

Road Safety: An Overview

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Abstract—Transport is fundamental to supporting economic growth, creating jobs and connecting people to essential services such as healthcare or education. But in many developing countries, the benefits are not being realized. One billion people still live more than 2km away from an all-weather road, where lack of access is inextricably linked to poverty. One in six women globally do not look for jobs out of fear of harassment in transit. Road crashes claim over 1.19 million lives every year, 93% of them in developing countries.

In September 2020, the UN General Assembly adopted resolution A/RES/74/299 "Improving global road safety", proclaiming the Decade of Action for Road Safety 2021-2030, with the ambitious target of preventing at least 50% of road traffic deaths and

injuries by 2030. WHO and the UN regional commissions, in cooperation with other partners in the UN Road Safety Collaboration, have developed a Global Plan for the Decade of Action, which was released in October 2021.

The Global Plan aligns with the Stockholm Declaration, by emphasizing the importance of a holistic approach to road safety, and calling on continued improvements in the design of roads and vehicles; enhancement of laws and law enforcement; and provision of timely, life-saving emergency care for the injured. The Global Plan also reflects the Stockholm Declaration's promotion of policies to promote walking, cycling and using public transport as inherently healthy and environmentally sound modes of transport.



I. INTRODUCTION

A. India: Who Report

India accounts for about 10% of road crash fatalities worldwide:

Estimates suggest that India lost approximately 300 000 lives due to road crashes in the year 2016. Upto 50 times this number suffered injuries, with some of them developing disabilities. A majority of those

dying on the roads are pedestrians, cyclists and motorcyclists.

According to official statistics published by the Ministry of Road Transport and Highways (MoRTH), 153,972 persons were killed in road crashes in the year 2021. This corresponds to 11.3 deaths per 100,000 population. (IIT-DELHI)

A. Road Safety in India: Who Report:

Estimates suggest that India lost approximately 300 000 lives due to road crashes in the year 2016. Upto 50 times this number suffered injuries, with some of them developing disabilities. A majority of those dying on the roads are pedestrians, cyclists and motorcyclists. According to government data, young people are more vulnerable, especially those who are the sole bread-earners for their family. The economic loss from road traffic injuries is expected to be approximately 3% of the country's gross domestic product.

Many road crashes are a result of faulty road design and engineering. Non-adherence to legislation is a major reason for road crashes. While over speeding remains the most common reason for road fatalities, other contributing factors include driving under the influence of alcohol, driving on the wrong side of the road, jumping red lights, using mobile phones while driving, not wearing a securely strapped quality helmet, skipping wearing the seat belt and fatigue. There is an urgent need for multisectoral response to address this growing challenge.

A road traffic injury is a fatal or non-fatal injury incurred as a result of a collision involving at least one moving vehicle. Globally, there were 1.25 million road traffic deaths in 2013. As against popular perception and usage in common parlance, a road traffic injury is not an accident. Oxford dictionary defines the term accident as "an event that happens by chance or that is without apparent or deliberate cause." There are known risk factors leading to road traffic injuries. Most road traffic injuries and fatalities are largely preventable.

II. UN DECADE OF ACTION

Progress made during the previous Decade of Action for Road Safety 2011-2020 has laid the foundation for accelerated action in the years ahead. Among achievements are inclusion of road safety on the global health and development agenda, broad

dissemination of scientific guidance on what works, strengthening of partnerships and networks, and mobilization of resources.

This new Decade of Action [2021-2030] provides an opportunity for harnessing the successes and lessons of previous years and building upon them to save more lives.

The Global Plan for the UN Decade of Action for Road Safety 2021-2030 offers a blueprint for policy makers to create national and local road safety plans. It calls for a new vision for mobility that puts safety first, adopts a wholistic and systems-focused approach, and ensures that all stakeholders meet their responsibilities.

