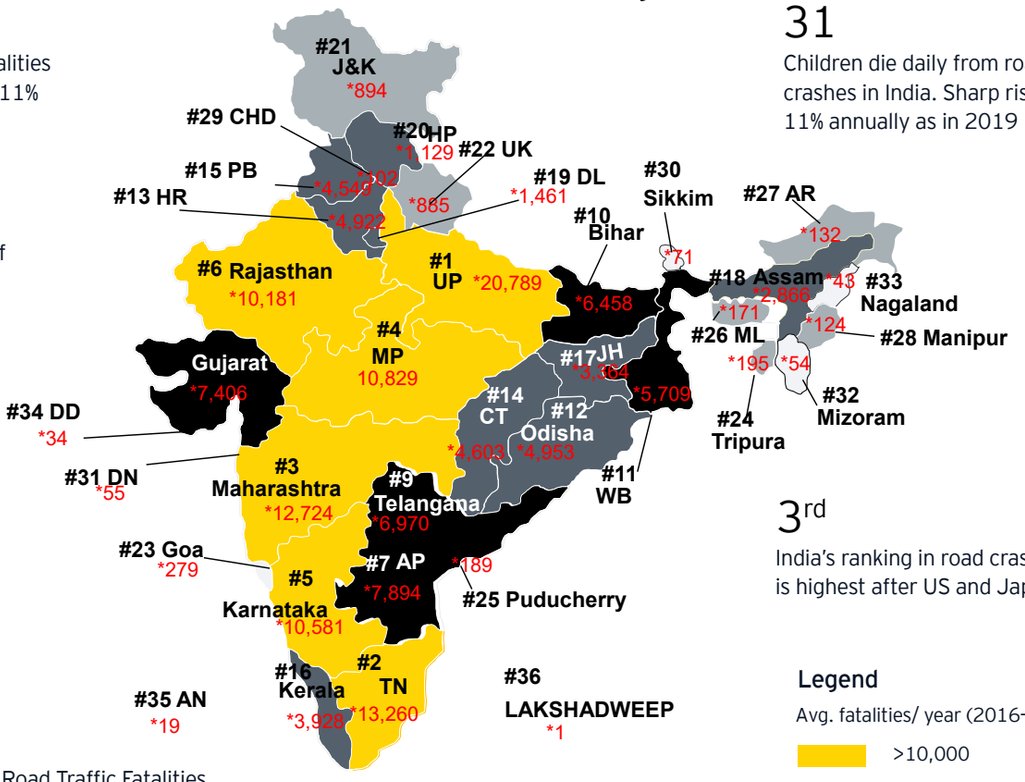
31

Children die daily from road crashes in India. Sharp rise of 11% annually as in 2019

3rd

India's ranking in road crashes is highest after US and Japan

State wise road crash fatalities and ranking in India



Legend

\# Rank as per Road Traffic Fatalities (avg. of 2016-21)

* Road Traffic Fatalities (avg. of 2016-21)

Legend

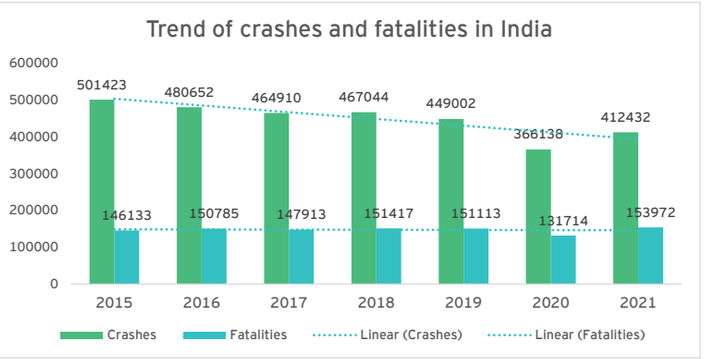
Avg. fatalities/ year (2016-21)

- >10,000
- 5,000-10,000
- 1,000-5,000
- 100-1000
- <100

Source: MoRTH Annual Report 'Road Accidents in India-2021'

Uttar Pradesh, Tamil Nadu (TN) and Maharashtra are the top 3 states if average fatalities of last 6 years (2016-2021) is considered.

There has been some reduction in crashes and fatalities from crashes in India since 2015 as can be seen in the graph. However, the reduction has almost been stagnant since 2015.



Every year India loses 0.15 million lives in road crashes which equals the size of a city like Shimla. Every year globally we lose number of people the size of the population of Estonia. It can also be compared to a jumbo jet crashing in India daily. India signed Brasilia Declaration committing to achieve the Sustainable Development Goal 3.6 i.e.to half the number of global deaths and injuries from road traffic crashes by 2030. India targets achieving the goal through 'The System's Approach' by targeting all the components of road safety rather than having a piece-meal approach.

1.3 India's progress towards road safety improvement

Sustainable Development Goal (SDG) 3.6 has 12 targets related to road safety:

- **SDG 3.6 Target 1:** By 2020 all countries establish a comprehensive multisectoral national road safety action plan with time-bound targets.
- **SDG 3.6 Target 2:** By 2030, all countries accede to one or more of the core road safety- related UN legal instruments.
- **SDG 3.6 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.
- **SDG 3.6 Target 4:** By 2030, more than 75% of travel on existing roads is on that meet technical standards for all road users that take into account road safety.
- **SDG 3.6 Target 5:** By 2030, 100% of new (defined as produced, sold or imported) and used vehicles meet high quality safety standards, such as the recommended priority UN Regulations, Global Technical Regulations, or equivalent recognised national performance requirements.
- **SDG 3.6 Target 6:** By 2030, all countries must have increased funding for road safety, by allocation of adequate financial resources to support road safety initiatives, including investment in infrastructure, capacity building, and public awareness campaigns.
- **SDG 3.6 Target 7:** By 2030, there should be enhancement in road safety data and information by development of comprehensive road safety data systems, including data collection, analysis, and reporting mechanisms, to inform evidence-based policies and interventions.
- **SDG 3.6 Target 8:** By 2030, all countries must have done promotion of research and innovation in road safety with focus on identification of effective interventions, technologies and best practices.
- **SDG 3.6 Target 9:** By 2030, all countries must have addressed needs of vulnerable road users by implementation of measures to protect pedestrians, cyclists, children and older people, by improving their safety in road environments.
- **SDG 3.6 Target 10:** By 2030, all countries must strengthen road safety legislation and enforcement by development of comprehensive road safety laws and regulations, including measures to address speeding, drink-driving, seatbelt and helmet usage, and distracted driving.
- **SDG 3.6 Target 11:** By 2030, all countries to enact regulations for driving time and rest periods for professional drivers, and/or accede to international / regional regulation in the area.
- **SDG 3.6 Target 12:** By 2030, all countries establish and achieve national targets in order to minimise the time interval between road traffic crash and the provision of first professional emergency care.

In alignment to the Sustainable Development Goals and Targets, MoRTH targets reducing fatalities from road crashes in India by 30% by 2028 and achieve Vision 'Zero' by 2050

India's progress with respect to UN SDG 3.6 targets

India has complied to some of these targets while work on others are ongoing. India had published a National Road Safety Policy in 2010. India already has Motor Vehicles Act, 1988. In 2019, an amendment to this Act increased the penalty for various traffic violations. The star rating system in India is comparatively new. States with the help of World Bank are doing pilot projects giving safety ratings to roads.

India already has technical guidelines, that is IRC guidelines for road engineering which they have revised in 2022 in order to bring it at par with global standards.

All states have established Road Safety Funds based on guidelines issued by MoRTH and CoRS. MoRTH is also arranging more funds under various schemes for road safety.

MoRTH conducts road safety data collection through the Integrated Road Accident Database (iRAD) portal. Earlier an FIR at a police station used to be the only source of crash information and the data was mostly irrelevant for analysis. The quality of iRAD data and its completeness is being worked upon.

There is a lot of ongoing research at premiere institutes like IITs as discussed later in this report focusing on road safety related aspects..

1.4 The journey of road safety initiatives

Global Events

2004 - WHO, WB published report on road traffic injury prevention

United Nations has been the nodal body taking some action on road safety improvement globally. Key interventions that made huge impacts have been listed in the figure. Largely the initiatives started after the report published by World Health Organisation (WHO) in 2004 on road traffic injury prevention.

2009 - 1st Global High-Level Conference on Road Safety in Russia

In 2009, the 1st Global High-Level conference on road safety in Russia highlighted the importance of road safety as a public health priority and emphasized the need for collective action to create safer road environments worldwide.

2015 - 2nd Global High-Level Conference on Road Safety in Brazil.

2011-2020 as the 1st decade of action for Road Safety

In 2015, the 2nd Global High-Level Conference on Road Safety was held in Brazil. The main outcome of the Conference was the adoption of the Brasilia Declaration on Road Safety, which is expected to guide action for road safety through the end of the United Nations Decade of Action for Road Safety 2011-2020 and beyond.

2020 - 3rd Global Ministerial Conference on Road Safety, Sweden

3rd Global Ministerial Conference on Road Safety, Sweden resulted in signing the Stockholm Declaration calling for a 50% reduction in fatalities and injuries by 2030 on way to Vision Zero by 2050.

2021-2030 declared as the 2nd Decade of Action for Road Safety.

Indian Events

2010 - National Road Safety Policy India, 2010

The National Road Safety policy emphasized the need for better road infrastructure, stricter enforcement of traffic rules, enhanced emergency medical services, public awareness campaigns, and improved post-crash care.

2014 - Supreme Court Committee on Road Safety (SCCoRS) established

In 2014, the Supreme Court Committee of Road Safety was formulated to address the issue, guide and monitor all states and Union Territories to bring down crash fatalities in the country. Writ petition (C) No, 295 in 2012 was filed by Dr. S. Rajasekran questioning the acute loss of life and limbs due to road crashes he had witnessed as an orthopaedic surgeon and Head of Department of Orthopaedic Surgery, Ganga Hospital, Coimbatore. This resulted in the formulation Supreme Court Committee of Road Safety (SCCoRS).

2015 - India signed Brasilia Declaration

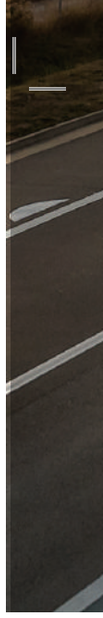
India was one amongst the initial 100+ countries to have signed the Brasilia Declaration in 2015 committing to achieve the Sustainable Development Goal 3.6 i.e.to half the number of global deaths and injuries from road traffic crashes by 2030.

2019 - Motor Vehicles Amendment Act, 2019

The Motor Vehicles Amendment Act, 2019 brought about higher penalties for traffic violations, including speeding, drunk driving, and not wearing helmets or seat belts. It introduced stricter provisions for driving licenses and imposed stricter penalties for offenses by juveniles.

