

# Strategies for Prevention of Road Traffic Injuries (RTIs) in Pakistan: Situational Analysis

Adeel Ahmed Khan and Zafar Fatmi

## ABSTRACT

Road traffic injuries (RTIs) are one of the leading causes of death among productive age group. Using systems approach framework (SAF), current preventive strategies for RTI control were reviewed in Pakistan. A review of the literature was done using four international search engines. Only ten studies on preventive strategies for RTI stemming from Pakistan were found. The first Road Traffic Injuries Research Network (RTIRN) surveillance system for road traffic injuries was established in urban city (Karachi) in Pakistan has shown promise for injury control and should be scaled up to other cities. Enforcement of traffic laws on seat-belt and helmet wearing is poor. National Highway and Motorway Police Ordinance (2000) was one of the few legislative measure so far taken in Pakistan. Using SAF, efforts are required to implement interventions targeting human, vehicle design and also making environment safer for road users.

**Key Words:** Road traffic injuries. Prevention. Strategies. Analysis. Pakistan.

## INTRODUCTION

Road traffic injuries (RTIs) are one of the leading causes of death among young and productive age group i.e., 5 - 44 years.<sup>1</sup> Approximately 3500 lives are lost every day due to RTIs, about 1.27 million deaths each year, globally.<sup>1</sup> An additional 20 - 50 million people sustain non-fatal RTIs and contribute to disability worldwide.<sup>1</sup> Around 90% of RTIs related deaths occur in low and middle income countries (LMICs).<sup>2</sup>

Road traffic deaths are predicted to decline by 30% in high-income countries (HICs).<sup>3</sup> Nonetheless, substantial increase is expected in LMICs. RTIs will be the third leading contributor to the global burden of disease by 2020, if immediate and effective actions are not taken now.<sup>3</sup> A total of 1 - 3% of gross national product (GNP) is lost globally, particularly from LMICs, approximating to \$ 500 billion in total.<sup>1,4</sup>

Pedestrians, cyclists, and riders of motorized two-wheelers and their passengers account for around 46% of global road traffic deaths and are considered vulnerable road users.<sup>1</sup> Commuters on public transport due to their risky behaviours are also identified as high risk group for RTIs. The proportions of high risk vulnerable road users are greater in LMICs than in HICs.<sup>1</sup>

RTIs have huge impact on the lives of survivors and their families. It pushes the families into extreme poverty, due to the expenses associated with cost of medical care,

rehabilitation and loss of productive life (usually young). It becomes more severe, when the family loses its sole bread earner due to RTIs. Furthermore, it also places a huge strain on health system in terms of financial resources, bed occupancy and increase demand on health care personnel.<sup>5</sup>

Nonetheless, RTIs are preventable. In 2004, World Health Organization (WHO) and World Bank (WB) jointly stressed the need for 'systems approach' and multi-sectoral action for prevention of road traffic injuries.<sup>1</sup> The 'systems approach' to road safety involves identifying the interactions between the road users, the vehicle and the road environment i.e., the potential areas for interventions.<sup>6</sup> On the same lines, the UN Road Safety Collaboration has developed a Global Plan for the Decade of Action for Road Safety 2011 - 2020. The UN addresses to retransform the road transport system by trying to accommodate human error by taking into consideration susceptibility of the human body and attempting to share the responsibility from road users to those who design road transport system. The categories or pillars of the activities that will be focused are: building road safety management capacity; improving the safety of road infrastructure and broader transport networks; further developing the safety of vehicles; enhancing the behaviour of road users; and improving post-crash care.<sup>7</sup>

Prevention of RTIs in the LMICs has been limited by lack of knowledge, absence of reliable estimates of the current level of injuries, and scarce knowledge about effective interventions in these countries.<sup>8</sup> The research for the reduction of RTIs is funded at a disproportionately lower level in LMICs than other health issues and considered a public or transport sector job rather than public health issue.<sup>9</sup>

*Department of Community Health Sciences, The Aga Khan University, Karachi.*

*Correspondence: Dr. Adeel Ahmed Khan, House No. A-647, Sector II-A, North Karachi, Karachi.*