'We must urgently move from an old model of drab, dirty and dangerous streets built for cars, to safe, green and vibrant spaces designed and built for people. Mobility underpins so many other aspects of public health and development. By making walking and cycling safe, we can reduce air pollution and fight climate change. By prioritizing the safety of vulnerable road users like pedestrians and cyclists, we can reduce poverty and tackle inequalities, including access to jobs, schools and gender equality,' said Dr Nhan Tran, Head of Safety and Mobility at WHO.

III. WHO IS AT RISK

A. Socioeconomic status

More than 90% of road traffic deaths occur in low- and middle-income countries as people violate traffic rules and there is also dearth of infrastructure. Road traffic death rates are highest in the WHO African Region and lowest in the European Region. Even within high-income countries, people from lower socioeconomic backgrounds are more likely to be involved in road traffic crashes.

B. Age:

Road traffic injuries are the leading cause of death for children and young adults aged 5–29 years. Two thirds of road traffic fatalities occur among people of working age (18–59 years).

C. Risk Factor:

The safe system approach: accommodating human error

Transport systems should be responsive to the needs of users and forgiving of human error. The safe

system approach to road safety aims to ensure a safe transport system for all road users.

This approach takes into account people's vulnerability to serious injuries and recognizes that the system should be designed to accommodate human error. The cornerstones of this approach are safe roads and roadsides, safe speeds, safe vehicles, and safe road users, all of which must be addressed in order to eliminate fatal crashes and reduce serious injuries.

D. Role of Enforcement:

If traffic laws on drink-driving, seat-belt wearing, speed limits, helmets and child restraints are not enforced, they cannot bring about the expected reduction in road traffic fatalities and injuries related to specific behaviours. Thus, if traffic laws are not enforced or are perceived as not being enforced, it is likely they will not be complied with and therefore will have very little chance of influencing behaviour.

Effective enforcement includes establishing, regularly updating, and enforcing laws at the national, municipal, and local levels that address the above-mentioned risk factors. It includes also the definition of appropriate penalties.

D. An Overview of Road Traffic Fatalities in India:

YEAR 2022: A total number of 4,61,312 road accidents have been reported by States and Union Territories (UTs) during the calendar year 2022, claiming 1,68,491 lives and causing injuries to 4,43,366 persons. The number of road accidents in 2022 increased by 11.9 percent compared to previous year 2021. Similarly, the number of deaths and injuries on account of road accidents were also increased by 9.4 percent and 15.3 percent respectively

YEAR 2021: According to official statistics published by the Ministry of Road Transport and Highways (MoRTH), 153,972 persons were killed in road crashes in the year 2021. This corresponds to 11.3 deaths per 100,000 population. (IIT-DELHI)

Over the last decade (2009-2019) road traffic crashes have been 13th largest contributor to health burden (deaths and disabilities) in India. For the working age population (15-49 years), they are the sixth largest contributor.

The number of cars and motorised twowheelers (MTW) registered in 2020 was 43.73 and 243.5 million respectively. The official registration data overrepresent the number of vehicles in actual

operation because vehicles that go off the road due to age or other reasons are not removed from the records. The actual number of personal vehicles on the road is estimated to be 50%-60% of those mentioned in the registration records

There is evidence suggesting that number of road deaths in India is underreported, however, its extent is not well understood. 'Global Burden of Diseases, Injuries, and Risk Factors Study' estimated that in 2019, deaths (95% confidence interval: 159,343 - 250,315) due to road injuries occurred in India.

This estimate is 40% greater than government-reported number of deaths. A National Burden Estimates of Healthy Life Lost in India study, using Sample Registration System (SRS) estimates of deaths by different causes, reported 275,000 road deaths in 2017. This estimate is 82% higher than the government-reported number (150,785) for the corresponding year.

Annual reports published by Ministry of Road Transport and Highways (MORTH) and National Crime Records Bureau (NCRB) are based on police data. The official estimate of non-fatal RTI in 2021 was 371,884 which probably underestimates injuries requiring hospitalization by a factor of 5 and all injuries by a factor of 20. These data should not be used for studying the epidemiology of nonfatal road traffic injuries (RTI) in the country.

