Review Article

Road traffic deaths, injuries and disabilities in India: Current scenario

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ABSTRACT

In 2005, road traffic injuries resulted in the death of an estimated 110 000 persons, 2.5 million hospitalizations, 8–9 million minor injuries and economic losses to the tune of 3% of the gross domestic product (GDP) in India. If the present trend continues, India will witness the deaths of 150 000 persons and hospitalization of 3 million people annually by 2010, increasing further to 200 000 deaths and more than 3.5 million hospitalizations annually by 2015. Nearly 10%–30% of hospital registrations are due to road traffic injuries and a majority of these people have varying levels of disabilities. A majority of victims of road traffic injuries are men in the age group of 15–44 years and belong to the poorer sections of society. Also, a vast majority of those killed and injured are pedestrians, motorcyclists and pillions riders, and bicyclists.

A clearly defined road safety policy, a central coordinating agency, allocation of adequate resources, strict implementation of proven and effective interventions and reliable information systems are urgently required. Greater participation from health and other sectors based on an integrated, intersectoral and coordinated approach is essential. Health professionals can contribute in numerous ways and should take a lead role in reducing the burden of road traffic injuries in India.

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INTRODUCTION

India is passing through the triple epidemic of communicable and infectious diseases, non-communicable diseases and injuries, due to epidemiological and demographic transition. An injury is defined as a 'body lesion at the organic level resulting from acute exposure to energy (mechanical, thermal, electrical, chemical or radiant) interacting with the body in amounts or rates that exceed the threshold of psychological tolerance'.[1]

Globally, injuries contribute to around 10% of total deaths and 15% of disability-adjusted life-years (DALYs).[1] Recent studies suggest that injuries contribute to 13%–18% of total deaths in India.[2–4] Road traffic injuries (RTIs) are included under unintentional injuries. The definition of road traffic fatality varies in different countries and is defined as 'any person killed immediately or dying within 30 days as a result of an injury or accident'.[5] According to WHO, RTIs are the sixth leading cause of death in India with a greater share of hospitalizations, deaths, disabilities and socioeconomic losses in young and middle-age populations.[6] RTIs also place a huge burden on the health sector in terms of prehospital and acute care, and rehabilitation.[7] This paper aims to assess the burden and impact of RTIs, identify factors associated with the occurrence of RTIs, examine current policies, mechanisms and interventions for RTI prevention, and highlight the role of the health sector and professionals in road safety in India.

MOTORIZATION, ROAD AND TRANSPORT NETWORK PATTERNS

Understanding transport needs, patterns and modes is vital to ensure road safety. The growth of the motor vehicle industry, liberalized economic policies of successive governments, aggressive media promotion, increasing purchasing power of people, easy availability of loans and poor public transport systems have possibly contributed to increasing motorization and a changing transportation scenario in India. The total number of registered vehicles increased by 14 times from 5.3 million in 1981 to 72.8 million by 2004 (Fig. 1).[8] The number of public transport buses increased slightly from 331 000 in 1991 to 768 000 by 2004, while during the same period, motorized two-wheelers (MTWs—scooters, motorcycles and mopeds)

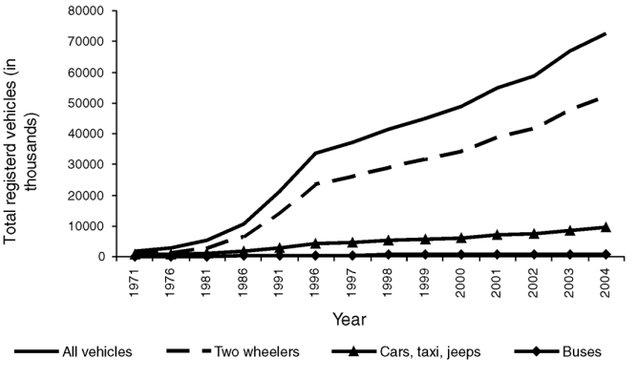

FIG 1. Motorization pattern in India, 1971–2002 (*Source:* Ministry of Road Transport and Highways, 2004)

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increased 4 times from 14 million to 52 million. Overall, 71% of all vehicles are MTWs, 12% are cars, jeeps and taxis, 1% buses and the remaining are other vehicles. The total number of registered vehicles is indicative of the overall pattern of motorization and the actual numbers could be less.[9] Irrespective of the distribution of vehicles across India, a majority are MTWs.