2023 - A steering committee formed to work on e-enforcement uniformity across India

Under the directions of SCCoRS, a steering committee has been established to prepare a concept plan for implementation of a nation-wide roll out of effective e-enforcement



1.4.1 SCCoRS Provides Comprehensive Road Safety Directives

The directives put forth by the Supreme Court Committee on Road Safety were quite comprehensive based on the System's Approach. They ranged from institutional framework to addressing all the 4Es of road safety, i.e. Engineering, Enforcement, Education and Emergency. The directives are as listed below:

Framing of State road safety policy State road safety council Lead agency Road safety fund Road safety action plan Distinct Road safety committee	**Status:** The administrative set up has been established in most states and union territories
Engineering improvement Traffic calming measures Road safety audits – capacity building Engineering designs of new roads and regular road safety audits Working group on engineering	**Status:** This is an ongoing process. The blackspot identification and implementation of short term measures is done by most states. The implementation of long term measures and road safety audits (post construction stage) is not implemented by most states
Driver's Training Lane Driving Road safety equipment Alcohol and road safety Speed Governor Permanent road safety cell Data collection of accidents Global Positioning System	**Status:** MoRTH is funding Driver Training Centres, GPS has been made mandatory in public transport vehicles since 2019, MoRTH issued data collection is now done through iRAD which has been established in all states since 2021. MV Amendment Act 2019 has increased penalty for various traffic violations
Road safety education	**Status:** Most states have added it in the curriculum but quality of design making it age appropriate and interactive needs to be worked upon
Emergency Medical Care Universal accident helpline number	**Status:** 108 Project and 112 have been established and 112

Administrative/ Institutional | Engineering | Enforcement | Education | Emergency Care

2 India faces more complex challenges than other nations

2.1 Quantum of challenges in India are large

Road safety if broken down comprises of 4 E's: Engineering, Enforcement, Education and Emergency Response. Thus, various departments and ministries are working on improvement of road safety. However, the quantum of problem and complexity of problems in India is much higher. Sweden achieved 50% reduction in its fatalities over a period of 6 years, however the comparison of India's quantum of problems is more than 100 times than Sweden.

Profile	Sweden	India compared to Sweden
Population	1.03 Cr	X 139
Road Length (km)	1.4 lakh	X 39
Vehicle Population	65 lakh	X 49
Fatalities	157	X839
Fatalities / lakh population	1.5	x6

4 Es of road safety

Engineering | Enforcement | Education | Emergency Response

India is 139 times the size of countries like Sweden in terms of population and 6 times in terms of fatalities per lakh population. Conducting road safety audit on the world's second largest network of roads (i.e. India), will need humungous resources. Arranging for these resources in a developing country like India is hard.

2.2 Stuck in a vicious cycle, leading to a piece-meal approach

Countries like Sweden, Denmark, New Zealand which have received significant reduction in their road crash fatalities vouch for the 'System's Approach' which is not just a theory anymore. System's Approach in a layman's term would mean that focusing on only 1 or 2 aspects of road safety at a time will never lead to success. Focussing on all four factors related to road safety, namely, engineering, enforcement, education and emergency response at all the three stages of a crash (pre-crash, during crash and post crash) are necessary to stop a crash from happening or to reduce the probability of crash to almost zero.

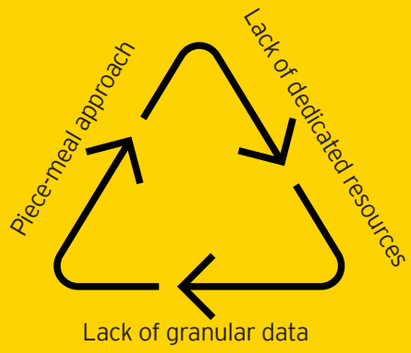
There are inter-department/ intra- department coordination issues and also clarity in designing the solutions is required.

Implementation needs to be carried out across the states in a uniform manner enabled by policies and regulations and technology interventions.

The State road safety agencies have been formed in all States in India based on SCCoRS Guidelines. But mostly they are facing some key challenges:

1. **There is a lack of dedicated resources.** In most cases, road safety is an additional charge for officers. They end up prioritizing their primary responsibilities and road safety comes second.
2. **Lack of data:** Since the officers consider road safety an additional charge, there is less time to fill data, validate it and check the correctness of it.
3. **Piece meal approach:** Since data availability is an issue, the authorities cannot look at comprehensive picture for decision making about a 'System's Approach'.

Because of these issues, road safety lead agencies end up in a vicious cycle.



2.3 How India can make systematic improvements

2.3.1 Data collection and analysis through iRAD

Government of India recognizes the need of data analytics in decision making and has implemented Integrated Road Accident Database (iRAD) in all States. The data is getting captured digitally in addition to FIR data (from police department) for tracking road crashes. The parameters are much detailed and include all information related to driver, vehicle, road and environment. The stakeholder departments like road owning agencies, Police Department, Transport Department, Health Department can download reports, see crash details, and see the data spatially. This was developed by MoRTH along with National Informatics Centre (NIC) and IIT Madras. The newer versions of this that are being updated by NIC will allow features like running queries and drill down in reports as well on maps for better analysis for each department. It will help them in taking key decisions, projecting future needs and in optimum utilization of resources. The district level officers have access to this portal as well. MoRTH and NIC together are trying to resolve the teething issues with this portal like data cleaning and training the officers for filling data more accurately.

2.3.2 Initiatives by various stakeholder ministries in India to improve road safety

E- Enforcement and compliance improvement

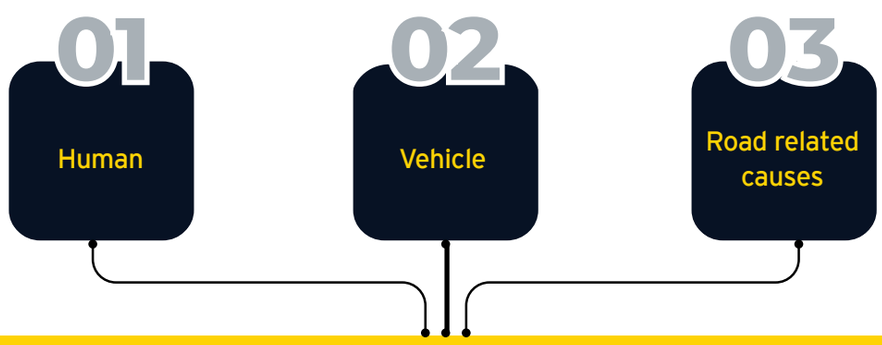
Given the larger population size and density of population in India, the government departments are always overloaded especially the enforcement departments. Thus, manual enforcement is a huge task. Therefore, the government is resorting to technological interventions for enforcement of traffic laws. Multiple Intelligent Traffic Management System (ITMS) projects, speed detection cameras, etc. are being implemented, especially on highways. E-challan portal is implemented in all States.

MoRTH has sanctioned funds for implementation of Automated Driving Test Tracks (ADTT) and Inspection and Certification Centres (I&C Centres) for multiple States in order to remove manual interference in driving license testing and vehicle fitness certifications. This will bring more transparency in the system, digitize the process and increase the difficulty level as well.

MoRTH has also sanctioned funds for Institute of Driver Training and Regulation (IDTR) for better training institutions.

Further, digitization of processes for driving license and vehicle permits through Vaahan and Saarthi portals has increased the compliances the process has become more convenient with minimum need of physically visiting the RTO.

3 Dissecting Crashes in the Indian Context



Generally the cause of a crash could be divided into any of the 3 categories

Human factor

Human related cause could be:

- Illness
- Lack of driving skill
- Indiscipline, traffic violation
- Fatigue
- Road Hypnosis

Some psychological factors that could lead to behaviour causing a crash are also at play. As portrayed in movies and also as per discussions with police and enforcement agencies, one of the problems observed in India is that law breakers are considered 'cool', crashes are considered to be 'destined' and not something that can be avoided by our actions. No tangible benefits perceived by good drivers and drivers losing calm over other driver's fault or due to noise pollution. All these factors may lead the drivers to violate traffic laws.

Socio-economic factors

These issues when bifurcated further reveal that there are socio-economic factors as well which influence the driver behaviour and their reaction time. Fatigue is a human related cause. Many drivers tend to moonlight between jobs for better income, leading to sleep deprivation and fatigue. Also, drivers and their families lack awareness on increase in probability of crash due to deprived sleep. Similarly, overloading of vehicles could be due to financial issues as well.

Many operators set targets for their delivery boys/ truck drivers for faster delivery. These make the roads less safe. Government intervention is required to regulate fleet management systems. The guidelines may enforce the fleet operators to monitor the health, give timelines for delivery considering sufficient breaks, ensure sufficient sleep in between duties, etc.

Vehicle

Vehicle related causes of a crash could be:

- Mechanical breakdown of vehicle
- Poor fitness of vehicle
- Aged vehicle
- Overloaded vehicle

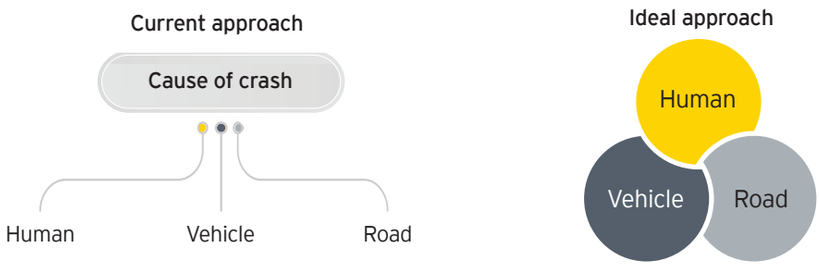
Road related factors

Faulty road design/ geometry, poor accessibility or absence of pedestrian infrastructure, inadequate or absence of street lighting, non-compliance of road features with IRC guidelines, lack of maintenance leading to faulty or non-functional traffic lights, overgrown trees/ shrubs reducing visibility, oversized and distracting hoardings along highways, etc could also lead to road crashes. There are IRC codes and guidelines already in place but adherence to those needs to be more pro-active.

"To err is human..." -W. Shakespeare

A piecemeal approach towards analysis of data:

The current method of data collection and analysis is based on the approach of attributing a crash to one of the above discussed parameters. But usually more than one of these is responsible for a crash. If the road lacks sufficient friction and the driver tends to overspeed in that section, the probability of crash goes higher. While many causes overlap, globally 70% of these are attributed to drivers. This leads to undermining the role of engineering and infrastructure when it comes to road safety. Even though the data is collected for all these parameters and they are not overlayed for analysis, this will still be a piece-meal approach and not a 'Systems Approach'. This will help in more optimum utilization of resources. The road sections with more problems shall be prioritized while allocating funds. Some road sections may not require ITMS if the faults in designs are removed. Thus a simple change in approach of analysis will save a lot of money in remedial measures.



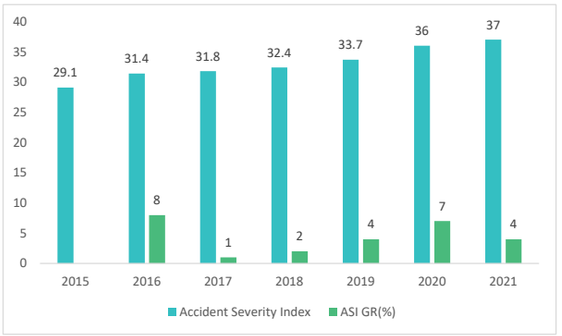
Current approach v/s ideal approach of road crash causal analysis

Factors other than 'human' contribute to road crashes

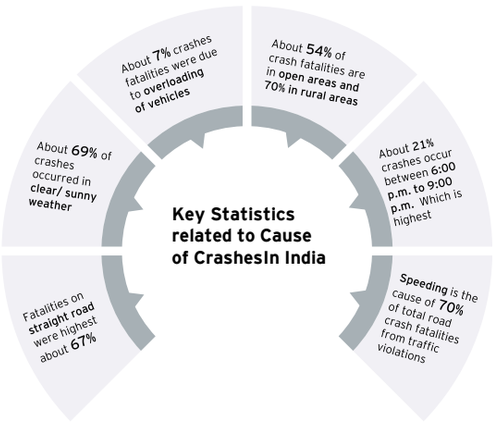
Most crashes (about 90%) of them indicate the involvement of human factors. This observation was part of FIR traditionally based on the accounts of victims and witnesses. Currently iRAD allows capture of all causes identified by road engineers, motor vehicle inspectors and police as well. Still about 90% data indicates traffic violations as the cause. **What if a driver wants to comply to speed but the signages do not indicate a speed change from a applicable distance. What if a pedestrian wants to walk on the footpath but walks on carriageway instead due to poor pavement condition of the footpath.** Many enforcement issues can be done away with by designing forgiving roads and by pro-active maintenance measures. Forgiving roads is a concept that is based on the principle that humans tend to make mistakes, the road design and infrastructure should be able to accommodate those. For example, most western countries have the design speed of road much higher than the allowed speed. Countries like Sweden and New Zealand have adopted it in a very comprehensive way. This principle should be adopted by all road owning agencies. In the trade off between cost, time and safety when designing a road, safety should be prioritized. For example, if the IRC code gives a range suitable as turning radii, the minimum advised should not be adopted just for the sake of saving time in land acquisition, sufficient turning radii is crucial for safety at junctions. The road owning agencies have to prioritize 'safety' over 'cost' and 'time' when selecting a value within the given range. Usually the causes overlap. A poor turning radius will increase the chances of a speeding vehicle to skid. Thus western countries focus on designing 'forgiving roads'.