Annual reports published by Ministry of Road Transport and Highways (MORTH) and National Crime Records Bureau (NCRB) have erroneously reported district-level deaths for million-plus cities. In some years, they have reported correctly for the cities. Because of this inconsistency, data showing the yearly changes in road deaths in the cities are not reliable.

The numbers and proportions of different road users killed and injured as mentioned in Ministry of Road Transport and Highways (MoRTH) reports are erroneous and cannot be used for any analysis.

This situation can only be improved by MoRTH with a complete revamp of the data collection systems in collaboration with the Ministry of Home Affairs and establishment of a professional data and analysis department.

E. Analysis of Data at National Level:

Tiwari, Geol and Bhalla Tables dealing with causes of road traffic crashes should not be used for any analysis or policy making. These are generally noted

by the local investigating officer in the police station for purpose of court proceedings This situation can only be improved by MoRTH with a complete revamp of the data collection systems in collaboration with the Ministry of Home Affairs and establishment of a professional data and analysis department.

It is not known why the involvement rate of children (59 years) in India is lower than that in the USA when a large number of children walk, cycle and travel on overloaded vehicles to school in India. Reasons for these differences need further study.

Higher level of underreporting of road deaths among older adults, as indicated by independent population-level surveys, may explain this inconsistency for older adults Among the states with more 10 million population contributing 98% of country’s road deaths, during the 5-year period from 2015 to 2019, road death rates have reduced in half the states and have increased in the other half. Significant reductions occurred in Puducherry (39%), Nagaland (35%), Chandigarh (29%), and Mizoram (21%) while significant increases were recorded in Bihar (44%), Tripura (31%) and Chhattisgarh (30%) Death rates have increased by more than 20% in Uttar Pradesh, Bihar, Madhya Pradesh, Jharkhand, Assam, Chhattisgarh, Tripura, and Manipur (names in the decreasing order of population).

This is a worrying trend as these states cumulatively contribute one in three road deaths in India. Much more attention will have to be given to street and highway designs and enforcement issues that have an influence on vulnerable road user safety than current

practice of focussing on motor vehicles. This will require a great deal of research and innovation as designs and policies currently being promoted do not seem to be having the desired effect in improving road safety. Since road death rates in states and union territories do not seem to be influenced strongly by location in the country (culture) it suggests that state RTI fatality rates may be more influenced by road infrastructure availability, vehicle modal shares, road design, and enforcement.

The total number of deaths in 2021 was 13.2 times greater than in 1971 with an average annual compound growth rate of 6%, and the fatality rate in 2021 was 5.3 times greater than that in 1971 with an AACGR of 4% The only way the decline of RTI fatalities can be brought forward in time is to institute evidence-based India-specific road safety policies that are more effective The official estimates of share of pedestrian among all road deaths are extremely low compared to independent researchers’ estimates (~19% vs ~35%), therefore, official estimates for all other modes will also be wrong. The error in the official reports regarding types of road users killed probably arises from a wrong coding of the victims’ status and the procedure needs to be reviewed carefully and revised.

The impact of Motor Vehicles (Amendment) Act that was passed in August 2019 cannot be evaluated without monthly data and a greater understanding of the extent of its implementation across the states. Due to COVID restrictions in 2020 and 2021, it may be few years before a robust analysis could be done to understand its effectiveness.

Jammu & Kashmir-Ut:An Overview

Annalysis At J&K-Ut Level:

YEAR	TOTAL ACCIDENTS(RTIs)	TOTAL DEATHS/FATALITIES	TOTAL INJURED
2021	5452	774	6972
2022	6092	805	8372
2023	6298	893	8469
2024	1214	185	1530

Mostly pedestrians and 2-wheeler riders which needs a detailed analysis.

IV. SRINAGAR CITY

The State of Jammu & Kashmir during the last decade (2001-2011) recorded a growth rate of about 23% exceeding the national growth rate of about

17%. As per the Census of India 2011, the State has about 27% (3.4 million) of its people living in urban areas. The State's urban population increased by 36.42% during last decade higher than the national average of 31.1% and much higher than decadal growth rate (19.42%) in case of rural areas at the State level.

