

Road Traffic Accidents: Development's Collateral Damage and a Major Public Health and Economic Concern

Lena Ashok¹, Zinnia Sharma², Trupti Kambe Zodge³, Pranav V⁴, Namesh Malarout⁵,
Alric D'Souza⁶, Sagarika Kamath⁷

¹Associate Professor; ²Intern, Public Health Evidence South Asia, Prasanna School of Public Health, Manipal Academy of Higher Education, Manipal, Karnataka, India, ³Manager, Clinical Services, Sapphire Hospitals Private Limited Thane, ⁴Project Coordinator, Amrita Institute of Medical Sciences, Kochi, Kerala, ⁵Scholar, Manipal Institute of Technology, Manipal Karnataka, ⁶Assistant Professor, Prasanna School of Public Health, Manipal academy of Higher Education, Manipal, Karnataka, India, ⁷Assistant Professor, School of Management, Manipal Academy of Higher Education

Abstract

Road construction is viewed as a core development activity. The unfortunate downside of this is the increasing burden of Road traffic Injuries (RTIs). 50 years ago, the WHO was called upon to do something about the heavy human toll of RTIs. However, RTIs remain a very significant contributor to human morbidity and mortality. It is significant to note that the burden of RTIs has shifted to low and middle income countries (LMICs), which despite having only about 50% of the world's motor vehicles, account for 90% of the burden of 12.5 lakh road traffic deaths and 2 to 5 crore non fatal road traffic injuries. UN Sustainable development goal (SDG) target 3.6 is to reduce by 50% the number of deaths and injuries from road traffic crashes across the globe by 2020. This implies the saving of 50 lakh lives, the prevention of 5 crore serious injuries, and an economic benefit to the tune of over US\$3 trillion. This is a major challenge. The WHO says that RTIs have a significant negative macroeconomic impact in LMICs. The loss to national GDP ranges from 1.03 percent in South Korea to 2.9 percent in Vietnam. Reducing RTI morbidity and mortality by 50% over a 24 year timeline can generate an additional flow of income equivalent to 22.2 % GDP (2014) in Thailand, 15% in China, 14% in India, 7.2% in the Philippines and 7.1% in Tanzania. RTI deaths in India have consistently increased year on year from 1990 to 2015.

Key words: Road traffic accidents, public health concern, economic burden

Introduction

Road construction is viewed as a core development activity. The unfortunate downside of this is the increasing burden of Road traffic Injuries (RTIs). 50 years ago, the WHO was called upon to do something about the heavy human toll of RTIs. However, RTIs remain a very significant contributor to human morbidity and

mortality. It is significant to note that the burden of RTIs has shifted to low and middle income countries (LMICs), which despite having only about 50% of the world's motor vehicles, account for 90% of the burden of 12.5 lakh road traffic deaths and 2 to 5 crore non fatal road traffic injuries. UN Sustainable development goal (SDG) target 3.6 is to reduce by 50% the number of deaths and injuries from road traffic crashes across the globe by 2020. This implies the saving of 50 lakh lives, the prevention of 5 crore serious injuries, and an economic benefit to the tune of over US\$3 trillion. This is a major challenge. The dramatic increase in vehicle density and traffic volumes in LMICs has naturally increased the opportunities for crashes.¹

Corresponding author:

Ms. Zinnia Sharma,

Intern, Public Health Evidence South Asia, Prasanna School of Public Health, Manipal Academy of Higher Education, Manipal, Karnataka, India

With the increase in road construction in rural areas, the burden of RTI mortality and morbidity has also increased sharply.² LMICs also suffer from the phenomenon of a death rate per vehicle sharply higher than in high income settings. This can be attributed to the lack of ability or political will in the LMIC settings to fund traffic regulations enforcement, maintenance of roads and improvements in road design. Drastic increases in RTI mortality were noticed by the mid 1970s in countries like Panama, Guatemala, Jamaica and Peru.³ The trend in high income countries has been the exact opposite. From 1990 to 2015, the average mortality from RTIs in the OECD countries came down from 22 to 8 per 1 lakh population. An outstanding example is Australia, where obvious interventions like fining and prosecuting drunk driving, strict imposition of driving speed limits and the use of road and vehicle safety devices drastically brought down the RTI mortality rate by 83% from 30 per 1 lakh population in 1970 to 5 per 1 lakh population in 2010. In 1993, the World bank estimated that 74 % of global RTI deaths were in LMICs.⁴