India has one of the largest road networks of about 3.32 million km, consisting of national highways, expressways, state highways, major district roads, other district roads and village roads. National highways account for 2% of the road network carrying 40% of transport and freight movement.[10] Indian highways pass through a large number of densely populated villages and towns. The spatial distribution of various community agencies such as schools, colleges, hospitals, religious places, public offices, business centres (including small and petty shops) results in varied exposure of people to RTIs.

The travel patterns in India are characterized by the presence of a heterogeneous mix of vehicles of different sizes, shapes and engine capacity. In a study of 13 cities, in 6 cities personalized modes of transport comprised >90% of all vehicles while public modes of transport were <1% of all vehicles.[11] The modal split in terms of per cent of trips indicate that the share of mass transport is well below what is desirable while personal modes of transport are high in most Indian cities. MTWs account for a large proportion of vehicles on the roads.[12,13] Studies by the Transportation Research and Injury Prevention Programme (TRIPP), Indian Institute of Technology, New Delhi indicate that the share of non-motorized transport (NMT) varies from 30% to 70% during peak hours in some cities depending upon the time and location. Bicycle transport is still a major mode of travel in towns, rural areas and even cities.[12–14]

PUBLIC HEALTH BURDEN OF RTIs

Indian scenario

Data available from the National Crime Records Bureau (NCRB), Government of India, indicate that deaths and injuries increased by nearly 2 (50 700 to 98 254) and 4 times (109 100 to 465 282) during the period 1991–2005, respectively[15] (Figs 2 and 3). According to the NCRB 2005 data (*www.ncrb.nic.in*), among the 28 states of India, the mortality rate per million population due to RTI varied from as low as 20 in Nagaland to as high as 216 in Tamil Nadu. States with rapid and high growth in motorization had a higher number of deaths (Table I). Nearly half the total road fatalities were in the 4 states of Tamil Nadu (14.5%), Andhra Pradesh (11.4%), Maharashtra (11.1%) and Uttar Pradesh (10.2%). Data from the Ministry of Road Transport and Highways indicate that 38%–40% (38% in 2000; 40% each in 2001 and 2002) of deaths due to RTIs in different states occurred on highways during 2000–02 (these data have limitations that are discussed at the end of this section).[16] Nearly 15% of road traffic fatalities occurred in cities with a population of more than a million.[16] Data for major Indian cities reveals that the mean mortality and incidence of RTIs was 90 and 410 per million population, respectively, with a ratio of 1:5. Many of the newly emerging cities had rates exceeding 90 per million population. The death to injury ratio was nearly 1:10 in some cities (Bangalore and Vadodara), while it was on the negative side (5:1) in Indore, Faridabad and Kanpur, indicating variations in RTI reporting across cities.

RTIs figure prominently as a major cause of death in national surveys also. The Survey of Causes of Death (SCD)[17] (covering 40 351 deaths from all over rural India from 1602 reporting units) revealed that 2.6% of total and 21% of injury deaths were due to transport injuries (defined as accidents occurring on public highways) occupying tenth place in overall ranking. RTIs were identified as the eighth leading cause of years of life lost (YLL) in rural areas of 10 major states in India.[18] The Medical Certification of Cause of Death (MCCD) survey (covering 498 586 deaths from urban areas) reported that road deaths constituted 1.5% of total and 16% of injury deaths.[19]

Hospital- and population-based studies

Odero *et al*. in a global review of RTIs observed that 30%–80% of hospital admissions are due to RTIs.[20] Limited studies in India reveal that 20%–50% of emergency room registrations and 10%–30% of admissions are due to RTIs.[21–29] In a survey of 23 hospitals in Bangalore, RTIs contributed to 12% of total casualty registrations (varying from 7% to 34% in different institutions), 52% of total injury registrations, 22% of admissions, 6% of total casualty deaths and 35% of injury deaths.[22] Nearly 60%–70% of hospitalized traumatic brain injuries are due to RTIs.[21,23] Bhattacharya *et al.* in an autopsy study from Delhi reported that 40% of deaths were due to RTIs.[30] Information on this aspect is lacking from district and rural areas.

