
Road Traffic Crashes (RTCs) and its Determinants: Public Health Issue

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Abstract

Thousands of people injured and die on our roads every day. Pedestrians, cyclists, and motorcyclists including men, women or children going towards school or job, playing in the streets or going for trips, never return home, leaving behind suffering families. Each year, millions of people spend many days or months in hospital due to severe crashes and numerous are not able to go for work, play or even live again as they earlier do. Current drives used in addressing road safety problems are minimal in contrast to these massive sufferers.

Keywords: Road traffic collisions; Determinants; Road traffic accidents; Public health

Introduction

Road Traffic Crashes (RTCs) are responsible for the great number of morbidity and mortality, resulting in a significant burden globally. According to the World Organization global status on road safety (2016) statistics [1], each year approximately 1.25 million people kill on world roads and more than millions bear injuries, with suffering of long hospital stay or live with permanent disabilities. So, massive young potential is being destroyed including poor, between the age of 15-44 years, and most often breadwinners in their family; with also raise in social and economic consequences. Furthermore, one of the top three causes of death among young (aged 15–29 years) people is road traffic related-injuries [1].

Thus, RTCs is considered a major contributor towards global burden of disease. As, WHO forecasted that by the year 2030, fifth leading cause of death will be road traffic injuries [1]. Desperately, the most affected part will be low- and middle-income countries.

Likewise, this global public health catastrophe is currently affecting the developing countries excessively which accounts for >90% of road casualties, which is not ignorable [1].

Moreover, RTCs data in Pakistan is yet scared. However, WHO report on road safety reported 5,192 deaths due to RTCs among Pakistan in 2010[1]. Similarly, a study based on hospital record found that traffic related-injuries accounts for 36% of fatalities annually in Rawalpindi district [2]. In addition, another study in Islamabad found 250 fatal RTCs and 270 deaths from the record of traffic police for the years in 2008 – 2010 [3]. Therefore, it is a public health concern throughout the world.

In continuation with this problem, the following paper includes in depth analysis of determinants/factors contributing towards RTCs and will highlight some possible recommendations for this growing public health crises.

Determinants of RTCs

It is known that driving is a social activity. Obtaining a thorough exploration of determinants and factors underpinning the RTCs at environmental, human/biological, Socio-demographic, medical/technological, political, and organizational could be of particular importance and may help to facilitate the formation of recommendations (Figure 1).

Environmental determinants

One of the main causative factors in increasing the global road crash injury is the external environment that includes traffic environment and road environment. A study showed that determinants linked to the traffic environment contains increased number of vehicles (motorization), growing traffic density, and vehicle's types are positively allied with higher number of crashes injuries and deaths [4].

On the other hand, Rivas, Milla, and Puente [5] found the association between road environment and RTCs that includes road infrastructural issues like improper construction of roads, more curved downhill/uphill land, inappropriate light, absence of sign boards, or may be slippery road due to rain fall, and fog can increase the risk of fatalities.

Correspondingly, a report from Iran analyzed that pedestrian volume, road geometrics, weather alteration, and light effects during day and night may affect the operators resulting in bigger chances of crash injuries or deaths [6]. Moreover, it was assessed that wild animals crossing could interrupt the vehicle operator resulting in crash. Desperately, developing world has less or improper pedestrian crossings or even less use of it can be fatal in terms of causalities [4]. Likewise, some natural limitations in the environment such as sunrise, sunset, dusty climate, and wind blowing may produce hazardous effects on the smooth running of traffic [6].

Human/Biological

Another more important factor for the risk of RTCs is users' problem, inclusive of drivers, pedestrians, and passengers.

High speed: The human operator often adjusts to changing environments in ways that do not always aspect for safety. A single error such as high speed can have consequences of life or death. As, WHO reported that the probability of crash occurrence and severity of the consequence has direct linked with an increase in the average driving speed and use of sharps vehicle lights [1]. Moreover, it is observed that frequent lane changing, and no use of helmet and seat belt, are also predictors towards accidents.

Distracted driving: Impaired driving could be the result of various kind of distractions that may lead to fatalities, but a significant increase in the use of mobile phones worldwide by drivers, has been observed recently and is becoming an important concern for road safety now a-days [1]. Driving performance could be impaired as a result of frequent mobile use while driving. This is shown that it can slower the reaction time like time for braking reaction and also distract to follow the traffic signals. In addition, text messaging can reduce the ability to keep in the correct lane, with young drivers at more risk now a day. Mobile users during driving are nearly 4 times more prone to involve passengers, pedestrians, and self in crashes than those who do not use phone [5].

Untrained and unlicensed drivers: Unfortunately, in developing countries with low literacy rate, untrained or inexperienced, and unlicensed drivers are common causes of road traffic collision resulting in higher mortality rates [1].

Alcohol use: The use of alcohol by drivers is an additional constituent for traffic deceases [7]. Different studies showed that fatality risk applies to both the road users as well as drivers [8].

Furthermore, another ecological study in Italy conducted by Torre et al. (2007) identified that high mortality rates related to traffic in overall population are completely associated with the percentage of alcohol user drivers [4].

However, there are some biological limitations, other than road-user mistakes; These include vision in night traffic, targets detections in the periphery of the eye, speed and distance estimation, the information processing in the brain that can have a bearing of crash risk.

