

Road Traffic Accidents (RTAs) Safety Issues On Highways: A Review

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Abstract

Nowadays, besides the fast development of technology (particularly in the field of the information technology), the number of vehicles on the highways/roads has increased enormously. In developing countries, with the increased number of vehicles, the significant number of road accidents (RTAs) have been reported. The major reasons for the RTAs in these countries are the lack of proper management (including RTAs data) and guidance to the consumers. A study was conducted on Hyderabad-Karachi M-9 Motorway section during half of the year 2017. The data revealed that total 17 accidents encountered during the reported time in which 15 human lives were lost and 54 people were reported as injured. In addition, 30 vehicles were damaged. Keeping those causes and reasons for RTAs in view, this paper has focused on undertaking a review of the reported RTAs in the available literature. The data analysis reveals that the causes of accidents are careless driving, bad road conditions and improper condition of vehicles.

Keywords—Highway, Careless Driving, Road Traffic Accidents (RTAs), Safety Issues.

1 Introduction

IN developing countries, according to estimates by 2030, road traffic accident claims more than 2.5 million people losing their lives and in addition around 60 million people (i.e., death and injured) got injured in these road accidents. Most of the accident involve children, pedestrian, cyclist and public transport users. Pakistan is a developing country with the population of around 207,774,520, facing the road crashes crisis. According to unconfirmed data, lack of adequate road standard safety measures and violation of traffic laws took more than 100,000 lives in last 10 years. However, three main factors of road accident were identified. These are human error, vehicular defect and failure in road environment. In Pakistan, most of the road accidents occur due to over speeding, wrong over taking and carrying overloading material, etc. The mechanical faults like tire bursting and brake failure are massive contributor of the road accidents. In Pakistan, initially highways were used as feeders to railways that were the main transport source for long distances and transport goods. However, nowadays, the usage of highways has increased, and the length of the roads

increased from 249,972 km (in 2000–01) to 263,356 (in 2015–16). A similar increase is recorded in the number of vehicles, from 4,701,600 (in 2000–01) to 17,317,600 (in 2015–16) [34]. In Pakistan, the maintenance and construction of roads is under the Government and national highway authorities. For this research article, a brief literature review is carried out to determine the road traffic issues in the era of road traffic accidents (RTAs).

2 Literature Review

The authors in [1] investigated about road accident cost including hospital expenses, court expenses and also the cost of intangible consequences like pain and suffering. During the last two decades, rapid increase in the number of vehicles is the major reason of increasing number of accidents. To minimize the road accident impact, the necessary measures include organizing safety programs, developing vehicle design, making a suitable plan and implementing traffic laws to reduce the accident on the roads. It is concluded that organizing safety programs as per requirement for reducing the number of accident and fatalities on

the road in future is indispensable.

The authors in [2] revealed that a safety awareness programs is conducted with the collaboration of Regional Transport Offices in 2011. The main aim of this program is to educate the people about the road rules. In Kerala, highest rate of road accident occurred in the country. Each year 3800 people lost their lives due to road accident. In these accidents 40% victims were two-wheeler rider and many more were permanently disabled. The increasing road accidents occur due to inadequate road space in view of this ever-increasing number of vehicles. The two-wheeler rider often does not wear helmet. The state government needs to organize safety programs for public to reduce the severity of road accidents. It is concluded that organizing such type of programs and safety classes in the educational institutes on regular basis is vital.

The authors in [3] concluded that day-by-day growing population and increasing the number of vehicles at proportional rates with the population is also the root cause of the increasing number of RTAs. In addition, untrained vehicle driver become a main source of accident. Driver education should be introduced in schools, with its future success will also change the behavior of the person. Well-equipped traffic aid centers should be installed at every 30-50 km on the highway which must contain patrol vehicles, ambulances, crane and traffic staff who regulate the traffic rules and laws and provide first-aid to the RTA's victims.

The authors in [4] used Geographical Information System (GIS) to identify the most frequent accident spots in the district of Enarkulam and Alappuzha. To identify these spots, the use of WSI method for collection of data at different location includes ten spots in Enarkulam and six spots at Alappuzha. According to the collected data, two spots were identified in Enarkulam and one spot was identified in Alappuzha. It is concluded from the study that some possible measures should be taken to reduce RTAs and improve those areas where accident were taking place on regular basis.