Recent population-based verbal autopsy studies indicate that RTIs are among the three leading causes of death in the age group of 5–44 years with a male preponderance.[2–4] RTIs account for 15%–50% of total injuries with more than half being hospitalized for varying time periods.[31–38] In a recent population-based survey in Bangalore covering 96 569 persons from 19 919 rural, slum and urban households, the mortality from and incidence of RTIs was 340 and 6490 per million population, respectively, with a ratio of 1:20.[37,38] The wide variation in incidence of RTI (160–640/million population; Table II) is due

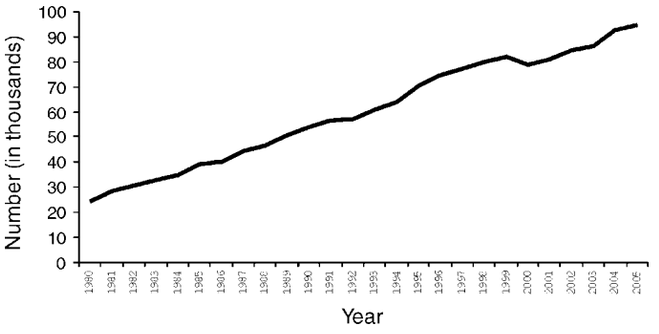

FIG 2. Road traffic deaths in India, 1980–2005

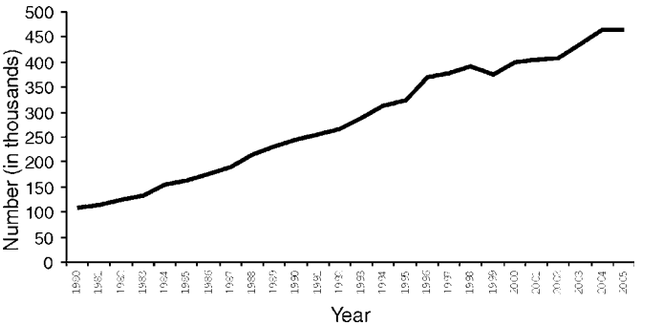

FIG 3. Road traffic injuries in India, 1980–2005

to methodological differences in sample size, definition, case ascertainment nature of study, indicating the need for better designed studies.[40]

Underreporting of RTIs is a serious and global problem.[41]

TABLE I. State-wise distribution of road traffic deaths in India in 2005. The national average is 90 per million population

State	Death rate per million
Tamil Nadu	216
Goa	178
Haryana	143
Andhra Pradesh	137
Sikkim	135
Himachal Pradesh	134
Delhi	130
Chandigarh	128
Karnataka	124
Rajasthan	111
Chhattisgarh	105
Maharashtra	103
Gujarat	97
Kerala	96
Uttaranchal	96
Madhya Pradesh	82
Jammu and Kashmir	80
Arunachal Pradesh	77
Orissa	75
Punjab	63
Tripura	61
Manipur	61
Mizoram	56
Uttar Pradesh	55
West Bengal	52
Assam	52
Meghalaya	50
Jharkhand	44
Bihar	24
Nagaland	20

Source: National Crime Records Bureau, 2005

The spectrum of injuries from road crashes varies from instant death to those requiring only first aid. The commonest sources of RTI data are from the police and hospitals. The majority of deaths are reported to the police due to their medicolegal nature, prosecution concerns and compensation needs. A few deaths and a majority of injuries are not reported to the police due to several reasons. A study in Bangalore compared police and hospital deaths and found underreporting of 5% for deaths and more than 50% for serious injuries.[42] Another study from rural Haryana estimated the ratio of serious:moderate:minor injuries to be 1:29:69.[34] Even though every healthcare institution provides care for RTI patients, details of RTIs are not clearly available due to poor information systems. Hence, the real problem is likely to be much higher than the reported figures. A recent Working Committee report for the Planning Commission[43] after examining available national data estimated the ratio of deaths:serious injuries:minor injuries as 1:15:70 and the current scenario is shown in Fig. 4.

Age and sex

RTIs are one among the 3 leading causes of death and disability in the economically productive age group of 15–44 years. All national reports and independent studies conclusively point out that men are killed and injured in greater numbers with male to female ratios varying from 4:1 to 5:1. According to the NCRB report of 2005,[15] 64.3% of deaths occurred in the age group of 15–44 years with children and the elderly accounting for 6.4% and 8.2% of deaths, respectively. The male and female rates were 147 and 28 per million, respectively.