*E-mail: adeel.khan@aku.edu*

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Pakistan is the sixth most populous country in the world, with a population of more than 190 million.<sup>10</sup> The first national injury survey of Pakistan (NISP) conducted in 1997, showed the yearly incidence of 15 RTIs for every 1000 persons. The relative risk for RTIs was higher in males, among 16 - 45 years old, and those in the professional category of labourers and vendors.<sup>11</sup> Moreover, 25% of the emergency room visits are related to injuries in Pakistan, whereas one-third of the surgical beds and almost 50% of the neurosurgical beds in tertiary care facilities are occupied by patients who have sustained injuries.<sup>12</sup> The Road Traffic Injury Study of Pakistan compared various sources of available data including police records and government agencies over the last 42 years (1956 - 1997).<sup>13</sup> The incidence of RTIs was 15 per 1000 persons per year. The injuries were most frequent among occupants of motor vehicles; however, in contrast, fatalities were commoner among pedestrians. Speeding was leading cause of RTIs. Other factors included rash driving, long duty hours for drivers, absence or inappropriate display of diversion signs and deficiencies in the policing system.<sup>13</sup>

The initial results of Pakistan's first road traffic injury surveillance project in Karachi city showed the annual incidence of RTIs to be 184.3 per 100,000 population and mortality to be 5.7 per 100,000 populations.<sup>14</sup> When compared to the National Injury Survey of Pakistan (NISP), gross differences was noted of which is the underestimation of incidence and mortality rates for all ages in the surveillance study. There was an inherent selection bias in recent surveillance study as data from a single metropolitan city cannot be extrapolated to represent the entire country. These may be possible reasons for the discrepancy between the two studies. The surveillance study results are representative of only urban Pakistan.<sup>14</sup> It was the largest road traffic injury data from the initial 3 years of RTIs surveillance from the metropolitan city reported from the five biggest emergency departments of the city which receive almost all the major emergencies of the city.

This study review the current preventive strategies which were undertaken to reduce the burden associated with RTIs in Pakistan and to identify the weaknesses and possible solutions in the local context.

## METHODOLOGY

A review of the literature was done. Google scholar, PubMed, Pubget and Pakmedinet were used as search engines. The original peer reviewed research articles, WHO reports in English language, non-government organizations reports were included in the review. Road traffic injuries AND Prevention AND Strategies AND Pakistan were used as search terms. References of the relevant articles were also used for citations. Ten studies were included in the review. Out of which, four articles

are from peer reviewed journals, four of them are reports of various governments and non-government organizations, while two are concerned with government legislations regarding road safety. Upon segregating the articles on the basis of interventions, three were related to establishing and comparing surveillance system with other international injury surveillance guidelines. Six studies were reports of regulations and legislations regarding road safety issues and role of private sector in promoting conducive environment for road safety behaviours in Pakistan. While one study was conducted to ascertain the impact of helmet wearing campaigns on a national highway.

## DISCUSSION

The interventions looking at systems approach framework were discussed. WHO has proposed 'systems approach' in the light of Haddon's matrix, which describes the interaction of three factors: human, vehicle and environment. This approach has produced positive results in developed countries where interventions are focused on the above components, individually or in combination. This approach has led to better understanding of behavioural, road and environment related dynamics which play important part in traffic injuries.<sup>8</sup>

**Human factor related to use of seat belt and helmet wearing:** The knowledge and attitude of an individual about traffic related issues, usage of restraints and first-aid skill are important factors for control of RTIs. In this regard, limited observations are available from Pakistan. Bhatti *et al.* reported limited success of increased enforcement on seat-belt wearing among drivers (+4.0%; 95%CI=1.8-6.1) and occupants (+6.2%; 95% CI=4.2-8.2). A higher increase of helmet-wearing was observed for motorcyclists (+9.8%; 95% CI=2.6-16.8) and pillion riders (+12.8%; 95% CI=5.4, 20.5). Overall, two of the five drivers and one of the five front seat occupants wore seat belts. This proportion was significantly higher in drivers and front-seat occupants of cars than those of the heavier vehicles.<sup>15</sup> Efforts are needed to improve enforcement resources, increased in fines debarring such vehicles on roads and awareness campaigns in Pakistan.

Furthermore, it is important to note that seat-belt and helmet wearing laws do not apply to all drivers of motorized vehicle in Pakistan.<sup>5</sup> National Highway Safety Ordinance (NHSO) 2000, is applicable to the highways only and the drivers of the motorized vehicle on the highways are required to wear seat belts, whereas both the motorcyclist and the pillion rider are required to wear helmets.<sup>16</sup> Moreover, the implementation of these laws is also not effective in compelling the individuals to follow the rules. A group of Pakistani experts, in a recent global study rated the enforcement level for existing seat-belt and helmet laws at 4 on a scale of 0 - 10.<sup>5</sup>