Insights from crash data in India

- National Highways constitute only 2% of total road length in India but contribute to about 36% of total crash fatalities.
- Pedestrians comprised 16% of total crash fatalities on National Highways in India (2021 data).
- Two wheeler users comprised of 40% of total crash fatalities in 2021 on National Highways in India.
- About 20% of crash fatalities were attributed to vehicular fault in 2021.
- About 70% crash fatalities involved drivers that were permanent license holders.
- Vehicles aged less than 5 years accounted for highest crash fatalities of about 30% while the vehicles older than 15 years comprised only 11% of crash fatalities.
- About 68% of total crash fatalities are from age group between 18-45 years which is the most productive age group. About 14% of crash victims are females.
- About 30% fatalities comprised of non-compliance cases to helmet and 11% comprised on non-compliance to seat belt. The probability of about 40% of fatalities could have been drastically reduced by compliance to safety devices.



Though crashes and fatalities are almost stagnant, the Accident Severity Index in India has been on a rise since 2015



Since this data is not available in the overlay format, it is hard to blame the drivers alone even though this data indicates that. The traffic rule compliant drivers may become vulnerable to crashes due to hypnosis, this could explain majority crashes on straight road sections, open areas and rural areas as well. Therefore, this could not totally be attributed to indiscipline.

Inferences

These issues when bifurcated further reveal that there are socio-economic factors as well which influence the driver behaviour and their reaction time. Fatigue is a human related cause. Many drivers tend to moonlight between jobs for better income, leading to sleep deprivation and fatigue. Also, drivers and their families lack awareness on increase in probability of crash due to deprived sleep. Similarly, overloading of vehicles could be due to financial issues as well. Many operators set targets for their delivery boys/ truck drivers for faster delivery. These make the roads less safe. Government intervention is required to regulate fleet management. The guidelines may enforce the fleet operators to monitor the health, give timelines for delivery considering sufficient breaks, ensure sufficient sleep in between duties, etc.

1. Education

- Regular Training sessions and awareness campaigns about hypnosis need to be conducted for drivers
- Since the younger age group is most vulnerable, the education of being safe on roads should start in schools at an early age and be repetitive and practical. Sweden and Australia are good examples for this.
- Regular trainings to be conducted by transport operators for their employees and as a CSR activity. which can be incentivised by the State

2. Engineering

- There is a need to analyze the cause of blackspots using overlay method to pinpoint solutions.

3. Emergency Care

- Fatality CAGR is very high, and ASI is rising steeply thus indicates the need of improving emergency response timing.

4. Policy

- Guideline for better fleet management for transport operators to deal with driver welfare and issues like hypnosis.
- This can be converted to a mandate for transport operators in future

5. Enforcement

- People tend to overspeed whenever they can like on straight road sections, during a clear day, etc
- 40% of fatalities could be avoided if people wear helmets and seat belts
- Majority crashes happen during peak traffic hours, this is because some cities are still not as congested and people are able to speed/ violate rules or the roads may have engineering issues
- Majority of accused drivers involved in crashes were permanent DL holders which indicates a tendency in drivers to drive carelessly or violate traffic rules or lack judgement
- Stricter checks on overloaded vehicles are required
- The share of non-compliance of safety equipment is very high, an overall behavioural change is required
- Pedestrians and two wheelers comprise the highest fatalities thus are most vulnerable road users.
- There is a need of pedestrian friendly planning and design of roads and infrastructure.
- Stricter driving license tests, stronger deterrents for traffic violations required as most crashes involved drivers that were permanent DL holders
- There is a need of overall behavioural change for all road users, they need to be more compliant to traffic rules

ROAD CRASHES THAT MADE HEADLINES RECENTLY

Some fatal road crashes have recently caught a lot of media attention. These instances were found out be majorly because of the human factor. The common time of crash was usually late at night or early hours of morning. In most of the cases despite the presence of proper signages and lights the crashes took place. Most of these have been on high speed corridors like national highways and expressways.

'2 Killed As Minor Rams Speeding Car In A Bike At Girgaon Chowpatty'
Details:
2 killed
Location: Girgaon Chowpatty (Mumbai)
Time: 5:00 a.m.
Vehicles involved: four wheeler & two wheeler
Day: 15.06.2023 (Weekday)
Cause: Over speeding and underage driving

'7 engineering students killed in a car crash'
Details:
7 killed and 6 injured
Terrain: hilly
Time: late night (12:30 a.m.)
Vehicles involved: SUV and van (four wheelers)
Day: Weekday (29th May 2023)
Collision type: No collision (The accident took place when the SUV went to the other side of the road, hit a divider and overturned and hit the second vehicle.)
Cause: Over speeding and lane change

'4 Killed As SUV hits bike, truck at Kolkata'
Details:
4 killed
Location: Kolkata
Time: 5:20 a.m.
Vehicles involved: four wheeler, two wheeler & a truck
Day: 11.04.2023 (Weekday)
Cause: Over speeding, breaking traffic signal, seatbelt non-compliance

'45 year old died in road crash'
Details:
1killed, 1 injured
Location: Telangana
Time: 04:40 PM.
Vehicles involved: four wheelers
Day: 16.04.2023 (Sunday)
Terrain: steep slope
Cause: Tyre burst leading to vehicle veering

'55 year old dies in road accident'
Details:
1 killed, 2 injured
Location: Nalgonda
Time: 6:05 a.m.
Vehicles involved: four wheeler
Day: 29.08.2018 (Weekday)
Cause: Seat-belt non compliance

'A 54 year old billionaire killed in a car crash'
Details:
2 killed and 2 injured
Location: NH (Mumbai – Ahmedabad National Highway)
Time: 3:30 p.m.
Vehicles involved: four wheelers
Day: 04.09.2022 (Sunday)
Cause: Over speeding and non-compliance to seat belt

'Overspeeding truck kills young man'
Details:
1 killed, 1 injured
Location: Kundli-Manesar Highway
Time: 9:30 p.m.
Vehicles involved: four wheeler, truck
Day: 16.02.2022(Weekday)
Cause: Over speeding

'24 year old escapes death as car hits divider'
Details:
1 severely injured
Location: National Highway, Roorkee, Uttarakhand
Time: 5:30 a.m.
Vehicles involved: four wheeler
Day: 30.12.2022 (Weekday)
Cause: Fatigue Driving, pothole (Road Infrastructure)

Although the data gives some insight into the cause, there is a lack of attention given to vehicle and road related causes.

The media stories focus more on cases where multiple fatalities occur, like a bus or heavy vehicle crash. However, majority of crashes in India involve two wheelers which does not catch much media attention.

The media stories often state the victim and witness perspective when stating the cause, the overlapping causes including road factors that are not visible to layman like improper turning radii, etc are not pointed out.

However, it is important to address the visible issues like potholes, speed and driver behaviour in general.

News stories reported in a constructive and comprehensive way may create a substantial awareness amongst the citizens. A collaboration between government and media can help in bringing a change in the 'coolness quotient perception' related to driving speed, driver behaviour amongst drivers.

4 Global Best Practices

Sweden

Inception

- Vision Zero adopted in Sweden in 1997 through Road Traffic Safety Bill
- Targets to reduces fatalities from road crashes to 'zero' by setting interim targets

Approach

- System's Approach
- Focus on design based enforcement and Designing 'Forgiving roads'
- Focus on vulnerable road users like pedestrians and cyclists which form 12% and 9% share of road crash fatalities respectively
- Setting Road safety performance indicators (SPIs), and evaluating the interim targets

Key Initiatives

- Speed restrictions on urban roads: upto limit of 40 km/h
- Tailoring road design to needs of vulnerable road user through National strategy for cycling in April 2017, 9% of fatalities are that of cyclists in Sweden from road crashes
- Sensitising stakeholders: e-learning format of Vision Zero approach
- Safety devices in vehicles: Like lane departure warning systems installed in 63% of vehicles

Achievement

- Reduction in crash fatalities by 50% between 2006 and 2020, (204 fatalities in 2020)

Scaling

- Same model replicated in Norway from 2011
- In 2019, Oslo had no pedestrian or cyclist fatalities.
- Overall fatalities reduced by 55% in Norway in 2020

Interim targets

- 50% reduction in fatalities and 25% in persons injured
- Reduction of pedestrian fatalities to 'zero' by 2020 (forms 12% of total road crash fatalities)
- every 5-10 years, the targets were achieved and new ones were set

Safety Performance Indicators (SPI's)

- Speed
- Driving under influence of alcohol and drugs
- Use of mobile phones while driving
- Seat belt and helmet use

1. Speed

- Swedish Transport Administration initiated a speed limit review to adapt speed limits to current road safety standards.
- Interim target: Speed compliance by 80% by 2020
- Combination of manual monitoring and speed cameras adopted

2. Driving under influence of alcohol and drugs

- Legal BAC limit of 0.2 g/l, and no trace of any illegal drug found in driver's body.
- Goal: 99.9% compliance by drivers by 2020
- Govt. is shifting to technology like "Alco-Gates" (gates equipped with a breathalyser test) to automate checking process

3. Seat belt and helmet use

- Mandated for front and rear seat passengers
- Mandated for children under 135 cm
- Compliance of 96.8% amongst children and 86.2% amongst adults achieved in 2020

4. Use of mobile phone while driving

- In 2018, handheld mobile phone use while driving was prohibited

Driver Training Program - Sweden

Sweden had a skid training program that includes a practical course with the following features:

- Slalom driving between courses
- Braking exercise (dry and slippery surfaces)
- Turning in slippery bends
- Avoidance manoeuvre (swerving to avoid an obstacle)
- The training also includes voluntary components like experiencing a mock crash at approx. 7km/hr by being strapped into a chair that descends a short ramp and trying to escape from an upside-down car. This helps in sensitising the drivers of impact a crash can have on their life and importance of safety rules. One important element of training is 'discussion and reflection' which helps in sensitising the drivers

Australia

Profile

- About 1200 people die due to road crashes in Australia every year. The fatalities per lakh population in 2021 were 4.3. Australia has a vehicle population of 2 crore and 10.27 lakh km of road length.

Inception

- The National Road Safety Strategy 2011–2020 (NRSS) was established by Commonwealth, state and territory Transport
- Ministers in May 2011. It sets out an agreed national framework of road safety goals, objectives and actions.
- The objective was to achieve 'Vision Zero' or zero deaths or serious injuries from road crashes by 2050 .
- It was followed up by National Road Safety Strategy 2021-30 which sets out Australia's road safety objectives and priorities for the next decade.
- First NRSS was framed in 1992 which aimed at reducing the rate of fatalities/ lakh population by 40% in 8 years, but could achieve only 34% which is about 20% reduction in fatalities in absolute numbers.