Vulnerable road users

According to Census 2001, 2% and 10% of Indian households own cars (including jeeps and vans) and two-wheelers, respectively.[44] Surveys by the National Council of Applied Economic Research (NCAER) show that 50/1000 households owned a car and 150/1000 households owned motorcycles in 2005–06.[45] While cars were common among the upper socio-

TABLE II. Burden of road traffic injuries (RTIs) in population-based surveys

Author	Year	Place	Sample size	Remarks
Sathiasekaran[35]	1996	Chennai	Survey of 4333 persons from 800 households in urban slums	Incidence: 1600/million population/year; highest in 15–29 years age group; 10% were bedridden for >2 weeks
Verma[32]	1998	PHC Palla, Faridabad	Survey of 38 909 people from 7135 households from 24 villages	29% of injured were traffic accidents, two-third of injuries occurred on village roads
Gururaj[36]	1998	Bangalore	Survey of 21 357 individuals from 4822 households	16% of households had an injured person; RTIs accounted for 47% of injury deaths; 20% of injuries due to RTIs; of those hospitalized 15% for >24 hours
Varghese, Mohan[34]	2003	Haryana	Survey of rural population of 25 000	18% of injuries were transport-related; Incidence: 649/million population
WHO-SEARO[33]	2004	Delhi	Survey of 5412 households in Municipal Corporation of Delhi	Incidence: 2900/million population/year; rates of major and minor injuries: 2857 and 670/million population, respectively. 82% hospitalized, 15% disabled >1 month, 2% died in hospital
Gururaj, Suryanarayana[38]	2004	Bangalore	Survey of 96 569 individuals from 19 919 households in urban, rural and slum populations	47% of total injuries; RTI mortality and incidence: 340 and 6490 per million population, respectively
Dandona *et al*.[39]	2006	Hyderabad	Community survey of 4019 pedestrians and 4183 motorized two-wheeler (MTW) drivers for 17 454 and 17 242 household members	Annual incidence of RTI for a pedestrian or MTW driver was 22 880 per million population based on 3-month recall period. Fatal and non-fatal RTI rate was 173/per million population. Among injured 13% treated as inpatients, 3% could not return to work and 1% lost their jobs

economic classes and in cities, motorcycles were common among the middle classes in both urban and rural areas. A large number of road users in India are pedestrians, two-wheeler riders and bicyclists—vulnerable road users (VRUs). These groups of road users form the major bulk on Indian roads and hence their exposure is higher. Unlike occupants in cars and other heavy vehicles, these road users are directly exposed in traffic environments and are thus unprotected. In the event of a crash, they come in direct contact with the impacting vehicle and energy transfer is high (even in low velocity crashes) resulting in serious injuries and deaths.[7] Mohan in a review of traffic injuries and fatalities in India emphasized that nearly 80% of those killed in Delhi and Mumbai belong to the group of VRUs.[14] Hospital studies in Bangalore during 1993,[21] 1998[22] and 2005[23] have shown that pedestrians, occupants of MTWs and bicyclists are injured and killed to the extent of 25%–35%, 30%–40% and 7%–10%, respectively. A similar pattern is also reflected in studies reported from other centres in India[25,27–29,39] and from population-based surveys.[32–38]

Injury patterns and outcome

The severity, nature and outcome of RTIs are influenced by a number of factors. Information on injury patterns, nature and outcome are extremely limited in India, as trauma registries and hospital-based research have not developed systematically.

It is estimated that of all road traffic fatalities, nearly 50%–60% occur at the site of the crash or during transfer to a hospital (first wave), 20%–30% during hospital stay (second wave) and 5%–10% after discharge from a hospital (third wave; Fig. 5).[46,47] Data from Hyderabad[48] and Bangalore (personal communication, office of Deputy Commissioner of Police, Traffic and Road Safety) based on police reports reveal that 40%–50% died at the site of the crash, 10%–15% en route to hospital and the rest during or after hospital contact. Two autopsy studies report that nearly a quarter of deaths occurred immediately or within a short time after the crash.[49,50] Hospital-based studies reveal that 2%–3% of patients are brought dead.[23–25] Since RTIs have a medicolegal component, the police are informed soon after the crash and some information is gathered by them. As police capture data on prehospital and hospital deaths, it is likely that deaths occurring after hospital discharge due to late complications and those due to misclassification are likely to be missed out in formal police reporting systems.