The enforcement of laws on seat belt and helmet wearing has brought considerable change in high income countries. In United States of America (USA), injury prevention strategies are two of the 10 most successful public health interventions of the last century. Seatbelt use alone has saved more than 147,000 lives in that country from 1975 - 2001.<sup>17</sup> In a study conducted in two Latino-majority communities in USA, the combined intervention of community awareness, education, child passenger restraint distribution, and law enforcement focused on educational traffic stops with incentives and warnings was associated with a significant increase in both driver and child passenger restraint use in the intervention community.<sup>18</sup> The interventions on seat belt and helmet wearing usage can be easily adapted in LMICs.<sup>19</sup> Specific interventions like enhanced training and enforcement practices along with raising public awareness were implemented in Guangzhou, China. A 12% increase in seat belt use was observed in Guangzhou over the period of one year, increasing from a prevalence of 50% before to 62% ( $p < 0.001$ ) after the intervention; an absolute change difference between the intervention and reference city of 20% was achieved. The incremental cost-effectiveness ratio of the intervention was also calculated and approximated to be US\$ 418 per disability-adjusted life year saved.<sup>19</sup>

In Malaysia, legislation to use daytime running lights by motorcyclists supported by 3 months educational and publicity campaigns, crashes were reduced by 29%.<sup>20</sup> Similarly, in Singapore, the legislation was helpful in reducing the number of fatal and serious injuries among motorcyclists.<sup>21,22</sup>

**Environmental factors highlighting importance of legislative measures and role of National Highway and Motorway Police (NH&MP):** Environmental factors include measures related to road design, road layout, speed limits and pedestrian facilities. The National Highway Safety Ordinance (NHSO) was promulgated effective September 2000 in Pakistan. This ordinance is deficient in having the guiding rules for its enforcement. In addition, the provincial ordinances have not been formulated after the eighteenth amendment. NH&MP regulate five motorways and highways; constitute 25% of the motorway and highway mileage in Pakistan.<sup>23</sup> NH&MP conducted a small intervention whereby two traffic black spots along the national highways were identified; Mansoor Bend located at a distance of 100 kilometres from Islamabad on N-5 and the Bakrala Bend situated in proximity to Gujjar Khan on N-5. The National Logistics Cell (NLC), and the National Highway Authority (NHA) improved road signage around bends and installed cat eyes, chevrons and road markings. Following the intervention, the number of accidents within a year (2002 - 2003) fell from 18 to 3, with reduction in number of deaths as well.<sup>23</sup>

The reasons behind the well performed NH&MP were adequate deployment of staff to cover small highway segment. There was a mechanism of fair incentive and reward for the officers that was a source of inspiration and motivation for the staff of NH&MP. This system is sustainable, despite the substantial administrative costs as it uses toll collection to generate revenue. Although, preliminary assessments indicate that a significant decrease in the incidence of road traffic mortality and morbidity can be attributable to the institution of this system. However, the impact of this intervention in terms of reduction in RTI related mortality and morbidity has not been looked upon meticulously; this would have enabled a more concrete comparison of the costs per life saved.<sup>23</sup>

It is important to note that other 75% of road network are still being patrolled by the traditional police force. The within-city traffic, licensing, registration and vehicle fitness, and construction and maintenance are carried out under the Motor Vehicle Ordinance 1965.<sup>23</sup> The Motor Vehicle Ordinance has several limitations; the law fails to adequately address the issues of licensing, point violations and ticketing systems, speed limits and major violation punishments. There is a need to standardize the rules regarding vehicles design and need to implement and adopt the National Highway Safety Ordinance (NHSO), 2000 for within city traffic police also. Appropriate regulatory measures also need to be developed and implemented for private driving training institutes. These institutes need to be registered with regulatory authorities. These structural changes will improve the existing training and licensing systems. National Road Safety Secretariat (NRSS), National Road Safety Council (NRSC) and National Road Safety Steering Committee (NRSSC) were constituted by the Ministry of Communications in November 2005. NRSS was identified as the lead agency for road safety in Pakistan. But due to resource constraints and operational requirements NRSS was wind up in 2008. After this, Ministry of Communications has taken lead agency role for Road Safety at the federal level. National Transport Research Centre (NTRC) and National Highways and Motorways Police are the technical/implementation arms.<sup>24</sup> There is a need to reinstate NRSS, for taking the lead role in road safety.