Despite the knowledge of solutions to lower RTI rates, the global burden of RTIs continues to rise. With government attention and investment divided across a plethora of issues and concerns, road safety seems to end up as a low priority concern. The evidence, however, suggests that RTIs are not just a public health concern, but also an economic one. The WHO says that RTIs account for the largest share of long term disability and mortality in the 15-29 age group. They also account for a significant chunk of morbidity and mortality in the 15-64 age group.⁴ Men account for 75% of RTI deaths. This places tremendous financial strain on families, especially in societies where men are generally the primary source of income. Rural areas suffer a disproportionately high burden of morbidity and mortality from RTIs. This can worsen already existing deficiencies in human resources in places that are productive economically but seeing migration to urban areas.⁵

Discussion

RTIs are catastrophic for low income households and households moving out of poverty, in particular in settings without universal health coverage requiring high out of pocket payments. Experts have wrestled with significant concerns in evaluating and describing the economic pay off in having accident rates decline.⁶ The WHO says that RTIs have a significant negative macroeconomic

impact in LMICs. The loss to national GDP ranges from 1.03 percent in South Korea to 2.9 percent in Vietnam.⁴ Reducing RTI morbidity and mortality by 50% over a 24 year timeline can generate an additional flow of income equivalent to 22.2 % GDP(2014) in Thailand, 15% in China, 14% in India, 7.2% in the Philippines and 7.1% in Tanzania. RTI deaths in India have consistently increased year on year from 1990 to 2015. Official Indian statistics probably under report severe injuries by 50% and mortality by between 10 and 30%.⁴ Notwithstanding the downward curve since about 2005 in China's RTI data, 2013 is estimated to have witnessed more than 2.6 lakh RTI deaths. There is an economic loss associated with each year that LMICs fail to act to enhance road safety.

The Global plan for the decade of action for road safety 2011-20 has identified the following 5 action areas⁴: 1. Road safety management capacity. 2. infrastructure safety. 3. vehicle safety. 4. road user behaviour. 5. post-crash care. A WHO report on road safety made recommendations to operationalize the global plan⁷: 1. Identification of a nodal agency in the national government to head the country level effort. 2. Assessment of country specific RTI related problems and policies. Assessment of the capacity for RTI prevention in each country. 3. Preparation of a country level road safety strategy. Preparation of a country level plan of action. 4. Allocation of adequate financial resources to tackle the problem. Allocation of adequate human resources to tackle the problem. 5. The implementation of specific approaches to prevent road traffic crashes and to minimize RTIs and the consequences of RTIs. The evaluation of the impact of these actions. The implementation of these recommendations at a country level would require that the initiatives to strengthen institutions are sequenced in a manner appropriate to the learning and absorptive capacity of the concerned country.⁸ The role of institutional management functions, especially that of the lead agency is critical. Only interventions will not be enough to sustain improvements in road safety.⁹ Institutional management functions can be built through doing the following: Enhancing institutional capacity, including nodal institutional capacity for RTI prevention. Evidence based training of stakeholders in the traffic police, transport, justice and health departments; senior policy makers, stakeholders in ministry nodal points and managers in relevant sectors.⁴