Among those reaching hospital alive, information on the nature and severity of injuries is limited. Few studies from India have documented the extent of injuries to the head, face, upper and lower limbs. The extent of polytrauma varies from 20% to 40% among RTI patients.[23,24,51] Brain injuries (severe:moderate: mild 1:2–4:8–12 based on the Glasgow Coma Scale) are extremely common among RTI subjects.[23,24] Fractures of the upper and lower limbs have been documented in 18%–20% of RTI patients.[23–28] Neurological injury, haemorrhage and shock are the major causes of death.

Disabilities and RTIs

In the age group of 15–44 years, injuries, especially RTIs, are a major cause of disability. With a gradual decline in conditions such as polio and other infectious diseases, RTI-related disability is likely to increase in the coming years.

WHO estimates that 100% of severe, 50% of moderate and 10% of mildly injured persons need long term rehabilitation services.[52] A few hospital-based studies reveal that disabilities persist for a long time among 20%–40% of people discharged after an RTI.[21,23,53] Census 2001[44] and the National Sample Survey Organization[54] estimate that nearly 2% of the Indian population are disabled. Injuries are responsible for nearly one-third of all disabilities and RTIs contribute nearly half of them.[55,56] It is estimated that nearly 3.5 million people in India have a disability from injuries with about 2 million being due to RTI-related disability. Disabilities following RTI are varied and affect physical, social, economic, spiritual and psychological spheres of life.

Socioeconomic impact of RTIs

RTIs lead to significant socioeconomic losses for the country and result in a heavy burden on individuals and families. The economic impact is huge due to direct and indirect effects. Costs due to acute/long term medical care, vehicle repair, damage to property, legal and funeral expenses are some direct costs, while loss of work/school, loss of savings, extra loans taken, work replacement/support, cost to employer, lost productivity and social costs of postponed or cancelled events are indirect effects. In the absence of universal insurance coverage, much of the expenditure has to be met by individuals and families. Loss of work and schooling are difficult to quantify in India. Every year, children affected directly or indirectly by RTI suffer from psychosocial/economic deprivation and orphanhood due to loss of their parent(s) as a result of being killed in a crash. The long term impact of such childhood deprivation leading to adult high risk behaviour, though well established, have not been examined in India.

RTIs are also linked to issues of poverty and equity. Generally, poor people are involved more often in road crashes, while their access to quality healthcare is limited. A recent study from Bangalore revealed that mortality from RTIs was 13.1 and 48.1 per 100 000 in the poorer socioeconomic strata of urban and rural populations, while it was 7.8 and 26.1 per 100 000 population in the 'non-poor' categories.[37,38] Poor families with a death due to

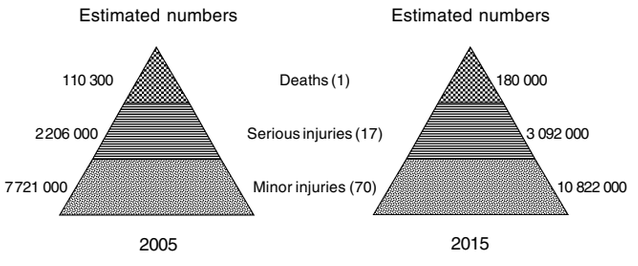

FIG 4. Estimates of deaths and injuries due to road traffic injuries in India in 2005 and 2015

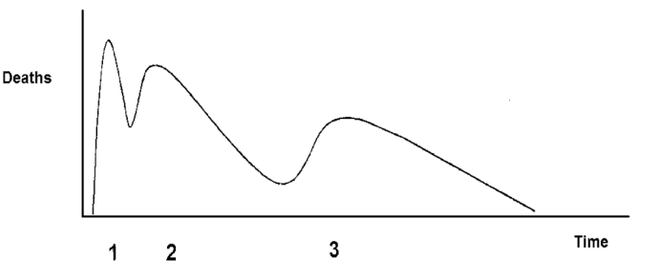

FIG 5. Pattern of deaths due to trauma. 1: First wave 2: Second wave 3: Third wave

an RTI spent Rs 17 000–35 000 for medical care and Rs 3000–8000 for property and vehicle damages; 35% of families resorted to sale of family assets, incurred loans (63%), pawned self and family property (35%) and a seriously injured person lost work for 80–100 days. Seven of the ten poor households with a seriously injured person reported a decrease in their earning potential and income. A small number of rural households reported a decline in food production. One of the members had to give up work or education to take care of the injured in 9 of 10 poor households.[24,25]