Socio-demographic determinants

Are also known factors for producing traffic crashes in population. Literature showed an association of

low socio-economic profile with traffic injury on the individual basis as well as regional and national level [9]. In United States, Hasselberg and Laflamme (2008) documented that there is an association between pedestrian and motor vehicle collisions with the neighborhood conditions and residential density [10]. But, in Netherlands a classical study exposed that high socio-economic status, growing traffic density, and proper medical resources availability are significantly related with lesser traffic mortality [11]. Additionally, in demographic determinants younger age and male gender is found to be more vulnerable in risk of traffic causality [10]. As per, WHO [1] report, younger males (15-29 aged) as compared to females and older are at more risk of crashes; account for 48% of road traffic accidents globally. The reasons behind could be risk taking behaviors, low temperament, and minimal control over vehicles. Moreover, WHO further described that 25 years aged drivers are almost 3 times more on risk in comparison with young females' due to the tendency towards risk taking behavior.

Medical determinants

Driver's health both physical and mental plays an important role in safe driving. Impaired vision or night blindness is a common predictor towards road incidences as it can have a deleterious effect on object recognition resulting in crashes or colliding of vehicles. Impairment in memory and cognition, heavy mental workloads due to anxiety, stress, and depression, negative emotion like anger, and sleep deprivation or use of sedative drugs may interrupt in driving capacity. Consequently, risky driving may lead to fatal situation [12].

Technological determinants

Technology in terms of manufacturing and proper maintenance of vehicle has a role in RTCs. Vehicle design, fitness, and heavy loadings falls into traffic crashes. However, designs built by manufacturing company itself are usually safe and strict company's law protects them from alteration. The major flaw in this context is locally manufactured vehicles, which usually do not promise for safety standards [7].

Political determinants

In local context, it has been observed that there are certain political factors which may create hindrances in the road safety like timely renovation of roads and sign boards, releasing of funds for construction, and favors in law enforcement etc. However, literature support couldn't find to prove these determinants.

Organizational determinants

Poor law enforcement, improper placement and operating sign boards by the traffic police applies towards RTCs [1]. Additionally, inappropriate monitoring and increased ratio of unregistered vehicles by the concerned department are being considered as RTCs producers. Moreover, urbanization resulting less parking area is another determinant for collisions [9].

Recommendations

In light of above mentioned determinants some possible recommendations are proposed at both preventive and interventional level.

Preventive level

Road traffic crashes can be prevented. For achieving this purpose, Government and stakeholders require involvement of a leading agency in road safety measures in collaboration with multiple sectors (transport, police, health, and education) to address this problem in a holistic manner. While a little evidence is there in reducing the use of mobile phone while driving, community leaders and government need to be proactive. Awareness campaigns regarding use of phones while driving must be functional at school, community, and media level. Documented actions can be taken such as strict legislative actions against non-complier of seat belt and helmet users: and launching public awareness campaigns through social media can be helpful in reducing the incidences [1].

Furthermore, national efforts for road safety could be boosted if one or more well-known political

leaders actively participate with working agency. In addition, routine medical checkups and screening for the exclusion of morbidity should be a strict legislative for drivers at national level.

Interventional level

Designing safer roads, proper use of land, and improving the safety standards of vehicles are considered to be effective interventions against RTCs. Interventions for the road user's behavior are also equally important that is enforcing laws for risk factors, and raising awareness among communities through media. As, it is proven through studies that improvement in the infrastructure of roads is an effective measure in producing immediate reductions in crash and injury among cyclists and walkers [13]. These findings also indicate for a need of a strong system that address the difficulties of road users. Moreover, the commercial drivers must be license assured, trained, and concerned department monitor them on regular basis. Furthermore, behavioral modification campaigns must be initiated by the organizations throughout the country [14].

Conclusion

Road traffic injuries create a major public health and development catastrophe, and are predicted to increase if determinants are not addressed effectively by the State Members.

It is acknowledged that RTCs are predictable and preventable. In order to combat with is growing problem; there is a strong need of close coordination and collaboration, using an integrated and holistic approach, across all sectors and disciplines of state. Every individual should take responsibility to follow the rules and work for behavioral change at community level. Subsequently, achievement will be at door step.

Conflict of Interest

There is no any conflict of interest.

Ethical Approval

This article does not contain any studies with human participants performed by any of the authors.

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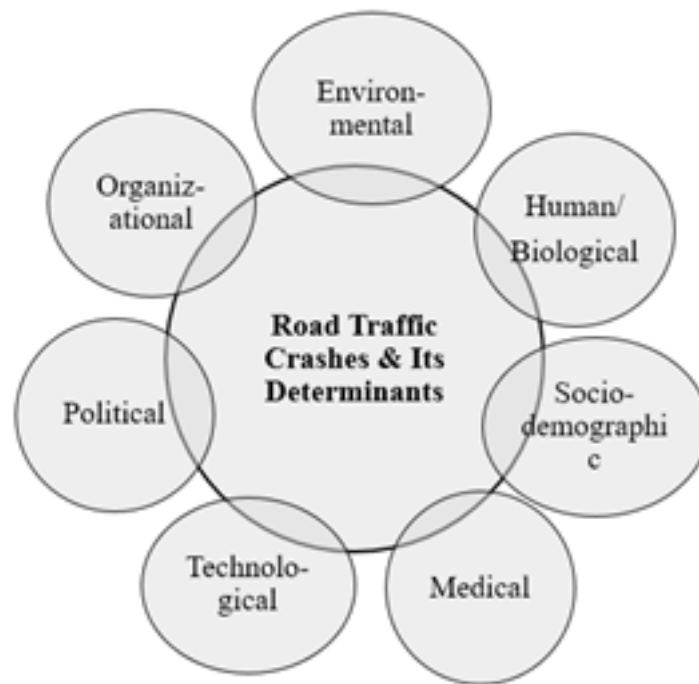


Figure 1: Road Traffic Crashes (RTCs) and its determinants.