The authors in [5] concluded that India is the 2nd most populated country in the world, yet there is little research on RTAs in India. To prevent injuries (to make effective policies regarding the accident) safety policies and social and economy based policies must be envisaged in the country.

The authors in [6] revealed that road traffic accidents is the leading cause of death and property damage due to complex flow pattern of vehicles on the highways. In year 2011, the rate of death has been increased

which is estimated that 1200 person died in 100 accident, whereas in 2001, it is estimated that 700 person died in per 100 accident. Mostly, the road accident occurred in rural areas due to the damage of roads and improper and untimely maintenance. It is concluded from the study that most of the road accidents occurred in year 2001 in Palakkad, Enarkulam, Kannur and Alaphuzha. In year 2011, most of the accidents occurred in Kannur, Malapuram and Palakkad. The comparison of the accidents and death ratio in the years 2011 to 2001 reveals that the ratio of death increases and the rate of accident decreases.

The authors in [7] concluded that road accident is a human tragedy, which results in loss of lives, injuries and loss of properties. A little amount of research is conducted on road accident to investigate the main causes of accident. In India, there were 500,000 road accidents in calendar year 2010. From the numbers, in every minute ten road accident were reported in which every 4 minutes one death occurred due to road accident. Most of the victims are under the age group of 25-65 years. To reduces these unwanted tragedies, many of the countries are adopting road safety measures including quality and design of roads, traffic management, road worthy vehicles, effective law enforcement and first-aid training programs to attend the victims with immediate response. It is concluded that the government alone can not take sufficient measures to resolve accident problems. It is rather a nation-wide problem and must be resolved with the cooperation and support of the whole nation. The authors in [8] revealed that during year 2005-2006, there were 38361 and 42363 accidents, respectively and the trend was rising. There is a slight decrease in road accident in year 2006 and it comes to 36,282 in year 2014. Road accident causes a major social, health and economic problem. Several safety programs have been organized in the country to minimize the impacts of road injuries occurring due to road accidents. The state government addressed road safety awareness programs as well as introduced a tough license issuing act.

The authors in [9] concluded that the major causes of road accident is recklessness and ignorance. The people do not follow the traffic rules and laws. The government can play a vital role to create educational institutes and offer courses regarding safety awareness and distribute material among the public and drivers. Governments need to ensure tough process of driving license issuance after proper examination of the driver. Other main reasons of road accident include over loading, use of cell phone during driving, and

use of drugs by the drivers. These problems should be coped by imposing penalties to the offenders and organizing awareness programs.

The study in [10] concluded that in 2001, road traffic injuries are the fourth main cause of death in Korea after stroke, heart and cancer diseases. Analysis by age (1-29) shows that road traffic injuries were the first leading cause of death among the young adult, second leading cause of death among the age group of 30s, and third leading cause of death among the age group of 40s. However, many people around the age of 50s die due to road injuries and majority of them die due to heart stroke, heart and cancer problems. The main reason of road traffic injuries is due to over loading, over speeding, reckless driving, drunk driving and disobeying the traffic rules. It is concluded that the multiple stakeholders such as policy maker, Korean police, public and media are able to reduce road traffic accidents as a joint effort.

The authors in [11] opined that road traffic accident is an unpredictable event which remain a huge burden for any country. Every year, 1.2 million road accidents occur in the world. In addition, 90% of the accident occur in developing countries and 50% road accident occur in Asia pacific region. In the severity of RTAs, 50% of death happen within five minutes due to serious injuries including heart failure and brain hemorrhage. Nearly 35% victims die in next 1-2 hours due to bleeding and remaining 15% victims die in the next 30 days due to road infection and negligent hospital treatment. It is concluded that the road safety knowledge among the drivers and general public must be enhanced .

The study presented in [12] shows that the transporter and general public in Pakistan do not follow the traffic laws. The competent authority is failed to enforce wearing of helmet and seat belt during the driving. The road traffic injuries model established especially for one city is generally applicable for other cities as well. Furthermore, multi-disciplinary private and public sector organizations arrange road safety programs to reduce road traffic accidents.