Rapid population growth and unplanned urbanization is fast resulting in depletion, deterioration and over-extraction of the ecological resources. Protecting our rich biodiversity is directly tied with the city 's sustainability and attractiveness as a place to live, work and visit. It is also clear that addressing environmental issues at the city level will not be possible without appropriate urban planning interventions. Resilience to potential environmental disasters can be increased through proper urban and land use planning (UN-HABITAT, 2010).

Enforcement is Jand k is a daily drill done by Traffic police, Motor vehicles department and Mobile magistrates as per roaster. E challan is being done in main cities besides awreness in universities, Educational institutions ,bus stands,

Special focus on school busse sis being given during the year 2024 we celebrated school safety week in Srinagar and conducted Transport Safety Audit of almost 20 schools and 400 Govt schools which emphasizes use of school busses as per Ais 063 Code, Proper Signages In And Around School, Traffic Calming Measures Like Humps, Speed Breakers, Cobble STONES, Infrastructural development like footpaths for those students who walk the vision is Safe school Transportation of students.

The Master Plan has the spotlight to integrate urban planning to environmental sustainability emphasizing governance by environmental agencies, institutions and stakeholders. This chapter is focused on protecting and restoring our ecology, and improving the environmental conditions of the city to sustain urbanization.

Srinagar City and its surrounding areas has an extensive ecological footprint of rivers, streams, lakes, canals, wetlands, forests, hills, gardens, orchards and agricultural fields. Anchar, Kushalsar, Dal Lake, and Nageen Lake are some of the significant lakes and Hokersar and many smaller wetlands are the ecological assets of the region. River Jhelum runs through the Valley and old Srinagar city was built around it.

The Kashmir Valley is surrounded by lofty Himalayas on all sides.

The Glacial Flooding and Jhelum River have sculpted much of the city 's topography over tens of thousands of years. Srinagar City lies in an ecologically fragile region with a number of wetlands, lakes and other water bodies. The Floods of September 2014 exposed the vulnerabilities of the city and the inevitability of a cautious and structured planning process for its survival.

The structure of the planning process has to be comprehensive and hierarchical using the scientific data in the form of layers based on geology, hydrology, soils, fault lines, floods and seismic vulnerability.

The Master Plan-2035 is a comprehensive public policy document calibrated to ground realities. The plan is at a departure from archaic planning efforts in terms of its public policy approach, development regulations, implementation mechanism, resource mobilisation, mixed landuse regulations etc.

The Master Plan has been prepared for a threshold population of around three million by 2035 spread over an area of 766 Sq. Km. The Srinagar Metropolitan Planning limits have been increased from 416 Sq. Km to approximately 766 Sq. Km., i.e.; 84% increase.

The Local Area of SDA stands already notified vide SRO-429 dated 21.10.2014 (including the municipal areas of Srinagar Municipal Corporation and that of Budgam, Ganderbal, Pampore and Khrew ULBs and additional 160 villages as outgrowths in twelve tehsils of Six districts viz; Srinagar, Budgam, Ganderbal, Pulwama, Bandipora and Baramula).

Urban Transport: We Must Develop Both Motorised Public (Maas) Transport with Service Mix and Non-Motorised Modes:

Smart City Has Done Some Interventions but A Lot More Need to Be Done with A Vision on Sustainability as City Is Expanding, We Witness Urban Sprawl.

We Lack Public Transport Same Needs Augumentation.

Inland Transport Must Be Revived

Urban Mobility: Srinagar with annual population growth rate of 2.0 per cent has registered a phenomenal increase in vehicular population during the last decade. Its vehicular traffic is increasing rapidly at more than 7.0 per cent per annum.

1. Due to this rapid growth of vehicles vis-à-vis marginal increase in road infrastructure, the problems related to transportation have grown manifold. Traffic congestion is already severe on many city roads and the gridlock plaguing Srinagar has reached a tipping point, with the region spending millions of man hours in traffic congestion each year.