Interim targets

- NRSS targets reducing the annual number of fatalities by at least 50% and serious injuries by at least 30% by 2030.

Approach

- Key policy directions to be pursued in each of the four 'cornerstone' areas of intervention, i.e. Safe Roads, Safe Speeds, Safe Vehicles and Safe People
- Safe System's Approach
- Speed management is embedded within all key themes
- Data based approach: Regular thorough reviews to adjust priorities in next action plan

Achievement

- There has been a reduction of 22.5% in fatalities between 2011 and 2020.

Key Interventions

- First 3 years focused on thorough review of existing systems based on which the priorities and actions were identified for next 3 years.
- Thus there have been Action Plans prepared for next few years as listed below:
  - National Road Safety Action Plan 2015–2017
  - National Road Safety Action Plan 2018-2020
  - National Road Safety Action Plan 2023–2025

Australia faced a similar issue to India where the crashes reduced till 2015 and then stagnated. But Australia has come out of such deadlocks by conducting thorough reviews every 3-5 years before preparing next 3-year action plans. The priority areas were adjusted based on findings of the review reports.

National Road Safety Strategy (NRSS) 2021-30

- The NRSS 2021-30 has revised priorities, added approach and more elaborate targets as given below:

Approach- NRSS 2021

- Social Model Approach:
- Under the social model, this strategy recognizes that other preventative health work, for example focusing on mental and physical health, will also impact road safety.
- Evidence-based approach
- Transparency: Regular publishing of targets and safety performance indicators, enabled by National Data Hub

Targets- NRSS 2021

- Zero deaths in CBD area by 2030
- Zero deaths of children (below 7 years)
- Zero deaths on all national highways and on high-speed roads covering 80% of travel across the network
- Zero fatalities and serious injuries by 2030

Corporate responsibility:

To make the corporates responsible for safety on roads, there are 2 Acts in Australia:

- The Corporations Act 2001, and
- Occupational Health and Safety Act 2004

These ensure that organizations provide a safe workplace and maintain a safety-focussed environment for employees making it a legal obligation for organizations.

Examples of corporate level initiatives taken up by organizations to improve road safety are:

- Introducing workplace road safety policies
- Focusing on safety behaviours in recruitment and selection
- Prioritizing road safety records in fleet selection and maintenance
- Training and education of staff

Road safety education in Australia

In South Australia, the police works in partnership with the Motor Accident Commission to deliver Road Safety education program to:

- Schools, students, teachers and parents
- Business groups and the community

The school curriculum is detailed based on the age groups as shown below including matters like how to decide a safe playing space, what is the emergency number and how to obtain a learning license, etc.

Preschool Children	Being a good passenger; calling Triple Zero (000) in case of emergency;
Primary School Children (upto Class 3)	Playing in safe places; stop, look, listen, think; click clack front and back - importance of seatbelt; wearing a safety helmet; calling Triple Zero (000) in case of emergency
Primary School Children (Classes 4 to 7)	Australian Road Rules; appropriate use of cycles, skateboards, scooters and roller skates; calling Triple Zero (000) in case of emergency;

Secondary School Children (Classes 10 and 11)	Methods of obtaining a driving license; conditions relating to Learner and Provisional licenses; risks associated with driving; being a responsible passenger; crash risk, speed, alcohol and drugs, fatigue and driver attitudes to road safety
Secondary School Children (Class 12)	Making informed choices and educated decisions; fostering change through open discussions; peer group pressure, choices, risks and consequences
Colleges and Apprentices (for overseas students)	Introduction to Australian Road Rules

Apart from this, there is a curriculum for Parents of Secondary School Students which includes:

- how parents can be positive role models in promoting skills and behaviours in the car
- updates on current road rules and contemporary road safety ideology
- choosing the safest vehicle for your child
- choosing the right driving instructor for your child

There are special programs for Business Driver Awareness Programs , senior citizens, Mobility Scooters (for senior citizens using motorized wheelchairs and mobility scooters and Urgent Duty Driving (for Emergency Services Staff).

Intelligent Warning Systems: placed at blind turns by fusing data analytics with vehicle-to-infrastructure communication technology

Managing Driver Fatigue and Hypnosis

The Road Safety Commission has unveiled a fleet of new roving road safety billboards in the form of 30 Centurion trucks set for regional and remote Western Australia (WA) roads. The campaign highlights the need to take breaks every two hours while driving.

RSC has partnered with cafes and roadhouses along the roads, the list is available on RWA website. The campaign says "A coffee on us!"

New Zealand

- Flexible safety barriers made of steel are being used so that the shock of collision is absorbed. These when fitted along the side and centre of the road, have reduced the number of people killed or seriously injured in crashes by 75%.
- **Raised intersection platforms:** encouraging motorists to slow down when approaching an intersection and providing a safer, slow-speed crossing space for pedestrians. Expected to reduce crash fatalities and grievous injuries by 40% at intersections.
- **Rural Roundabouts:** these can reduce the number of people killed or seriously injured by up to 65%,
- **Wide centrelines:** more space between lanes can reduce serious crashes by up to 20%
- **Changes to the phasing and timings of traffic signals in urban areas:** this can help people move more safely through intersections and reduce the number of people killed or seriously injured by up to 25%

Wide centrelines

Flexible safety barriers

Raised intersection platforms

Source: Making New Zealand roads safer (brochure) (nzta.govt.nz)

South Korea

The 3 main goals of Korean road policy are:

- **Overhaul dangerous roads to significantly reduce traffic crashes:** South Korea introduced the advanced Cooperative Intelligent Transport System (C-ITS) that automatically identifies risks on the road including crashes and freezing and gives notification to adjacent vehicles. Improve hazardous roads, secure rest areas (for drowsy drivers, etc.) on expressways and national highways, continue to build up safety facilities such as sidewalk. Strengthen road safety and disaster management with preventive measures and emergency responses to heavy snow, flooding, collapse of slope, tunnel etc.
- **Provide easy and convenient access to nationwide roads:** South Korea promoted the construction projects of expressways (both state and private-funded) and national highways based on the 7×9 National Arterial Road Network Plan (7 north-south roads and 9 east-west roads) with a goal to ensure convenient access to the national road network from anywhere in the nation.
- Maximize road efficiency and enhance customer services

Singapore

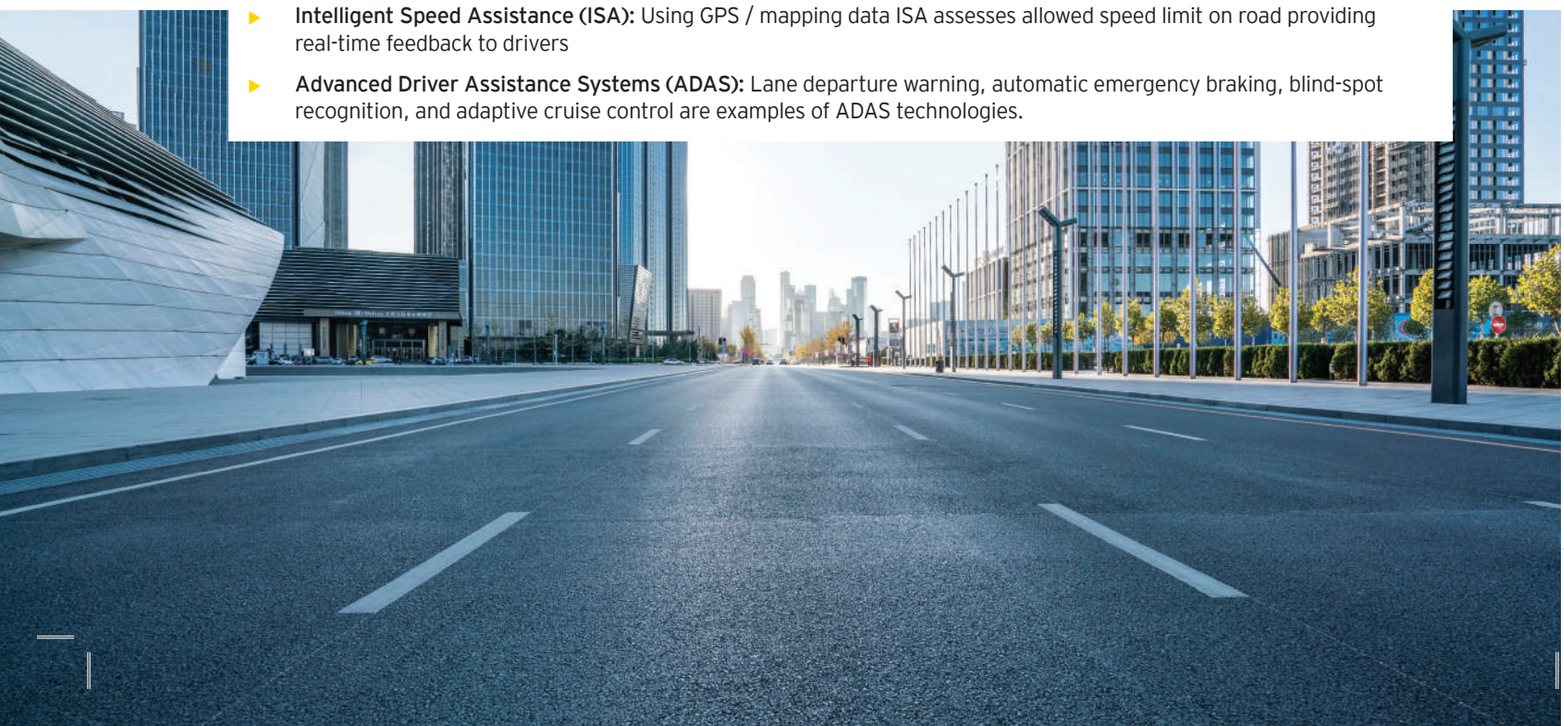
The Road Safety Engineering Unit of Land Transport Authority (LTA) started an initiative called 'Enhanced School Zone' to improve traffic safety around schools. It included demarcation of school zones, installation of crash cushions at high-risk locations and erecting concrete bollards at selected bus stops.

Additional traffic measures that may be implemented in School Zones to further enhance road safety, are:

- Traffic calming measures such as road humps and speed regulating strips
- Raised road surface at pedestrian crossings and use of signals at-grade crossings
- Parking restrictions
- Railing to deter jaywalking

Other techniques used to make roads safer adopted in various countries

- **Intelligent Speed Assistance (ISA):** Using GPS / mapping data ISA assesses allowed speed limit on road providing real-time feedback to drivers
- **Advanced Driver Assistance Systems (ADAS):** Lane departure warning, automatic emergency braking, blind-spot recognition, and adaptive cruise control are examples of ADAS technologies.



5 Ongoing Research Work in India

Central Road Research Institute

- Project iRASTE (Intelligent Solutions for Road Safety through Technology and Engineering) aims to re-imagine road safety with the predictive power of AI. For the first time, AI will act as a force multiplier and transform Road Safety Engineering. Predictive insights generated via AI can prevent accidents even before they happen. Over time, the project expects to impact a 50% decline in road accidents in Nagpur city and Blackspot reduction on the city's road network.

IIT Bombay

- Modelling and Analysis of Crash Risk and Performance of Motorbike Riders under Influence of Human Behavioural Factors (2019)
- Optimizing location and capacity of emergency response infrastructure for megacities (2017)
- Driving simulator (2014)
- Analysis of speed reductions and crash risk of aggressive drivers during emergent pre-crash scenarios at unsignalized intersections (2023)-Aims at quantifying the relationship
- Crowd Data - Using the crowd to create and maintain useful public transport data assets In India (2015)
- Modelling distraction tendency of motorized two-wheeler drivers in time pressure situations (2022)

National Institute of Industrial Engineering (NITIE):

- 'Impact and interactions of road environment factors, vehicle break-down, road user's behaviour the severity of Road Traffic Accidents (RTA) in Indian urban areas'.