Mohan in a recent review of the economic impact of RTIs highlighted that the estimated economic loss due to RTI was to the tune of nearly Rs 550 000 million every year or nearly 3% of India's GDP for the year 2000.[16] The costs are observed to be much higher based on value of statistical life using the stated preference approach (150 000 purchasing power parity dollar for high exposure individuals) from a recent Delhi-based study. In the study, the cost of a fatality was estimated to be Rs 1.3 million instead of Rs 0.5 million using the willingness to pay approach.[57] This huge economic burden indicates the serious-ness of the problem and the need for urgent measures for prevention.

Factors associated with RTIs

Information on causes and potentially modifiable risk factors are crucial to develop focused interventions. An understanding of human, road, vehicle and system-related factors is vital to understand causation. A number of factors with regard to human, vehicle, environment operating before, during or after a crash contribute to RTIs. The world report on RTI prevention classifies major risk factors as those influencing exposure to risk, crash environment, severity of crash and post-crash injuries.

From a broader perspective, increasing individual modes of transport, heterogeneous traffic mix, rapid addition of high speed vehicles and less emphasis on the safety of VRUs are some contributing factors.[13,16] Though traffic in India has a large share of VRUs, the designs of roads and vehicles have not received enough attention from the point of view of safety for VRUs. Increasing speeds,[13] non-use of helmets,[58] drinking and driving,[59,60] poor visibility,[13] failure to implement safety laws[61] and poor trauma care[62,63] are some factors recognized in India. An intersectoral approach to coordinate, implement and evaluate road safety activities is also lacking in India.

Trauma care in India is poorly coordinated.[63] Inadequate emergency and trauma care, lack of trauma audits and deficiencies in acute trauma care account for a higher number of deaths and greater number of disabilities. Lack of first aid, delays in transfer of patients, longer time interval between injury and reaching a definitive hospital, absence of triage, lack of facilities in hospitals (especially public sector hospitals) are some major problems in trauma care in India.[23,64,65] Many practices such as the use of early large intravenous fluid administration, prehospital spinal immobilization, advanced life-support training for ambulance crews have not been found to be effective in decreasing the morbidity and mortality of RTIs but continue to be practised.[66] Clear guidelines, standards and protocols for trauma care are deficient in India. It is crucial to remember that prioritization is required to recognize factors which can be addressed by interventions that will result in a noticeable reduction of deaths and injuries.

CURRENT STATUS OF RTI PREVENTION IN INDIA

At the national level, India lacks a road safety policy and programme with clearly defined objectives, components, resources and indicators (report of the Expert Committee on Road Safety and National Road Safety Policy are under consideration by the Government of India *www.morth.in*). Simultaneously, independent state road safety policies have been formulated in Kerala (*www.keralapwd.net/road_ policy.jsp*), Tamil Nadu (*www.tnhighways.org/ policy.htm*) and Andhra Pradesh. At present, road safety, often linked with transportation growth, is an individual and isolated responsibility of the transport, police, urban development, law and health sectors. Due to lack of a clearly defined agency and mechanism at the national and state levels for coordinating, integrating and monitoring road safety, progress has been limited. Lack of research institutions, skilled manpower across sectors, limited participation of the health sector in prevention and a resource crunch have also not helped matters. The national- and state-level road safety councils have been recommendatory bodies and have not taken a comprehensive approach to road safety.

The Central Motor Vehicle Rule of 1989 as amended by the Central Motor Vehicle (first amendment) Rules, 2003 has stipulated several rules and standards regarding safety.[67] Some major ones that will have an impact are those with regard to driving licences (Chapter II; Section 24–31), construction/ equipment and maintenance of motor vehicles (Chapter V), speed governors in vehicles and speed limits (Chapter VIII; Section 112, 117–18), safety belts (Section 125), breath tests for alcohol (Chapter 13; 203–6), wearing of helmets (Chapter VIII; 129) and insurance practices and compensation issues (Chapters IX and XII). Scientific evidence from high income countries exists for the effectiveness of interventions such as use of helmets,[68] prevent-ing drinking and driving,[69] speed control,[46] safety belts,[70] trauma care,[71] environmental modification,[72] and child safety seats.[73] Recently, data have emerged from low and middle income countries as well.[74] The implementation of these laws and regulations are far from satisfactory in India and undoubtedly, systematic implementation can be highly effective in reducing deaths and injuries.