Another study [13] revealed that a huge number of accidents occur due to reckless driving. In Pakistan, by the year 2000 to 2010, Punjab has the highest and Baluchistan has the lowest ratio of road accidents. However, Sindh province has a higher ratio of fatal accidents. The number of RTA deaths in Punjab is higher than other provinces of Pakistan. The population growth results in higher number of vehicles, leading to the higher probability of road traffic accidents.

The authors in [14] state that road traffic accident is

the eight main cause of deaths worldwide. According to WHO (2004), road traffic accidents would become the 3rd main cause of death in year 2020, if not controlled properly. Furthermore, the available data is not reliable due to under reporting. However, road traffic accidents is one of leading causes of death and injury all over the worldwide. An international comparative study was carried out to investigate various regions in terms of motorisation (vehicles per individual), individual hazards (passings per person), and traffic chance (passings per vehicle). The study shows that the developing countries has higher motorization, but lowest risk. Whereas, Africa has least motorization, but have high traffic risk. Southeast Asia, Africa and the Middle East have the highest risk in terms of personal safety.

The authors in [15] stat that the seat belt law was introduced in 1994. According to the hospitals record, 1200 road accidents were reported after enact seat belt law in Kuwait. The fatality and injuries were slightly increased for the use of seat belt as to non-user of seat belt. It is concluded that seat belt non-users received higher number of face, head, abdomen and limb injuries.

The authors in [16] state that road transport is the most important mode of travel in a country. Nowadays it is an emerging problem which almost all the governments have tried to cope with. Road accident causes both economical and social impacts on the individuals. The increasing number of vehicles on roads creates a social problem as well as high rate of loss of lives. Furthermore, it is concluded that bad road condition is one of the main causes of injuries, permanent disability and sometimes death. The government and the private agencies should repair the bad portion of the highways on time. The driver education to induce good driving habits must be carried out.

Another study [17] concluded that in developing countries the abrupt increase in the use of vehicles is the major reason of increasing accidents . In year 2020, road traffic accident will become the third leading cause of death, if not controlled properly. Road accidents mainly affect males in their productive and active period of life. It creates huge economic losses for the family whose dependent is on the single source of income. To reduce these accidents, several safety awareness programs must be organized.

The authors in [18] revealed that road traffic accident rate is higher in most of the Gulf countries. Saudi Arabia is also facing problems of morbidity and mortality due to RTAs. Road accident deaths and injuries are avoidable by safety awareness programs

that educate the road users and vehicle drivers about the traffic laws.

The authors in [19] concluded that in rural areas road accident causes huge loss of lives of young, male adults who mostly belong to poor families. Most of the victims travel by public private transport, pursued by motorcycles and cars. Motorcycle is most economic and common source of transport in rural areas of Sindh province for poor and lower-class families. To reduce these vehicle accidents, strict security measures must be enforced. There is also need of paying attention on improving vehicle condition in rural areas of Sindh.

In [20], the authors suggested that a proper training to the employees regarding latest skills and knowledge to the road traffic investigator must be provided. The city must apply road traffic standards and improve future road safety facilities such as first aid, cameras, ambulance, computers and well establish offices.

The authors in [21] stated that the worldwide road traffic accident fatalities and injuries have become a serious problem. In Nigeria, road accident fatalities and injuries have become alarming and ranked among the other countries with higher rate of accidents worldwide. However, by introducing road safety concepts and awareness campaigns can significantly reduce RTAs. Furthermore, such campaigns have been introduced through media and road side slogans such as “drive to stay alive”, “drive carefully”, and “accident kill more passenger”. Effective safety programs must be organized by tear round and should not be kept limited to festival season.

In [22], the data collected in Keral, India from 2010-2016 reveals that the ratio of deaths is on the rise. Road accidents are the main source of loss of lives, injuries, polluting the environment and also destructing service sector. The study also found other road accident occurring frequently in the state’s highways. In rural areas, road conditions are very poor and also the main cause of increasing road accident.