IIT Delhi

The Transportation Research and Injury Prevention Programme (TRIPP):

- Road Safety Inspection of Identified Blackspots And Travelling Workshop (2018-2021)
- Review of Effectiveness of Road Safety Interventions in South-East Asia Region: An Evidence and Gap Map for Intervention Priorities (2018-2021)
- Pedestrian Safety and Sustainable Mobility In NCT, Delhi (2018-2021)
- Safety Audit of Yamuna Expressway (2018-2021)
- Establishing a Research Program In India on Evaluating Safety of Rural Roads and Highways (2018-2021)
- Technical Support for Monitoring and Implementation of Transport Policies for Improving Traffic Safety And Bus System In North County Transit District Project Details (2018-2021)

IIT Mandi

Developed Smart Road Monitoring System (SRMS) that would help reduce manual intervention in traffic management and prevent accidents caused at sharp or blind turns. It can be used for speed detection, vehicle counts, enhanced traffic control and road usage, by employing the Micro-Electro-Mechanical Systems (MEMS) and Internet of Things (IoT) technologies. that can work in any weather including rain, snow, fog or other poor visibility conditions to record crash data which is encrypted and shared only with appropriate stakeholders.

IIT Madras

Integrated Road Accident Database (iRAD) was developed and implemented by IIT Madras in Tamil Nadu and later in all states in association with MeitY.

INFERENCE: The government can collaborate with these institutions for improving their policy, action plan. All these institutions in general are focussing on granular data analysis involving unseen factors, creating prototypes involving artificial Intelligence (AI), etc with deep data analysis, creating data based decision making models to ease the work of government authorities.

6 Road Ahead- Based on five pillar approach

At present almost all stakeholder departments are aware about the Systems Approach. The SCCoRS had advised all states to conduct the training on this subject for all stakeholder departments, however they face challenges in implementation of the solutions due to complexity of problems in India and lack of granular data. It is anticipated that with upcoming versions of iRAD, there will be more granular data available and better analysis will lead to data based decision making. Government has taken this up on priority. Thus, Government plans to follow the UN vision for Road Safety- the Five Pillar Approach.

01

Road Safety Management

Establish road safety policy addressing all pillars

Establish a governance mechanism

Improve data collection and analysis

Review funding

02

Safer Vehicles

Encourage investment in fleet management

Encourage use of safe vehicles

03

Safer Road Users

Develop standard training and awareness raising

04

Post – Crash Response

Increase responsiveness to post-crash emergencies

05

Safer Driving Environment

Promote safe operations, maintenance and improvement of roads in local communities

Improve driving conditions in areas under the control of the UN

Road Safety Management

- Even though, the National Road Safety Policy in India was published in 2010, some states are yet to publish a state level policy in alignment with the national policy. Thus, all states and union territories need to establish a state level policy and action plan and localise the same in the form of district level strategy which shall be reviewed every 3 -6 months.
- Most states have established a governance system in the form a Road Safety Lead Agency, however they lack a dedicated full time staff.
- Collaboration with the premiere institutions in order to utilize the ongoing research works in current policies and action plans to speed up improvement of road safety and implementation on ground.
- The need of a dedicated staff across levels in all stakeholder departments is necessary for road safety related works . The performance of officials should be based on sole road safety related tasks.
- Improvement in data quality in iRAD through training the officials. The issues like skipping the entry of data, wrong interpretation can be resolved by sensitising the officials. Also, there needs to dedicated staff for data collection and analyses in each department. Notification of crashes from police to other departments need to be prompt so that the inspection can be completed within 48 hours without loss of evidence from site.
- The data analysis needs to be improved such that all officers from various stakeholder departments can drill down the reports and maps by running queries. This will help them in making informed decisions.

Safer Vehicle

- The use of safe vehicles is not a common practice in India. Buyers in India prioritize convenience and economy of a vehicle. The New Car Assessment Program (NCAP) rating of a vehicle is crucial as it is given after making the base model of each vehicle through seven types of crash tests. The rating 5 is given to the safest vehicle. Lack of awareness about this is the leading cause of people not checking the safety rating of a vehicle. Thus awareness and sensitisation of vehicle consumers should be taken up in the near future. Digital media campaigning targeting youth through web series on OTT platforms and Youtube can be taken up.
- Policies encouraging incentives to encourage manufactures and buyers to deal in safer vehicles can help in bringing a behavioural transformation and change in vehicle buying culture in the country.
- Leveraging technological interventions can help in better enforcement. Onboard diagnostics such as ignition control for vehicles based on alcohol consumption levels, helmets in case of two wheelers and seat belt in case of four wheelers may aid in traffic rule compliance without additional load on government resources.
- In order to leverage the technological interventions better, there needs to investment on research on topics such as low cost measures to make the vehicles safer, or on low cost safety restraints for vehicles that will be modified to suit Indian conditions.
- Shift to automated vehicle fitness inspection certification processes can help in reducing load on officials, speeding up the process, reduce the waiting time and will make process more convenient and transparent for the citizens.

Safer Road User

- School curriculums can be designed based on learnings from countries like Sweden and Australia. The curriculum needs to be designed age appropriately with field visits and including interactive sessions. The Australian curriculum has a module on road safety for pre-school children as well where they are taught about the emergency number that needs to be called in case they are in a road crash and the module for students of class X includes the information on how a learning license can be applied for.
- Fleet Management Advisory could be implemented in India. This can reduce the cases of crashes from human factors like drowsiness, illness, fatigue and even hypnosis. The trainings to staff on how to tackle hypnosis should be mandatory by fleet managers/ transport operators. Listening to music, eating snacks every 15 minutes, strong lights, tea/coffee and conversation brakes helps in addressing mind's monotony and thus avoiding hypnosis on straight road sections. The regular health check ups, scheduling of drivers such that they get eight hour sleep after every shift, schedules including a brake every three hours of driving are some other examples that can be incorporated in the guidelines.
- Regular driver refresher courses for commercial drivers should be encouraged. The certification courses will increase the employability of drivers and will give them a chance to get latest information. Road safety authorities or transport authorities in western countries post videos and information on their websites based on latest research and innovations such as 'how to set the rear view mirrors avoiding blind spots' and ' how to teach your kids to ride bicycle in a safe way'.
- Shift to technological enforcement and driving tests can be prioritized in the near future. MoRTH has already issued funds for pilot of Automated Driver Testing Tracks (ADTTs), this can be scaled up in each state on a fast track mode. This will increase transparency in the process and raise the difficulty level of tests as well.
- Driver rating can be linked with employee appraisal by Corporates in their policies, esp. for commercial drivers. There are some mobile applications available in the market to test the driver's skill sets, there could be more accurate measures designed by the Corporates to take up the same.

Post Crash Response

- Digitalization of processes can improve emergency response. A central comand and control centre to monitor the functioning of ambulances and trauma care units can be leveraged for providing timely medical help to the road crash victims. To be able to do that, there needs to be a command and control centre to monitor the functioning of ambulances and trauma care units. Western countries have a quicker alert system. When a crash happens the nearest trauma care units, ambulances and para-medical staff are alerted about the incoming trauma. Since the quantum of crashes is higher in India, this is possible only if the processes are digitalized. The victim/witness can have option of selecting the ambulance and trauma care unit through the app/ portal, etc. based on factors like their affordability and estimated time of arrival of ambulances.
- Infrastructure augmentation for trauma care in terms of trauma care units, staff deployment, procurement of ambulances is a must. This should be based on not only the gap assessment in terms of number of ambulances and trauma care units but also the area it can cater to within 15 minutes. Thus, this gap assessment should include the service area analysis.
- Most of the ambulances are not managed by the para-medical staff that has been trained to handle trauma cases. Capacity building of para-medical staff can be taken up in a phased manner.
- First responder training of volunteers and creating a task force especially in rural and remote areas should be taken up at state and district level. These localized groups can buy more time for ambulances by giving some treatment immediately. NGOs and local community groups can be leveraged for implementing this at local level.

Safer Road Environment

- The focus on constructing new roads is indicative of vast efforts towards road infrastructure development, however, newer KPI for all road owning agencies should be construction of new safe roads. In place of monitoring kilometers of roads constructed , the key performance indicator of road owning agency/ officers should be based on kilometers of roads with 5 star rating for motorists, cyclist as well as pedestrians.
- A Standard Operating Procedure (SOP) at central, state and local level needs to be established to fast track the blackspot rectification, maintenance and other road safety related works. Technological interventions like e-office, digital monitoring and tracking tools involving approvals from multiple stakeholder departments specific to road safety can help in closing the rectification measures faster.
- Since less than 1% of the existing roads have been audited, resources should be focussed on road safety audits and health monitoring of older roads through post construction stage audits.

Role of Corporate Sector

The corporate sector is a major stakeholder in road safety improvement. Companies handling logistics with their fleet covering more than one lakh km per day can bring about a lot of change in their ecosystem to make the driving experience safer for their employees.

- The drivers need to be trained and sensitised about traffic rules.
- Awareness about hypnosis and the remedial measures such as using music, snacking, taking breaks, using bright lights, having conversation with fellow travellers/ conductor, etc can save them from hypnosis.
- The companies need to conduct regular health check ups, eye check ups and refresher courses for driver training including hazard perception test.
- The scheduling of driver duties should be done considering the diurnal cycle of drivers, the shifts should not be longer than 8 hours, the targets should ensure regular breaks.
- Comfortable resting facility and refreshments within vehicle may be provided, if drivers need to take turns for longer shifts.
- The family of drivers need to apprised about their health reports and schedules to keep them from taking up extra work or from moonlighting.
- Use of technology in vehicles such as fatigue management system, black box, reminders for breaks can help.
- Corporates can fund research work or other road safety projects under their Corporate Social Responsibility (CSR) works.

7 Best Practices in India

Leading case studies on road safety in India

With the existing situation of road safety in India, it is important to create dialogue and raise awareness. FICCI, in its endeavour to promote road safety initiatives, instituted the FICCI Road Safety Awards, which are conferred on corporates, Public Sector Undertakings, schools, higher education institutes and other organizations under different categories, for their outstanding work around road safety.

The objective is to leverage expertise of the organizations to produce possible solutions that could mitigate or reduce occupational road risks and drive the agenda of making roads safer for the people at large. This can further help organizations to learn about such initiatives, which they could implement in their respective organisations.

HumanQind NGO

Crosswalk initiative - safe school zones

- With the HumanQind NGO as the lead partner of TRIPP Centre IIT Delhi, Crosswalk initiative was adapted for Delhi government high impact project safe school zone project for creation of a model school zone in every district of Delhi.
- The aim of the NGO is 'We co-create community centered school zones' and the Crosswalk initiative was formed keeping that aim in focus.
- The initiative's main target was to always keep children first while making plans for road safety.
- An experiential curriculum was inculcated in schools where students made visionary road safety plans with help of their teachers.
- With the help of these students, plans were made to create a community relevant safe school zone with appropriate infrastructure championing a student first approach, such as:
  - Traffic calming measures (barricading)
  - Proper signages in the school zone and
  - Better walking and cycling facilities
- Integrated approach was applied in schools, the students, teachers, parents and state municipal corporation (SMC) members formed road safety clubs.
- Close to 30 hours of training was given to pilot road safety clubs in schools to SMC members and teachers.
- Orientation of 100+ SMC members, and over 1000+ school staff on road safety in school zones was conducted.
- Preparation of school database for parent-student interviews was done. It was a dashboard sensitizing education school authorities of their travel footprint and its effect on the students and community.
- It was a simple tool for government, teachers and school authorities to create evidence for action and planning for safer accessibility near school zones.
- 9 workshops were conducted to design a safe school zone with students with a total duration of 22 hours.
- Outreach was done via school level exhibition with students, parents, teachers and neighbouring communities
- In the end the stakeholders collaborate with government to make student envisioned road safety plans a reality.