2. Vehicular pollution is assuming critical dimensions and parking problems are aggravating. These problems among others will grow in size and scale unless action is taken now. We are witnessing acute health problems.

3. Two comprehensive Traffic and Transportation Plans have been prepared for Srinagar city which include the Srinagar Urban Transport Project 1992 and Comprehensive Mobility Plan (CMP), 2012 (by Rail India Technical and Economic Services) but not a single step has been taken so far. As per CMP, about 36% of urban road space is consumed by private modes (Cars/TWVs) which share about 30% of the total motorised passenger trips.

4. On the other hand, public transport using 44% of road space caters to 71% of the total motorised passenger trips in main city areas; however, in the periphery at outer cordon stations, public transport consumes only 13% of the road space while sharing about 70% of the motorised passenger trips.

5. Interestingly, buses and mini-buses occupying just 8% of the existing road space cater to 32% of the total motorised passenger trips.

Existing transport network is characterised by inefficient pattern, inadequate widths, missing links, bottlenecks, flawed design of intersection curves etc.

6. The total existing road network of Srinagar Local Area (SPA) is 03 percent with average link length of 0.50 Km. As per CMP, 60 percent road length measures less than 10 metre in RoW (6.5 metre c/w) while only 15 percent road length is having RoW more than 20 metre.

7. The four-lane to six-lane c/w configuration is only for almost 12% length while about 90% of the existing road network has undivided carriageway without roadside footpaths² even though pedestrians constitute a major proportion of road users.

8. The Master Plan proposes to create streets for everyone, and reform the practice of designing streets solely for use by automobiles. They are designed and operated to enable safe access for all users, including

pedestrians, cyclists, motorists and transit riders of all ages and abilities.

9. Srinagar has geographical disadvantages with physical thresholds like mountains, wetlands, and water bodies which turn out to be the major constraints in the development of an organised road network but scope for Active Transportation Exists.

10. The city road network is cramped because of missing links, incomplete rings, inefficient radials, bottlenecks, etc. Some of the radials like Rangreth Road, Airport Road are virtually dead ends as they are not connected to any major arterials. Also the location of strategic installations across city has been another key impediment in the development of efficient transport network. Srinagar has historically developed with a radial road network spanning in north, south and west directions.

All the radials are witnessing extreme traffic flows much beyond their capacities, hence poor level of service.

The city road network needs a complete relook so that an efficient and sustainable transport network is developed to cater to the future demand. As per the travel demand model based on Business As Usual (BAU) scenario given in the CMP, daily intra-city travel demand is projected to 3.6 million person trips by 2031.

As per the model, overall modal share for public transport by 2031 is estimated to be 61% down from 80 percent recorded in 2011. Therefore, major challenge will be to sustain the modal choice in the years to come.

The Master Plan envisages a sustainable and inclusive transportation system for Srinagar city and underlines the need for keeping the share of non-personal transport at 65– 75% to achieve the goal of National Urban Transport Policy (NUTP), 2006.

If Srinagar city and its suburb are allowed to grow without any intervention towards sustainable transport system, the city may witness systemic breakdown.

The guiding principle of this Master Plan, accordingly is to place People before Cars for their mobility on city roads. For this, walking and bicycling have to be made safer and public transport more proficient and attractive.

The traffic characteristics of Srinagar reveal that there are huge enablers existing in our city which need to be properly exploited to develop a safe, reliable and comfortable public transport system.

The primary requirement would be the identification of potential public transport corridors supported by a High-Capacity Transport System (HCTS). The policy Annalysis At J&K-Ut Level:

has been supported by strategic densification linked to the road hierarchy as one of the basic concepts adopted in the landuse model of Srinagar. Accordingly, a mass transport network has been identified to meet the future travel demand of the city.

Year	Total Crashes.	Total Deaths/Fatalities	Total Injured
2021	5452	774	6972
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Mostly pedestrians and 2-wheeler riders which needs a detailed analysis.