The authors in [23] state that road accident is one of the main sources of loss of lives and injuries. It becomes not only a social problem, but it is also putting an adverse impact on the dependents of family members. The increasing trend of road accidents enact a negative impact on the individuals as well as on dependents. Young age groups of people are unsafe due to road accidents which cause economic loss, but also pain, grief and suffering, etc. It is concluded that design-friendly transportation policies, road infrastructure as well as improved vehicle design to reduce the impact of road accident must be envisaged. In [24], the authors investigated the magnitude and

pattern of fatalities in Sindh, Pakistan. The collected data indicated that every 1 or 2 road traffic crashes produce fatal accident. In addition, every day more than four people lose their lives and these are common in rural areas as compared to urban areas. Road traffic crashes mostly affect male adults who are passengers or pedestrians.

The study in [25] reveals that pedestrians are more injured in road accidents due to lack of awareness. They are not conscious about the risk of an accident when they move on the road. However, limited number of officials perform their duties from Dhaka to Sylhet highways followed by one car. The main reason of road accident is the domestic and wild life animals coming on the highway and creating problems for drivers, leading to accidents.

The authors in [26] conducted a survey on Hyderabad-Karachi Highway for two years (2015-2016) in terms of traffic accidents, loss of lives and vehicles. In addition, they investigated the causes of the occurrence of road accidents. Their data has revealed that careless driving is the major cause of RTAs on the motorway. Due to this reason, 29 and 19 people died in year 2015 and 2016, respectively and total 293 numbers of people got injured in both the reported years. As far as economical loss is concern, 93 numbers of vehicles were damaged 2015 and 110 numbers of vehicles were damaged 2016. The condition of the road/highway has been recognized as a reason for the RTAs. The data has shown that 16 people died in accidents due to bad road conditions. Furthermore, 40 people got injured and 34 vehicles were damaged in the accidents which occurred due to bad road condition.

The study presented in [27] concluded that pedestrians are the common victim of road accident. The collected data indicated that 46.55% male victims were of the ages between 21-40 years. Mostly, the accidents occurred during daytime (62.06%). In addition, 79.31% of victims lost their lives on the spot due to severity of the accidents. Pedestrian were common victims of road traffic accidents (81.89%). The main reason of death occurred on the spot due to head injury is about 45.68%. It is concluded that to reduce death toll rate, various prevention measures must be taken such as seat belt and helmet wearing while driving on the highways. Strict laws should be enforced on the road users to control over speeding, consumption of alcohol, improving road infra-structure, providing hospital care centre, and medical services, etc.

Authors in [29] carried out a research on the occurrence of RTAs in Jordan, based on the accidents registered in hospitals. They concluded that majority of the accidents occurred on first day of a week and

during summer time.

The authors in [30] state that road traffic accident pose a serious challenge. The government of India revises its policies and rules time-to-time regarding the road traffic accidents. Although, it still fails to address the appropriate legislation and policies.

A study in [31] states that one in two road traffic accidents in Sindh cause a loss of four human lives per day. The data was obtained from government documents and daily newspapers reports on accidents. The results show that the total annual number of RTAs, fatal RTAs and RTA deaths were 2272 (± 293), 1104 (± 89) and 1321 (± 136), respectively. The results revealed that 85% of victims were male between the ages of 15-49 years. The most common victims are pedestrians, motorcyclists and drivers. In rural areas, the death rate is higher as compared to the urban areas. The most common cause of RTAs was '*hit by the vehicle*', collision of motor vehicles, breakdown and over speeding.

The authors in [14] state that RTAs cause significant social and economic issues for people and society. Shara-e-Faisal, one of the busiest road of Karachi city, was selected for study purpose knowing the patterns of RTAs. Due to high flow of vehicles in weekends and on Mondays, the percentage of road accident higher as compared to the other days of the week was higher. Young people between the ages of 20-30 are generally affected due to RTAs. The proportion of male affectees in RTAs is higher than female affectees. It is due to higher demand of travel by males. Day Time Crashes (DTCs) were found to be higher in number as compared to Night Time Crashes (NTCs). The frequency of crashes was recorded higher in the mid-block as compared to intersection. Nevertheless, the data revealed that crashes increased with the passage of time. Bike riders are the highest contributor in road traffic accidents because of reckless riding. Rear end and side-swipe was observed to have a significant impact on RTAs. More RTAs were reported on the road sections where street lights and lane markings were not present. The arrangement of these basic needs may help to reduce RTAs on this busiest road in the city. An investigation was carried out to identify harmful road sections. The analysis revealed that the areas without street lights and lane markings were the most risky sections. An evaluation model was proposed with the help of LDFA to mitigate the risks of RTAs on Shara-e-Faisal. The model depends on MVK, DTCs and NTCs, and can predict the condition where a risky section of the road can be named as perilous. This model can be used as a successful tool in the improvement of a traffic safety program to

reduce RTA risk in Pakistan.