Impact

The pilot project covered:

- 11 schools (3 private and 8 government schools) through its 21st century life skills design curriculum.
- There was direct engagement with close to 30,000 students.
- Indirectly benefited everyday safety and accessibility of 100,000 students and their families.
- Media and social media coverage across many popular platforms.

Crosswalk initiative workshop – teachers, students all working in tandem to achieve their safe school zone goal

Students and stakeholders meeting

Delhi Public School, Greater Faridabad

United for road safety, united to save lives - a dipsite's mission

The school made efforts towards road safety through different methods. Under technological initiatives the following interventions were made by the students of the school:

- R.A.O.D.S (reduction of accidents caused due to drunken driving and over speeding) through the use of AI powered thermal camera, alcohol sensor and GPS sensor.
- AI based traffic system which is deployed using a network of raspberry pi- cameras helped in decreasing accidents and provided a more fluid traffic management system.
- Smart helmet and red watch – an SOS device used to alert any 3 predefined contacts in case of emergency.
- Project AARMA 2.0 was an effective solution to solve the problem of accidents caused due to high beam lights at night.
- Project Suraksha is a car sensor whether all passengers in a vehicle have to put their seatbelt on, failing which, the car's engine would not start.
- Accident avoider at blind cuts through LDR based device.
- A device for Smart gesture identification during driving.
- AI enabled fog accidents avoider and bus capacity recognizer are some of the other important initiatives taken up by students.
- COMFORICKSHAW was ideated and designed by the young innovators of the school with safety provisions such as low centre of gravity, sensors which send out a warning when any body part/ piece of clothing is left out of the rickshaw ,flat footboard , flat wide seat and speed breaker detection. Besides these, it has a dynamo that produces electricity which is then stored in a battery.
- Apart from several other technological interventions such as AI cap to ensure safety of the visually impaired on roads, road safety e-shoes with built in tracker were also made.
- Secondly, the school included integration of road safety in curriculum, this was done through:
- BALA (Building as learning aid on traffic rules and safety), a project on traffic management and accidental control based on AIOT Integration showcased under the flagship program of NITI Aayog where the school showcased the project- Automatic Fog Analyzer
- Training/Workshops for students/faculty: Interactive workshop on ' Road Safety ' was organized by 'Traffic cum central zone Cyber Crime Cell', Quiz conducted by Traffic Tau
- Insightful session with the principal via stories, PPTs and inspirational videos wherein she constantly encouraged children to follow the traffic rules such as wearing helmet, abiding by the "creative" road safety signs and ensuring the safety of pedestrians while riding their bicycles, parent awareness programmes on Road Safety
- Experiential learning activities such as role play, enactments, watching videos at all grades and interaction with the traffic policemen and visits to places such as the Traffic Park.

COMFORICKSHAW – made by students

Dipsites -The Responsible Stakeholders

Impact

- Students were observed to give reminders to parents about necessity of road safety norms
- Operational changes such as, buses were equipped with speed governors and fire extinguishers along with GPS and CCTV
- Pledge on road safety was taken by bus drivers and conductors
- 24x7 Ambulance was stationed at school premises
- New road safety signs installed outside school

Sri Ramakrishna Engineering College, Coimbatore

Road accidents hotspot analysis and suggestive measures for road safety in Coimbatore city

- A special task force on road safety (STF-RS) has been constituted by the government for analysis of road accident hot spots and pilot field survey in Coimbatore city and Coimbatore and Nilgiris districts.
- The department of civil engineering of Sri Ramakrishna Engineering College, Coimbatore acted as a member of the field survey team for the STF-RS and underwent the field survey along with police department.
- A small team comprising of faculty and students went for the field surveys across the city and a total of 9 hotspots were identified.
- The identified hotspots for the study were Jyothi Colony, KSB Pumps, Kumarapuram, Periyanaikampalayam, Rakipalayam, NSM Palayam, Press Colony, Thambu School and Veerapandipirivu.
- These were places with high usage and more prone to crashes and mishaps.
- Derivation of causes and solutions was done from the road engineering perspective.
- Crash history, type of junction, establishments nearby, traffic flow description, traffic signal status, lighting conditions, visibility (line of sight) and road condition at the junction were the factors considered by the college team when they prepared their solutions for the STF-RS.
- Then identification of road user related causes of accidents was carried out.
- On the basis of all this, the derivation of community led solutions and suggestive measures for Road Safety were planned and implemented.
- Finally a proposal of road accident preventive solutions for the hotspots was sent to respective authorities from the college team part of the STF-RS.

Impact

- Both road engineering as well as enforcement solutions were provided and implemented.
- Proposed suggestions were implemented and it was observed that the percentage area of high risk zones and very high risk zones reduced considerably.
- The percentage decrease of traffic congestion in area of safe zone is 16.79%, which is a very good sign of improved road safety in Coimbatore city.

Field surveys conducted by Sri Ramakrishna Engineering College students and professors across Coimbatore city

ISBR Business School, Bengaluru

Safety Sarathy - a mega awareness drive on road safety

- The Institute's tagline, 'Real World, Real Learning' embodied with Safety Sarathy's mega awareness drive throughout Bengaluru city.
- With the continued focus on road safety as one of the key causes, ISBR Business School in 2022, took their commitment to the next level by conceptualizing a multi-year annual mega awareness campaign on traffic and road safety, named Safety Sarathy.
- To conduct an awareness of this magnitude the college collaborated with:
  - Bangalore traffic police.
  - Industry partnership with ReadyAssist, a company focusing on 24x7 road side assistance.
  - Club2DS (Drive Smart, Drive Safe), a non-profit organization focusing on Road Safety.
- Various activities were conducted by the college students and professors:
  - Survey of all potential traffic signals for the smooth conduction of awareness drive
  - Education of students and faculty through sessions with traffic police
  - Awareness drives and a visit to the traffic control room in Bangalore at Infantry road
- Pre engagement of students through research about road safety, impact of rash driving
- Creation of posters and banners by students with help of knowledge gained by visiting places mentioned above
- The college took on the responsibility to contribute to the knowledge and reusable artefact through process document, junction maps and instruction documents
- On field drives were conducted by groups of 20-25 students rallied across 11 junctions
- Students and professors of the institution carried eye-catching and informative posters and banners and creative acts about road safety
- At every stop signal they used to stand in front of the vehicles and display their posters and banners with intuitive messages about road safety standards and their maintenance

Impact

- More than 250 students performed at 11 traffic junctions across the city throughout the day
- An estimated 5000 commuters saw the students flaunt their posters and banners
- 172,000 steps taken by all students in all, were donated as part of 1 crore Steps for road safety campaign
- The entire Safety Sarathy event in Bengaluru got media coverage of over 16 National leading dailies

Slogans carried by enthusiastic students and professors of ISBR Business School, Bengaluru for road safety awareness

Inauguration of the event at Traffic Management Center, Infantry Road

Instakart Services Pvt. Ltd

"Strive for a safe drive" initiative

- Being a subsidiary of Flipkart, health and safety of their employees was of paramount importance to Instakart services.
- Conducted road risk assessment for delivery executives required on any road or terrain to deliver essential items.
- Assessed external environment like poor road conditions, climate, traffic violations, drunken driving, over speeding vehicles, stray animals entry.
- Strengthened standards and controls keeping external uncontrollable factor in consideration.
- Implemented standards and controls such as:
  - Road safety clauses in vendor agreements
  - No helmet/seat belt no entry policy
  - Better and new delivery bags
  - Guidelines on carrying capacity
  - Accident and QR based near miss reporting
- Conducted training of delivery agents and drivers using awareness through animated road safety training E-module.
- Provided defensive driving training, safety toolbox talk, national and monsoon road safety campaigns for all.
- Conducted defensive driving lessons for drivers, in all metro and tier 1 cities.
- Conducted defensive driving training to develop a set of driving skills and strategies to recognize the unanticipated risks and take well-informed decisions.
- Trained drivers on the above safe driving method eto manage and control the vehicle better in an emergency and reduce associated dangers.
- After successful conduction and implementation of actions by the company, they kept conducting road safety surprise audits in order to monitor and review their efforts
- For future scope of improvement, the company intended to make use of technology to find better, cheaper and easier road safety methods.
- The introduction of ergonomically friendly e-kart delivery bag abolished the old and dangerous gunny bags.
- Ergonomically friendly bags were designed by the company by thorough research into the problems faced especially by delivery executive on 2-wheelers while delivering items using dangerous gunny bags tied to their vehicles.
- The newly designed delivery bags provided more stability, were easy to handle, store more deliverables and were also waterproof.

Ergonomically friendly E-kart delivery bag


The difference brought about by using ergonomically friendly E-kart delivery bag

Drive simulator, part of national road safety week

Impact

- Compliance ratio went up significantly, but for non-compliant delivery executives, One to One Counselling given, Oral Warning given and Warning letters recommended, Connect with Ops leaders for enhanced road safety culture
- Helped to enhance road safety awareness among delivery executives which resulted in a 37% reduction in road accidents compared to 2021.
- Ergonomically friendly E-kart delivery bag and saddlebag construct helped to improve productivity by more than 50% and ensured the safety of the delivery executives.
- Development and implementation of a dedicated online accident reporting tool to immediately report all accidents/ incidents within 24hrs and the investigation had to be completed within 72 hours.

Odisha State Road Transport Corporation

3S (Suraksha-Sattva-Sampurna)

- Customer – centric initiatives were undertaken to counter drawbacks in accordance with the road safety norm.
- Through the 360-degree secure initiative, passengers were the beneficiaries of safe and reliable services, but were also able to post enforcement incidents if any.
- The OSRTC ensured modernization of fleet through technological intervention by upgradation of tracking and monitoring systems and their maintenance.
- The tracking system now has features as per Automotive Industry Standard (AIS) 140 guidelines and each bus has a GPS tracking system, camera surveillance and an emergency button.
- Apart from these, several other measures were taken by OSRTC to guarantee better road safety standards:
  - Regular maintenance and inspection of buses to ensure they are in good working condition
  - Hiring and training qualified and experienced bus drivers
  - Implementation of strict safety protocols for drivers and passengers
  - Regular monitoring and reviewing of security footage
  - Establishment of emergency response protocols in case of accidents or incidents
  - Regular conduction of drills and exercises for drivers, conductors to prepare them to help passengers during emergency situations
  - Encouragement of passengers to report any suspicious activity or behaviour
  - Enforcement of strict penalties for violators and rule breakers
- The OSRTC implemented various data dissemination techniques like informing the passengers about various bus services, routes and schedules through the use of mobile application were put in place to ensure the 24x7 availability of emergency services.

Impact

- Saving of at least 5 crore annually on various Motor Accident Claims Tribunal.
- Direct insurance coverage of more than 70 lakh passenger annually enhanced the financial sustainability by reduction of economic burden on the corporation.
- Estimated saving of almost above 4 crore annually due to various major and minor accident.
- Estimated operational benefit of at least 15 crore annually due to structured monitoring.

Growth in bus fleet by 26% since the introduction of 110 new buses compliant to the new safety and monitoring features

MoU signed with Petrol Conservation Research Association for drivers training program, renewed to focus on fuel efficiency and safe driving protocols.

L&T Infrastructure Development Projects Ltd.

Behavioural architecture based approach to diagnose and mitigate black spots accident prone spots on highways

L&T Infrastructure Development Projects Ltd. followed two methodologies to arrive at Black Spots/ APS.