Political support can be obtained if communities that suffer the burden of RTIs put across their demands. This can be facilitated by civil society and private sector participation. National traffic injury surveillance systems need to be improved with the objectives of better mapping of injuries and their causes and consequences. These surveillance systems will also play a very significant role in generating the data that is needed to evaluate the effectiveness of RTI mitigation efforts. Several policies and interventions that have very promising potential to reduce the incidence of RTIs are very cost-effective: The reduction of speed limits, improvements in road design, diligent traffic rules enforcement, public awareness campaigns on road safety, installation of speed cameras, application of deterrent penalties are examples of interventions that are both cost wise and operationally effective. Studies show that with an increase in vehicular speeds of 1km/hour, a 3 percent increase in incidence of crashes resulting in injury is observed, with the corresponding increase in the incidence of fatal crashes being 4 to 5 percent. The risk of dying for an adult pedestrian which is less than 20 percent when struck by a car at 50 km/hr, balloons to almost 60 percent at 80 km/hr. Bringing about a reduction in RTIs through systematically bringing down drunken driving is another low hanging fruit that the nodal agencies can look to pluck. Regulatory blood alcohol limits need to be aligned with internationally accepted norms.

Seatbelt and helmet adoption can be enhanced in the following ways: Publicity campaigns; deterrence based police enforcement campaigns; adoption of higher safety specifications for new cars and the adoption and aggressive promotion of vehicle seatbelt reminder systems. The correct use of helmets can reduce the risk of death among 2 wheeler commuters by more than 40%. The corresponding decrease in the risk of serious injury in the same population is 70%. The decrease in the risk of death among car commuters wearing a seat belt is 40 to 50% for front seat passengers and 25 to 75% for rear seat passengers. The formulation and enforcement of laws to prevent mobile use while driving is another important measure. State of the art emergency medical services play a critical role.⁷

Supervising children walking or cycling to school in Malaysia was seen to reduce the risk of injury among the supervised children by 57%. With the principle of separating different types of road users, an exclusive motorcycle lane was introduced in Malaysia. This led

to a 600% decrease in deaths from motorcycle crashes and a 39% decrease in the number of motorcycle crashes themselves. With a view to reduce average vehicular speeds through traffic calming measures, simple engineering measures such as crosswalks, speed breakers and raised intersections were introduced in China. Of the 4 intervention sites, it was observed that the average speed dropped by 9 percent in 3 of them. It was observed that there was a drop of 60% in the overall number of casualties. Speed control measures, implementation of revised traffic rules, use of seat belts and improved emergency and prehospital care were implemented in Brazil, which were seen to result in a significant reduction in mortality. Setting and enforcing blood alcohol concentration limits resulted in a 17% decrease in RTI mortality in Uganda; the same intervention in Cuba brought about a 9.9% reduction in traffic crashes, a 70.8% reduction in RTI mortality, and a 58.7% reduction in RTI injuries in comparison to the previous year's data. Setting and enforcing the use of seat belts in Iran resulted in a statistically significant reduction in death rates from 38.2 per 100,000 population in 2004 to 31.8 per 100,000 population in 2007; also, the death rate per 10,000 vehicles reduced from 24.2 to 13.4. Setting and enforcing helmet use among two wheelers in Colombia resulted in a 52% reduction in two wheeler RTI deaths; the same intervention in Thailand resulted in a 500% increase in helmet usage, a 41% decrease in RTIs and a 20.8% decrease in RTI deaths; the same intervention in Vietnam resulted in a 16% decrease in RTIs. and an 18% decrease in RTI deaths; the same intervention in Malaysia resulted in a 25% fall in two wheeler crashes, a 27% fall in two wheeler RTIs and a 35% fall in two wheeler RTI mortality. The encouragement of helmet use among child bicycle riders in the Czech republic resulted in a 100% increase in helmet use and a 75% reduction in road traffic accident related head injury admission rates.¹⁰ In Argentina, over the period from 2010 to 2016, with the implementation of several road safety initiatives, a significant improvement in road safety indicators was seen, with a 45% decrease in RTI fatalities and a 11% decrease in the total number of non fatal RTIs in the implementation areas.¹¹