Overview Of Public Transport in Srinagar City:

Mode Of Public Transport	Total No of Busses/Mini. Busses/Cc. (Operational). One Way-Trip- Basis: Occupancy Ratio: Full	Passengers Carried.
Smart City Busses (Intercity)	90.	14000 Approx. Per Day
Mini Busses	503.	25000 Approx.
Contract Carriages	519.	9000 Approx.
Autos Etc	22471.	1.60 Lacs.
Total	4000.	4000.
	212000 Persons Per Trip/Per Day.

Besides Road transoortcorporation has established depots for District services and Intercity almost 400 busses besides trucks 453

Overall Transport Sector needs revival. During last few decades they are the nucleus of development in all sectors within JK-UT as such needs a package from the government to Strengthen its operation .

Day by day people use and depend on CARS/TWO WHEELERS its dependency has been growing at a fast pace if we don't give proper alternatives to commuters.

F. International Knowledge Base:

Imposing stricter penalties (in the form of higher fines or longer prison sentences) will not affect road-user behaviour significantly. In general, the deterrent effect of a law is determined in part by the swiftness and visibility of the penalty for disobeying the law, but a key factor is the perceived likelihood of being apprehended on the road and sanctioned Driver or pedestrian education programmes by themselves usually are insufficient to reduce crash rates.

The only effective way to get most motorists to use safety belts and motorcyclists to wear helmets is with good laws requiring their use and strict enforcement Use of seatbelts and airbag-equipped cars can reduce car-occupant fatalities by over 50% Use of daytime running lights on cars shows a reduction in the number of multi-vehicle daytime crashes by about 10–15%. Similar results have been confirmed for the use of daytime running lights by motorcyclists Traffic-calming techniques, use of roundabouts, and the provision of bicycle facilities in urban areas provide significant safety benefits.

A great deal of additional work needs to be done on rural and urban road and infrastructure design suitable for mixed traffic to make the environment safer for vulnerable road users. This would require special guidelines and standards for design of, (a) roundabouts, (b) service lanes along all intercity highways, and (c) traffic calming on urban roads and highways passing through settlements safe Crossings at intersections or subways.

Way Forward:

Establishment Of Transport Research Institute:

Road Safety Audit of All Highways/Roads.

Reserve adequate space for non-motorized modes on all roads where they are present. Notification and enforcement of mandatory use of helmet and daytime headlights by two-wheeler riders Traffic calming in urban areas and on rural highways passing through towns and villages.

Scientific study on Travel demand estimation through District Road Safety Committees.

G. Revival of Depots /STUs across country.

Construction of service lanes along all 4-lane highways and expressways for use by low-speed and non-motorised traffic Removal of raised medians on intercity highways and replacement with steel guard rails or wire rope barriers.

Modern knowledge regarding pre-hospital care should be made widely available with training of specialists in trauma care in the hospital setting vi Tiwari, Geol and Bhalla.

Development of street designs and traffic calming measures that suit mixed traffic with a high proportion of motorcycles and non-motorized modes Highway design with adequate and safe facilities for slow traffic Pedestrian impact standards for buses and trucks Evaluation of policing techniques to minimize cost and maximize effectiveness Effectiveness of pre-hospital care measures.

Traffic calming measures for mixed traffic streams including high proportion of motorised two-wheelers Establish National Board/Agency for Road Safety Establish a special central department for coding and recording all fatal crash data.

The data so collected should be anonymised and made available publicly for analysis Establish safety departments within operating agencies Establish multidisciplinary safety research centers at academic institutions.

H. Improved conditions for Non-Motorised Modes :

Traffic Calming tends to improve pedestrian and cycling conditions. Reduced vehicle traffic speeds and volumes tend to make walking and cycling. Safer, more comfortable and more convenient.

Many people place a high value on street design features that improve safety and mobility for non-motorised transportation.

Noise, Air Pollution and Aesthetics Traffic calming generally reduces traffic noise. Speed reduction from

50 to 30 km/h typically reduces noise levels by 4-5 decibels¹⁰, or more in certain circumstances. Strategies that reduce traffic speeds to about 30 km/h and smooth traffic flow also reduce air pollution.

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