- Firstly, they considered all the parameters defined by Ministry of Road Transport & Highways (MoRTH) and also included spots showing higher Accident Severity Index (SAI) which may become a potential Black Spot in near future.
- Then the company pioneered a unique behaviour architecture approach on roads which was drawn from its latest learnings from cognitive neuroscience and design which helped them to arrive at a unique custom designed solution specific to each location or spot.
- Driving was looked at through the lens of behavioural science and it was understood that driving is a non-conscious activity governed by inherent biases and heuristics in decision making.
- Their findings showed that behavioural challenges were mainly because of the awareness-action gap (intended to be attuned to safe practice, the driver behaviour often does not always reflect this intention) which exists within the driver because of these reasons:
  - Familiar, similar and monotonous roads which resulted in their caution and alertness going down
  - Conflicting goals, when drivers see an open road, they tend to overspeed rather than adhering to the speed limits
  - Anonymity provided by the vehicle driven, as it led to deviant behaviour
  - Poor feedback due to the result of missing signages and road infrastructure
- After analysing various black spots identified the company came up with a few design interventions that were introduced in road furniture, markings and signages like:
  - Receding white lines
  - Waybars
  - Road studs (cat's eye) patches and rumble strips
  - Action consequence signages
  - Future seeing signages
  - Empathy signages
- The company successfully deployed these design interventions on two of their project highways which they managed and operated namely, Sambalpur-Sundergarh-Rourkela stretch on SH-10 in Odisha spanning 162 kms and Krishnagiri-Thopurghat Omallur on NH-44 (Old NH-7) in Tamil Nadu spanning 96 Kms.

Application of recommended design intervention solutions on APS Locations on the Sampalpur-Rourkela Highway (SH10)

Cat eye patch/ road studs

Action Consequence Signage

Storage Lane Solution – Cat eyes and yellow road marking

Impact

- Implemented at Sampalpur-Rourkela section (Odisha) at 5 identified Accident Prone Spot (APS) locations
- Successfully brought down the fatal accidents by 100% ('Zero' fatalities) through behavioural change in the drivers
- The solution was introduced on treacherous section of Thopurghat (Tamil Nadu) at 4 identified Black Spots and were able to bring down the fatalities by 80% in the last 3 years

Ashok Leyland

Road safety initiatives

Various road safety initiatives were undertaken at Ashok Leyland as follows:

- Road shows
- Awareness programs at schools and colleges
- Trucking centres and workshops with driver training institutes
- These steps were undertaken to spread awareness on safety while commuting or driving.
- Virtual programs carried out to enhance the reach to truck drivers and to make them aware of:
  - Road rules and regulations
  - Safer driving tips
  - How to apply first aid in case of an emergency
- The company identified that the problem of poor eye sight inflicted a good population of drivers and contributes significantly in road mishaps.
- As a result, they set up regular eye check-up camps which helped large number of drivers in identifying their problems and take proper corrective measures.
- The company also conducted special Safe driving sessions especially for fresher heavy motor vehicle drivers.
- They also provided road safety training to various other types of commercial vehicle drivers as well.
- Followed this up by conducting road safety programs at corporate customer sites, a few of the recognized customers were Delhi fire service, GMR group, Darcel group, Delhi airport authority, Delhi cluster depot Sicgil Industrial Ltd. and Indian Oil Perundurai plant.
- Apart from the awareness drives mentioned for the drivers, the company also conducted awareness drives at public places for the masses.
- The company also made efforts to reach out to government departments, traffic police, dealers and state transport unions and prisoners through their road safety programs.
- A special road safety program was conducted for women drivers across the country.
- They provided the drivers knowledge on blind spot awareness and identification of number plates.

Impact

- With the motto 'A skilled driver is a safe driver' Ashok Leyland trained 1.78 lakh drivers during FY 2021-22.
- Different types of colour coded (red, white and yellow) reflective safety stickers were applied on all vehicles.
- Creation of road safety awareness in young minds right from schools to colleges helped in creation of good road Samaritans in society.
- The drivers were inculcated with better driving habits and discipline that resulted in safer roads.
- HAZMAT training, AIDS and TB awareness camps also impacted lakhs of people.

Road Safety Training at Workshops

Safe Driving Session for Drivers

Regular eye check up camps for drivers

Traffic Wing, Punjab Police

Establishing Punjab Road Safety and Traffic Research Centre First of its kind in the country established under police

- The Punjab Road Safety and Traffic Research Centre (PRSTRC) worked towards creating a safer and more efficient system for road users in the state.
- The PRSTRC also worked in partnership with government departments, non-governmental organizations, universities and industry partners to promote research collaboration, develop innovative and effective road safety strategies and created solutions to long-term traffic problems.
- The main goal of the research centre was to reduce road accidents and injuries to the maximum possible extent, through the application of innovative research methodologies and practices.
- The mission of PRSTRC has been to identify key factors behind road accidents and then to apply it to a range of solutions for traffic system.
- The research team worked on five primary areas:
  - Road safety engineering: focused on research and analysis of road crash data, development of a better technologies to improve road safety.
  - Automotive safety and crash investigation: vehicular crashes and development of solutions to automotive safety technologies.
  - Awareness and capacity building: research of traffic management and awareness, provided training to road users.
  - Data analytics and Information technology :this department is responsible for development and deployment of advanced data analytics and information technology solutions for the analysis of road safety, traffic management data, and IT systems to support the Centre's research activities.
  - Geoinformatics: this department developed a GIS-based applications to support traffic management and safety. All the work including satellite mapping and drone survey.

Deployment of inhouse research and development road crash investigation vehicle

Smart barricade project LENS (Law Enforcement and Safety)

Impact

- Increased awareness about road safety and traffic management among citizens.
- Deployment of advanced technologies to monitor, analyze and improve road safety and traffic management.
- Identification of 784 accident black spots in the state and got central grant of 1100 crores for its rectification for the national highways.
- Have developed PATHS – Punjab assessment tool for highways safety, its own methodology to do road safety assessment of the highways.
- Developed own traffic management products, like smart barricade, 3D traffic light and crash investigation vehicle.

Lead Agency on Road Safety, State Transport Authority, Odisha

a) Operation Rakshak b) National Road Safety Short Film Festival

- The state aimed to bring down fatality due to deprivation of first-aid in the golden hour (first one hour of a road crash).
- The government visualized the concept of "Operation Rakshak" with the aim of 30 weeks – 30 districts – 300 master trainers – 30,000 first responders who could be anyone working at a eatery, or a small businesses establishments etc. in order to reduce road crash fatality due to lack of care in golden hour to half.
- People were taught to administer first aid and pre-hospital trauma care to accident victims within the golden hour.
- There was a Training of Trainer (ToT) program which was conceptualized in such a way that master trainers could train at least 1000 people in each district.
- To scale it up, the State Transport Authority has envisaged the launch of 'Operation Rakshak Junior' in the near future, in collaboration with the National Cadet Corps and the National Service Scheme, having a yearly count of 65,000 and 95,000 volunteers respectively, in Odisha.
- With millions of web users watching short films as they become the standard communication tool promoting values, culture and business ethics, encouraged the Transport department, Govt. of Odisha in taking up the National Road Safety Short Film Festival, 2022.
- To sensitize people on road safety, they organized the film festival, a first-of-its-kind event in the country.
- The public talent spectacle ensured word of mouth awareness across the grassroots levels of the citizens on social media, local news media with stories of talent from their region free of cost.
- There were certain innovative aspects in the film festival like, Cyclothon (Let's ride for road safety), screening at the steel city and a film expo at Jagannath Dham.

Impact

- People took the initiative to save lives by giving the required first aid without any fear as they have been made aware of the Good Samaritan Policy which gives a 2000 rupees reward to those who help road crash victims.
- 3126 First responders have been trained by Automobile Skills Development Council (ASDC) while the operation was in first phase.
- In the second phase, 8263 First Responders were trained.
- The short film festival was a successful case study of crowd sourcing, collaboration and creative expression with 230 entries.
- 300 plus film screenings were conducted across 30 districts, where more than 1 lakh people saw the films which included students from schools and colleges and HMV drivers.

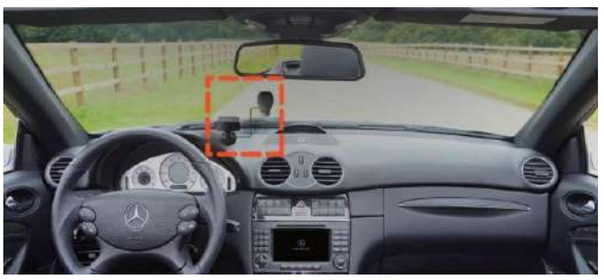
First responder's training under operation 'Rakshak'

National Road Safety Short Film Festival 2022 at Puri, Odisha

Adani Total Gas Limited (ATGL)

Adani Total Gas Limited's Automation in road safety and driver monitoring

- Adani Total Gas Limited incorporated various measures under their automation in road safety and driving monitoring initiative.
- As a part of their In-vehicle monitoring system (IVMS) implementation, all ATGL vehicles (hired/owned) since the first day of operation had to monitor their operations in real time and provide alerts to control room.
- Daily violation report is shared with all supervisors, transporters and respective coordinators at site.
- Centralized fleet control room, was setup wherein monitoring and live tracking of vehicles was done and level-1 emergency response was also provided on 24x7 basis.
- Driver Management System (DMS) + Advanced driver assistant systems (ADAS) were used to monitor driver behaviour, measuring fatigue and working hour violations.
- Journey risk management that made journey plans by mapping safest routes and shared with drivers to reduce crashes.
- Defensive driver training, (both classroom and practical) after completion of which an ATGL boarding driver pass is received.
- Regular spot checks were done through breath analyzers to prevent drink and drive instances.
- Monthly transporter meetings were held for concerns and feedback of drivers and supervisors.
- A dedicated 4 member team was setup to monitor the overall driving operations and safety.
- Road safety week campaign with the slogan 'Sadak Suraksha Jeevan Suraksha' and all supervisors and drivers were a part of it.
- The campaign was conducted for improving road safety awareness.



Device is placed besides the wheel, facing the driver

Footage from various camera angles in the driver state monitoring system

Devices used in driver state monitoring systems

Impact

- Reduction in safety violations were quite evident as they went from 56 to 8 per day.
- There was no fatality due to road safety for the past 3 years.
- Vehicle average running increased from 110 km/day to 182 km/day due to the road safety measures taken.
- Drivers mandatorily got to rest for 30 minutes after 3 hours of continuous driving.
- As part of the green initiative 100 % of light commercial vehicles were converted to CNG powered (389 out of 389).

Maruti Suzuki India Limited

Road safety education and enforcement initiatives

- The company took their road safety and skill development part of their corporate social responsibility to the next level through its successful road safety education and enforcement campaign.
- Numerous innovative initiatives were realized by Maruti Suzuki to improve driving skills through professional driving training, increase compliance with traffic rules and enhance road safety consciousness.
- The company introduced important institutes across the country such as:
- 8 Institutes of Driving & Traffic Research (IDTR) & 23 Road Safety Knowledge centers (RSKC) in association with six state governments. The IDTRs imparted quality and safe driving training to varied types of drivers including commercial drivers, police personnel, corporate employees and tribal youth.
- IDTRs used scientifically designed test tracks, driving simulators and a well-defined curriculum to conduct learner, refresher and evaluation courses for drivers of light motor vehicles, heavy motor vehicles, two wheelers, three-wheelers as well as forklift.
- RSKCs provided training to learners' license aspirants and traffic violators and played a very vital role in imparting necessary and prerequisite knowledge about driving to the learner license aspirants and road rules and road safety knowledge to traffic violators.
- Automated Driving Test centers (ADTC) were specially designed tracks for conduction of driving tests, equipped with high-resolution cameras to capture real time footage of tests and analytics-based assessment tools to help in the issuance of driving licenses more transparently and efficiently.
- Innovative features of ADTC were its state of the art driving test tracks with different track formations, the use of technology for comprehensive and transparent testing of drivers, and the entire process ensuring accuracy, and repeatability whilist minimizing human intervention.
- Traffic Safety Management System (TSMS) were implemented for the Delhi police at 13 road junctions.
- TSMS comprises 3D radars and high resolution cameras that simultaneously capture traffic violations such as over-speeding, red-light violations, stop line violations and wrong side driving happening at traffic junctions.