It has been clearly demonstrated that the reduction of RTIs has a significant positive effect on long term income growth at the macro level.⁴ Further research is required to compare the relative economic effects of averting injuries and diseases. Evaluating the impact of RTIs only through an economic prism would miss the bigger picture, i.e. the

intangible value that society assigns to health, which is not captured in growth estimates.¹² It has been estimated that welfare benefits ranging from 6% of GDP to 32% can be accrued by reducing RTI mortality by 50% over a period of 24 years. RTI morbidity and mortality, which are entirely preventable, impose unacceptably high social and economic costs. Well planned road safety interventions yield measurable results faster than most other investments in human capital. These interventions also have a very good cost to benefit ratio. Health capital, which is defined as the value of a person's lifetime health, and human capital, which is defined as the sum of knowledge, skills and know-how that a population possesses, are both impacted positively by a reduction in RTI morbidity and mortality. This is relevant in the light of research clearly indicating that investments made in human capital have a very significant impact on economic growth and prosperity. Evidence suggests that over the last two and a half decades, the difference in economic growth between nations that invested the highest in human capital building and those that invested the least is as high as 1.25% of GDP per year.¹³

Conclusion

The least used of all RTI reduction strategies are probably those that aim to reduce exposure to risk. Road traffic risk stems from the need to travel; for work, education or leisure. This can be tackled with a twin pronged strategy: First, through the promotion of regional economies such that the need for long distance travel is reduced. Second, the setting up of self sufficient compact townships that would scale down the need for intercity short distance commuting. Road traffic risk on Indian roads is aggravated by the mixed nature of the traffic, with pedestrians, buses, bicycles, trucks, mopeds, cars, scooters, vans, motorbikes, taxis and autorikshaws all vying for the same space. Risk exposure reduction requires that on road networks used by multiple categories of non motorized and motorized vehicles of varying width and speed, there is a need to separate the slow moving vehicles from the fast moving vehicles. Heavy vehicles need to be separated from the light vehicles. Speed limits need to be enforced on fast moving vehicles. In many developed countries, speed governors are increasingly being used in commercial truck and bus operations. In stark contrast, in India, such devices are rarely used, and even if installed, are promptly disabled by the operators. Private bus and truck operations are mostly based on tightly drawn timetables

that incentivize speeding, pressurizing drivers. Wages are often linked to number of trips and number of ticket receipts. Enforcement of speed limits in India is almost non existent.¹⁴

Inexperienced drivers are high risk drivers. In a society like India, which is seeing increasing levels of motorization, the risk that inexperienced drivers pose is amplified because of their relatively high proportion in the driving population. Added to this, inadequate driver training and testing facilities, and we have a ready recipe for disaster. The speed choice of drivers is influenced by factors like age, experience, alcohol use, drug use, psychological condition, road surface condition, road layout, traffic density and extent of road traffic rules enforcement. Accident risk reduction requires that drivers' perception of speed risk change; the biggest hurdle to this change is the lack of acceptance among them that their choice of speed greatly influences RTI risk for themselves as well as for other road users, both drivers and pedestrians.¹⁴

The increase in RTI deaths on Indian roads has been alarming. RTI fatalities have increased more than 10 times from 14,500 in 1970 to 1,47,913 in 2017. From 2003 to 2013, RTI deaths increased at the rate of 5 percent every year, compared to the 1.4 percent annual increase in population. The rate of RTI deaths increased from 7.9 per hundred thousand people in 2003 to 11.2 per hundred thousand people in 2013. Despite low levels of motorization, RTI mortality risk in India is 4 times that in Sweden and Britain, and double that in Germany and Japan. The RTI mortality rate per 10,000 vehicles has fallen from 87.5 in 1970 to 8.6 in 2013. Many developed countries are at >1 fatality per 10,000 vehicles.

Large reductions in RTI morbidity and mortality are within the reach of most countries. Governments need to muster the political will to adopt, enforce and sustain over the long term fool proof proven strategies with evidence based actions, institutional engagement and a constant recalibration of strategies in response to real time data. In the 25 years from 1990 to 2015, average RTI fatality rates in the OECD countries dropped by more than 63%, from 22 to 8 per hundred thousand population. The window of opportunity is open for leaders to surpass these achievements, ensuring healthier lives for their people and giving a fillip to economic growth and wellbeing.⁴

Ethical Clearance- Not applicable, as it is a Review of literature.