A study by World Health Organization (WHO) [32] on Global Burden of Disease (2004) states that road traffic accidents in 2004 were 9th main source of loss of lives. The study forecasts that at current rate the RTAs will rise to 2.4 million deaths by 2030 and will become third major causes of death, even superseding the deaths by HIV and diabetes.

RTAs injures affect all age groups, but their impact is most striking among the young. RTAs have become second major cause of deaths worldwide in age of 5 to 14, 15-29, and 30-44.

The authors in [33] state that in Dhaka, heavy vehicles including buses, mini-buses and trucks are the main source of road accidents. Around 79% of RTA cases involve the heavy vehicles (buses 20%, mini-buses 22% and trucks 37%). Both in urban and rural areas, pedestrian accident are a most dominant accident type which (26.95%). This type of fatal accident follows by head on 13.95%, rear end 15.95% and run off road 17.95%. The majority of victims of accidents involved young males, about 29% falling in between the age of 25-35. The gender-wise statistics are as follows: 37% female falling in the age of 35-45, and 31% are fall in between the age of 55. It is noticeable that 62.50% of the victims were below the age of 10 years, and 37.50% were between the ages of 10-15 years. Most of the victims were primary school level students who do not follow the traffic rules and regulation. It is concluded that pedestrian are the primary victim of road accidents.

3 Problems in the area of road safety

The problems pertaining to the area of road safety can be summarized as follows.

- 1) Traffic education is the area that could help promulgate a safety culture on roads in Pakistan by inculcating traffic rules among the people. Unfortunately, traffic education and awareness programs have never been given much importance in Pakistan.
- 2) The road environments need significant improvements. Roads are full of potholes which have become death traps. Maintenance of roads has never been a priority from the government. The billions earned by the government every year from the fuel duty, motor registration dues, and driving license fees are not gainfully spent on the maintenance of roads. Besides, over speeding is almost uncontrol-

lable and offenders are conveniently ignored by the enforcing agencies.

- 3) The majority of the commercial vehicles in Pakistan are not road worthy and there is no system of banning their entry on roads. Many accidents happen due to faulty engines, poor brakes, worn out tires and ill trained drivers. There is too much laxity in the laws and it is very difficult to punish errant drivers.
- 4) There is a dearth of dual carriage ways preventing head-on collisions on intercity roads. There are no special safety measures near public places like hospitals, schools, mosques and shopping centres, etc. No street lighting provision exists which impose serious threats to security.
- 5) A large number of fatalities on roads involves pedestrians. These deaths occur simply because the pedestrians have to share the carriage way with the vehicles in the absence of proper and adequate space. Similarly, proper pedestrian crossings are not provided on the roads and junctions in urban areas. The random and unchannelized pedestrians crossing causes many accidents.
- 6) In Pakistan, education to inculcate traffic sense among the people has never been given due importance, which is evident from the fact that important passive measures like wearing a helmet by the motorcycle riders and use of seat belt in the vehicles are rarely observed.
- 7) Above all, the law enforcing agencies are not performing their role effectively. Corruption and malpractices are rampant among the relevant government departments.

4 Conclusion

In Pakistan, one of the major concerning issues is traffic management. From the detailed literature review, the main causes of road accident were found to be unskilled drivers, lack of training institutes, bad road condition, use of cell phones during driving, hazards of alcohol/drugs, and overloading. In Pakistan, issuance of driving license is not well regulated and monitored. Road safety audits must be conducted on regular basis before and after the completion of a road. The black spots, where accidents occur repeatedly, must be repaired on priority basis. The traffic rules and legislation must be enforced by introducing heavy penalties to the offenders.

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