Impact

Since the inception of these 4 centers by Maruti Suzuki,

- Around 43 Lakh individuals were trained through Institute of Driving and Traffic Research and Road Safety Knowledge centers.
- 5 Lakh individuals have taken driving license tests through automated driving test centers.
- 33 Lakh e-prosecution slips (challans) were issued with the help of traffic safety management system.
- More than three lakh individuals received driving training through both IDTR and RSKCs
- Close to 1.3 lakh learner license aspirants and 35,500+ traffic violators were trained.
- 173 Number of Driving trainers trained to create a multiplier effect in other driving schools.

One of the Automated Driving Test Track (ADTT) Centers setup at Delhi (Mayur Vihar)

Light and Heavy Vehicle Simulators inside the Institute of driving and traffic research

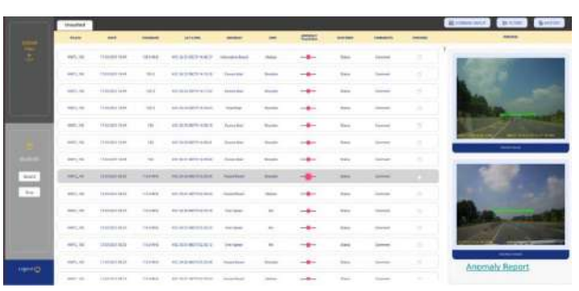
L&T Infrastructure Development Projects Ltd.

iHAMS (intelligent Highway Asset Management System) for improving road safety and enhanced monitoring of roadside furniture and road assets

- iHAMS was developed to ensure reduction of crashes and road injuries due to delayed repair works or other necessary corrective actions that were required to take place on the road in use.
- It was an AI based solution that helped overcome the problems faced in road monitoring which was more of a manual process, time consuming, error prone data collection and limited reporting.
- The main benefits of this innovative device were, the digitization of highway assets, enhanced road safety, effective monitoring of highway assets, better progress monitoring of repair work of assets.
- iHAMS was also used to improve effectiveness of data collection, reporting and improvement of the overall day to-day road maintenance including the safety of the road users through proactive actions by detection of potholes, cracks, street light working, water stagnation, encroachments, hoardings, cattle movement, guard post, guard rail, mud accumulation, and unauthorized median opening.
- Video data is collected through dashcam footage of route patrolling vehicles.
- This data is run through a proprietary AI that will detect any missing, vandalized and accidental damaged assets.
- The result of the surveys is reported in an online based customizable dashboard for maintenance teams.
- The Management dashboard comprised of three modules: Master Data Library, Shift Data Analysis and Data Analytics

iHAMS setup installed in a vehicle

Result from iHAMS technology being used



The iHAMS GUI

Impact

- First implementation in the country that encompassed over a 100 number of assets and covered a wide range of features.
- Monitored numerous road assets, both fixed and linear assets along with the routine pavement defects and compliments the manual inspections with its pre-emptive detection, thus brought in more transparency and accountability.
- Effective monitoring of highway assets which took away the manual process of entering and auditing vast amounts of observational data, thereby resulting in reduction of time taken to take necessary corrective actions.
- Actionable insights are achieved through machine learning data analytics algorithm.
- Reduction of theft and increased safety of highway assets.

Netradyne Technology

Improving driver behaviour and reducing road accidents with the use of AI and ML based IoT Solution

- A driver focused safety platform that has an weekly virtual coaching review and lessons on the app.
- Driver▸i® safety camera system uses artificial intelligence, machine learning, and dynamic edge computing to create a new safe driving standard for commercial vehicles.
- Some salient features of this device were:
- In-cab auto alert and surround area scan for traffic to detect safe and dangerous distances.
- AI-enabled smart IoT solution for visibility into event types.
- Automated AI-powered coaching for drivers for risk mitigation.
- 270 degree HD camera view for visibility on the road, driver and two side windows.
- Cutting edge features like - driver app, safety management, dynamic edge computing and real time alerts through internal sensors.
- The device also helped in reduction of driving incidents and protects against false claims.

Impact

- Being a good's carrying company, profitability of the company has been impacted by increasing vehicle uptime, lowered accident costs, lowered insurance costs and most importantly, saving lives!
- 50% reduction in road-accidents since the use of Netradyne's Driver▸i® in its transport system.
- 80% reduction in distracted driving and alerts with help of this device.
- 1.2 to 0.08 the reduction in violation warnings for every 200 minutes of driving, contributing to the development of a culture of safe driving leading to reduced violations and lesser vehicle operating cost.
- Significant improvement in driver-behaviour on the road, as a result making roads safer for all.
- The AI-enabled smart IoT solution offered them visibility into the event types, and provided access to footage that users have successfully used for exonerations.
- Cloud based solution helped in better tracking of hazardous or precious cargo in transit.

Netradyne's Driver▸i® safety camera system

Real time coaching and In-Cab alerts by Driver ▸i®

Shiv Nadar School, Gurugram

Safety of students in transit, traffic management outside the school and students' project - HIFAZAT

For safety of students in transit:

- The Shiv Nadar school envisioned providing safer, greener travel to all of its students.
- In order to achieve this goal, the staff was trained to handle fire accidents, provide basic first aid support, safe evacuation from the bus.
- The school planned to minimize travel time of students as much as possible without risking over speeding and rash driving.
- Accordingly, safe and closest pickup/ drop point from/to their residence was determined.
- For assuring that speed limit is followed by all, live tracking of school buses was done by the school as well as respective parents through the use of app based solution provided by the school.

For traffic management outside the school:

- Along with the students in transit the safety of students on foot i.e. the walker students was also of paramount importance to the school, for which the following steps were taken -
- Barricade in areas of drop and pick up areas where walking students enter/exit the school premises
- Didis and caretakers accompany students and maintain discipline amongst them while they arrive/leave from school till their parent/s pick them
- Control of bus and car movement on road by security of school and by didis and caretakers for smooth management of student's safety on road
- ID and escort checks and related alert messages are sent to parents through the school's app
- All entry and exit are under CCTV surveillance and monitored live all the time the school is functional
- Dedicated school Ambulance on site to provide medical aid in case of any emergency

Live CCTV monitoring of students in transit

The device HIFAZAT and its implementation

For Students Project HIFAZAT:

- Webcam is placed on dashboard to capture driver's face and hands. It uses artificial intelligence to get calibrated eye aspect ratio to gauge driver's state of mind (e.g. drowsy, lethargic) and uses ear to hand distance parameter to check if driver is on phone while driving.
- The device is incorporated with camera view obstruction detection, speeding detection and remote access to operators.
- If the driver is found violating any of the rules the fleet operator is alerted through the app.

Impact

- As a result of the measures implemented, lesser traffic congestion and air pollution near school premises and surroundings was observed
- Due to live monitoring of buses, entry/exit points helps school to remain alert at all times when the buses are functioning
- Bus sweep protocol helped to ensure that there was no objectionable material in the bus, no student was left sleeping, all safety equipment's were functional, regular maintenance and upkeep of the vehicle
- Daily breath test helped curb driving under influence of alcohol

DAV Public School, Vasant Kunj, New Delhi

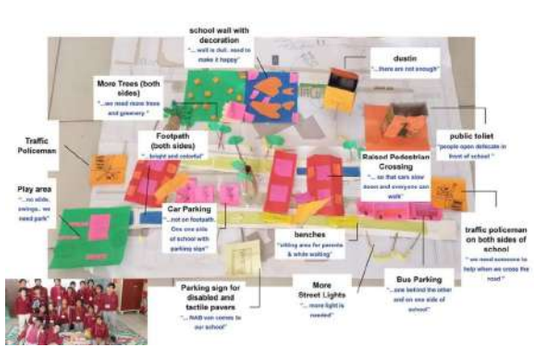
250 Meters of Happiness

- This project was conducted by the school in association with HumanQind NGO, as part of their crosswalk initiative.
- The school adapted a holistic program developed using a bottom up plan for school accessibility and safety with the help of students.
- A batch of 50 children (age 9, grade 4) were selected and they expressed, re-imagined and collaborated to envision and co-design '250m of Happiness' in front of their school to create a pilot project for the school, local neighbourhood and for the city.
- The school made projects that enhanced students' civic leadership as they engaged with communities and stakeholders.
- The school adopted a student first approach and partnered with all pillars of school system (parents, alumni, staff, administration and politician.
- For this initiative, a design thinking curriculum was implemented at the school, in which the nominated class of 50 students attended 9 workshops in order to plan for their school street safety and then a school level exhibition and an outreach where students, teachers, school and community stakeholders voted for the proposal to become a reality eventually.

Impact:

- The project has won The Global Honor Award for Local Project Challenge (Professional category) to Accelerate the SDGs at UN World Urban Forum, 2020
- Pilot project for GNCTD, Transport Department High Impact Project Safe School Zone project , creating one model safe school zone in every district with HumanQind & TRIP Centre, IIT Delhi.
- The project has been discussed in the Road Safety Summit 2021 and Road Safety Summit 2023.
- It impacted 10,000 students across 4 schools that used the same street.
- 7000 sq. m of urban space in the capital was codesigned with the help of students of India.
- Students proposed better footpaths, waiting areas for parents, set by appropriate speed limit for slower school streets, accessible crossings, street lighting and signages that were implemented on their school's street.
- Through the innovative 21st century & experiential learning curriculum, students were able to engage and improve life skills like confidence, critical thinking, curiosity, problem solving, empathy. Which didn't only help them in the field of road safety but also in other subjects as well as beyond schools.

Students made designs during workshops as part of the initiative '250 meters of Happiness'



Students collaborated and co-designed access to school

Bringing all the stakeholders and government together and made a vision a reality

Notes

Glossary

Term	Definition
ADTT	Automated Driving Test Tracks
AI	Artificial Intelligence
ASI/SI	Accident Severity Index ((Total Fatalities/ Total Crashes)x100)
CAGR	Compounding Annual Growth Rate
CPWD	Central Public Works Department
CSR	Corporate Social Responsibility
EY	Ernst & Young
FICCI	Federation of Indian Chambers of Commerce and Industry
FY	Financial Year
GDP	Gross Domestic Product
DIDC	Gujarat Industrial Development Corporation
GPS	Global Positioning System
GR	Growth Rate
HIC/(s)	High-Income Country/(ies)
IIT	Indian Institute of Technology
iRAD	Integrated Road Accident Database
IRC	Indian Roads Congress
ITMS	Intelligent Transportation Management System
KPI	Key Performance Indicator
LMIC/ (s)	Low- and Middle-Income Country/(ies)
MeitY	Ministry of Electronics & Information Technology
MoRTH	Ministry of Road Transport and Highways
NCAP	New Car Assessment Program
NIC	National Informatics Centre
OSRTC	Odisha State Road Transport Corporation
PWD	Public Works Department
RS	Road Safety
RTO	Regional Transport Office
SCCoRS	Supreme Court Committee of Road Safety
SDG	Sustainable Development Goal
UN	United Nations
WB	World Bank
WHO	World Health Organisation

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