Source of Funding- Self funded.

Conflict of Interest – Nil.

References

1. Jacobs G,Cutting C.Further research on accident rates in developing countries.*Accident Analysis & Prevention*.1986;18(2):119-127.
2. Sachs W.For love of the automobile.1st ed.Berkeley:University of California Press;1992.
3. Alvarez C,Diaz-Coller C.Traffic accidents:a growing public health problem[Internet].Who.int. 1977[cited 12 December 2018].Available from:<http://www.who.int/iris/handle/10665/306794>
4. The High Toll of Traffic Injuries:Unacceptable and Preventable [Internet].World Bank.2017 [cited 12 December 2018].Available from:<https://www.worldbank.org/en/programs/global-road-safety-facility/publication/the-high-toll-of-traffic-injuries-unacceptable-and-preventable>
5. Hawkins E.Investment in roads in Underdeveloped Countries.*Bulletin of the Oxford University Institute of Economics & Statistics*.1960;22(4):359-369.
6. G.W.The Effect of Rate Regulation on Resource Allocation in Transportation.*The American Economic Review*[Internet].1964[cited 16 January 2019];54(3):160-171.Available from: <http://www.jstor.org/stable/1818500>
7. Peden M,Scurfield R,Sleet D,Mohan D,A.Hyder A,Jarawan E et al.World report on road traffic injury prevention[Internet].Geneva:World Health Organization;2004.Availablefrom:<https://apps.who.int/iris/bitstream/handle/10665/42871/9241562609.pdf?sequence=1>
8. Bliss T,Breen J.Country Guidelines for the Conduct of Road Safety Management Capacity Reviews and the Specification of Lead Agency Reforms, Investment Strategies and Safe System Projects[Internet]. Washington DC:World Bank Global Road Safety Facility; 2009. Available from:http://siteresources.worldbank.org/EXTTOPGLOOASAF/Resources/traffic_injury_prevention.pdf
9. Marquez P,Banjo G,Chesheva E,Muzira S.Confronting “Death on Wheels”.Making Roads Safe in Europe and Central Asia.Establishing multisectoral partnerships to address a silent epidemic Europe and Central Asia Region.Human Development Department (ECSHD) Sustainable Development Department (ECSSD) Global Road Safety Facility (GRSF) The World Bank [Internet]. Washington DC:The World Bank Group;2009. Available from: https://www.researchgate.net/publication/311329088_Confronting_Death_on_Wheels_Making_Roads_Safe_in_Europe_and_Central_Asia_Establishing_multisectoral_partnerships_to_address_a_silent_epidemic_Europe_and_Central_Asia_Region_Human_Development_Departmen
10. T.Jamison D,Nugent R,Gelband H,Horton S,Jha P,Laxminarayan R et al.Injury Prevention and Environmental Health[Internet]. Washington DC:World Bank;2017.Available from: http://dcp-3.org/sites/default/files/volume_downloads/DCP3%20Injury%20%26%20Environment_Front%20Matter.pdf
11. Raffo V.Argentina-AR Road Safety:P116989-Implementation Status Results Report: Sequence 11 (English)[Internet].Washington,D.C.:World Bank Group;2016.Available from: <http://documents.worldbank.org/curated/en/833181468205183448/Argentina-AR-Road-Safety-P116989-Implementation-Status-Results-Report-Sequence-11>
12. M.Cutler D,Richardson E.Measuring the Health of the U.S. Population.*Brookings Papers on Economic Activity*.1997;28:217-282.
13. Yong Kim J.World Bank Group President Jim Yong Kim Speech at the 2017 Annual Meetings Plenary. Speech presented at;2017;Washington,DC,United States.
14. Singh S.Road Traffic Accidents in India:Issues and Challenges.*Transportation Research Procedia*.2017;25:4708-4719.