**Environmental factors: An effective surveillance system for road traffic injuries for planning intervention strategies:** Road traffic injury surveillance is an integral component of planning intervention strategies for controlling the burden associated with RTI. Recently, a global non-government organization Road Traffic Injuries Research Network (RTIRN) has assisted in developing surveillance system in the emergency departments of five major hospitals in an urban city (Karachi) of Pakistan.<sup>25</sup>



First, it demonstrates that such system can be established in resource-poor setting.<sup>26</sup> Secondly, collected data from the surveillances sites i.e., major tertiary hospitals of the city was used for report generation every 3 months, and was shared with major stakeholders to drive medical, engineering and law enforcement interventions. The stakeholders involved were the municipal government, traffic police, highway and city police, citizen-police liaison committee, ambulance service providers, hospital administrators, ministry of health, corporate partners, and print media. An annual conference was also arranged to share the findings with the general public and high level government officials such as Minister of Communication and Transportation. All these activities have led to sensitization of the concerned stakeholders about the magnitude of the problem and also the potential solutions to counter the burden related to RTIs.<sup>26</sup>

For instance, the hospital which received the highest number of casualties among the five emergency trauma centres, have upgraded the neurosurgical facilities. The municipal government has also provided training of paramedics and provision of Basic Life Support Ambulances that will be stationed at the places where highest frequencies of casualties occurred according to the surveillance system.<sup>26</sup>

The Road Traffic Injury Study of Pakistan also showed that the police underreport 18% of the road traffic fatalities and 72% of the road traffic injuries.<sup>4</sup> On the engineering side, the surveillance system identified fifty locations with highest frequencies of road crashes.<sup>26</sup> The measures adopted by municipal government included development of overhead pedestrian bridges, reducing speed by introducing traffic calming devices, ensuring pedestrian safety through development of footpaths and street lights and coupling of bus stands with zebra crossings.<sup>26</sup>

The challenges faced during the surveillance system were developing individual partnership with the involved stakeholders including industry, police and municipal government. The lack of capacity of the relevant authorities of doing in-depth analysis of the data was another limitation of taking effective public health actions. Lack of a lead agency for road safety results in dilution of responsibility for road safety. This leads to poorer utilization of information available through surveillance.

**Vehicle and equipment design; role of private sectors and non-government organizations regarding road safety:** Vehicle and equipment designs are also very important as a strategy for reducing the burden of RTIs. Role of private sector is very important in LMIC's, as there is always scarcity of resources to be spent on prevention strategies for RTIs. One of the examples of contribution of private sector in Pakistan is the injury control and traffic safety course conducted by a vehicle

manufacturing company.<sup>27</sup> The participants were traffic engineering experts, doctors attending to road traffic accidents at hospital's emergency wards, representatives from auto industry, fuel companies, provincial and other government departments, etc. This Road Traffic Injury Research Project (RTIRP) was initiated to evaluate the nature, location, magnitude and major causes of traffic fatalities in Karachi.<sup>27</sup>

Various other awareness campaigns have also been organized by the company including road safety campaign and concerts at schools, road safety walk etc.<sup>27</sup> Two large state and private oil companies have also been contributing to the road safety initiatives.<sup>28,29</sup> Evidence from HICs have also showed that well-structured behavioural change intervention campaigns comprising of Zebra Crossings, health education, penalties, cameras for speed limit, health and seat belt wearing, through a multi-media strategy, have resulted in significant public health gains.<sup>30,31</sup> Though, the impact of such random activities is small, these efforts need to be streamlined with the governmental activities to have larger impacts.

It is also known that design of the vehicles also contribute in occurrence of vehicle crashes. It has been proved in HICs safety features like laminated windshields, collapsible steering columns, head restraints; increased side door strength, better brakes and airbags have reduced the deaths associated with crashes.<sup>32</sup> Therefore, the design of locally manufactured vehicles needs to be improved in order to make them safer on the roads. For this purpose private companies can also play their role in making the vehicles road and user friendly.<sup>33</sup>

## CONCLUSION

Limited evidence regarding preventive strategies to combat burden of RTIs is available in Pakistan. Albeit its limited scope the intervention applied have shown to be successful. The traffic law enforcement has been poor and there is non-compliance to seat belt use and helmet wearing in Pakistan. The success story of helmet wearing enforcement campaigns should be shared with stakeholder to expand the implementation of traffic safety laws. The RTI surveillance model established in one city need to be replicated to other cities as well. The information gathered through surveillance should be continuously and promptly utilized for public health actions. Sustained political will is required to revive federal lead agency National Road Safety Secretariat (NRSS). Moreover, multidisciplinary approach is required to reduce the burden of RTIs and the contribution of private sectors should also be synchronized with the public sector in order to achieve this massive task. WHO systems approach provide systematic information to implement interventions targeting human, vehicle design and also making environment safer for road users in countries like Pakistan.

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