Education of people to adapt safe behaviours has been a major activity in India. The ongoing education programmes are general, sporadic, isolated and have not been systematically evaluated. The activities aim at provision of safety information to the general public at selected time periods in a year. A net positive change can only be seen when education is combined with enforcement of the law and engineering solutions. Some of the engineering solutions for vehicles and roads that are being implemented have not necessarily been developed locally and are recommended and implemented based on experience in high income countries; their contribution to the overall road safety scenario needs further evaluation.

Trauma care has largely been an urban phenomenon and confined to acute care in hospitals with neglect of emergency care and rehabilitation services. Acute hospital care is expanding with technology and specialized care, more so in the private sector (with increasing costs). There are no uniform/defined protocols for the management of trauma patients across India. In totality, road safety has not received adequate attention from policy-makers, parliamentarians and professionals,[75] and there has been a lack of integrated and coordinated approaches.

ROLE OF THE HEALTH SECTOR AND PROFESSIONALS

In India, the health sector bears the maximum impact of RTIs by providing care and rehabilitation amidst scant resources. Globally, major advances have been made in the management

and rehabilitation of injured persons in recent years.[6] In many high income countries, the health sector has been the driving force for reduction of road deaths and injuries.[76] The WHO 2004 slogan for World Health Day 'Road Safety is no Accident' implies the need for systematic efforts by all involved partners. The health sector needs to play a central role in larger road safety policies and programmes, apart from providing care and support for the injured. The public health approach (delineate the problem, recognize risk factors, identify and facilitate implementation of interventions, and evaluate what works) has been recommended and applied to road safety as well.[46] Specifically, the health ministry and all other involved ministries (home, transport, urban development, etc.) need to consider RTIs as a public health issue and support and strengthen policy-making, information for action, services for the injured, prevention programmes, capacity-building efforts and lead advocacy efforts.[77]

Health professionals and their professional bodies across wide disciplines need to take an active role. Some initiatives that can be undertaken are:

1. Placing the burden and impact of road deaths and injuries on the Indian public health agenda and facilitating activities at different levels along with incorporating road safety in all ongoing and forthcoming activities.
2. Leading advocacy efforts for implementation of evidence-based information (helmet legislation and enforcement; reducing drinking and driving; advocacy for speed reduction, safety of VRUs, etc.) to improve road safety.
3. Strengthening capacity of policy-makers and professionals to develop, implement and evaluate road safety activities.
4. Developing guidelines, standards and protocols for effective emergency care, acute care and rehabilitation programmes, and to apply evidence-based medicine in clinical practice.
5. Undertaking awareness and sensitization training programmes to strengthen knowledge and increase skills for healthcare personnel not just in care, but also in prevention, rehabilitation and policy issues.
6. Strengthening and undertaking research on public health burden and impact, understanding risk factors, characteristics of trauma, measuring impact of interventions through well designed public health and clinical research methods (trauma registries, surveillance programmes, hospital- and population-based studies, etc.).
7. Influencing policies of other sectors (transport, urban development, highway and infrastructure growth) that have an impact on the health of people, as it is vital to understand and convey to the concerned ministries the need to incorporate a health component in all development policies.
8. Improving teaching of undergraduate and postgraduate medical and allied education with a scientific approach to strengthen road safety.
9. Simplifying and changing medicolegal practices so that a scientific approach is developed in the care and information gathering process.
10. Supporting the development of a systems approach to road safety in an integrated and coordinated manner.

Reducing the burden of RTI is a challenge due to its multifactorial causation, multi-partner involvement and absence of appropriate policies and programmes. However, several opportunities exist. Most high income countries have been successful in reducing the burden of RTIs over the past 2–3 decades by implementing a number of solutions in an integrated manner (a detailed discussion of all interventions is beyond the scope of this paper). The lessons learnt, experience gained and emerging principles needs to be applied in India. Policy-makers and healthcare professionals in India need to take concrete steps to reduce deaths and disabilities from RTIs, which is likely to increase with the growing economy, globalization, motorization and unplanned safety. Road traffic deaths and injuries need not be the dark side of our growth and development amidst transportation growth. A significant number of RTIs can be predicted and prevented and lives can be saved, if road safety is given a greater priority.

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