

Surveillance Insights into Road Traffic Injury Burden in Lahore, Pakistan: A Call for Policy Action

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ABSTRACT

Road traffic injuries (RTIs) are a major public health issue in Pakistan, particularly among users of motorized two-wheelers. This study assessed the magnitude and characteristics of RTIs involving motorized two-wheelers in Lahore, Pakistan, over a three-month period from January to March 2022. A retrospective descriptive surveillance design was employed using data from the Rescue 1122 Road Traffic Injuries Surveillance System in collaboration with three tertiary care hospitals: Lahore General Hospital, Jinnah Hospital, and Mayo Hospital. All injured or deceased victims of motorized two-wheeler crashes presenting to emergency departments during the study period were included. Data were analyzed using SPSS version 26.0, applying descriptive statistics to determine distributions by vehicle type, age, sex, and crash location. Across all hospitals, motorized two-wheelers accounted for 65%–87% of all recorded accidents, with males representing 80%–88% of victims and females 12%–20%. The 25–50 years age group was the most affected, reflecting high exposure and commuting activity. Major hotspots included Thokar Chowk, Chungi Umer Sidhu, Band Road, and Kot Lakhpat Industrial Area, locations known for dense traffic and inadequate enforcement of safety regulations. The findings demonstrate that motorized two-wheelers are the predominant contributors to RTIs in Lahore, disproportionately impacting economically active males. Strengthened helmet legislation, improved road engineering, strict traffic law enforcement, and sustained RTI surveillance are urgently needed to mitigate this preventable burden and inform data-driven policy reforms in Pakistan.

Keywords: road traffic injuries, motorized two-wheelers, surveillance, injury prevention, public health policy

INTRODUCTION

Pakistan is one of those countries which face high incidence of road traffic accidents. With the passage of times, use of vehicles have been increased significantly. Motorized two-wheelers are especially increasing in number, being a cheap way of transportation. High number of vehicles on roads are prone to more road traffic accidents which result into high morbidity and mortality (Shamim et al., 2011, P.213-217).

World Health Organization points that road traffic injuries contributes financial losses to wounded, families and country. Injured persons get the treatment, diagnostic facility, off from work during the treatment, rehabilitation and period of disability. These all contribute to huge economic losses (Fisa et al., 2022, P.513). Motorcyclists are particularly vulnerable due to the absence of protective barriers. Capsulitis of motorcyclists are much higher than victims using cars like automobiles (Rifaat et al., 2012).

Haworth (2012) notes that worldwide half of the casualties are due to traffic accidents involving motorcyclists (28%), pedestrians (23%), and bicyclists (3%). There is increased tendency of riders to fell on ground during crash and hit to hard surface of road resulting in severe trauma to head and chest.

Partial policies for motorcycle safety exist in Pakistan; however, these have largely been adapted from frameworks developed in high-income countries, where the fundamental means of the transportation (roads, vehicles, and driver behavior) differ markedly from those in Pakistan (Baniya, 2018). Our local traffic environment is characterized by heterogeneous traffic consisting of both fast- and slow-moving vehicles, congested lanes, and widespread non-compliance with traffic regulations. Moreover, specific challenges such as speeding, underage riding, red-light violations, helmet non-use, and weak policy enforcement further exacerbate motorcycle-related safety issues in the country.

A study in Kenya found that few motorcycle riders use helmets, even though there are many head injuries. Out of 835 drivers observed, only 168 (20.1%) were wearing helmets, while 667 (79.8%) were not using any head protection. At the time of the crash, 94 riders (28%) had helmets, but 247 (72%) did not. As more people use motorcycles on Kenyan roads, it is important to keep working hard to lower the risk of head injuries and their effects (Sisimwo & Onchiri, 2018).

According to 2018 statistics, motorized two-wheelers accounted for 74% of all vehicles which had been registered in Pakistan. However, implementation of traffic rules in the country, as in many other developing nations, remain unsatisfactory. The rapid growth in motorcycle use, coupled with inadequate safety infrastructure, has contributed to a rising burden of motorcycle crashes. Motorcyclists are involved in 45% of all reported road traffic accidents in Karachi (Shamim et al., 2011).

Previous studies have looked at the main factors that affect how serious injuries are in motorcycle crashes. When it comes to rider traits, age is a key factor that influences the results of crashes. Younger and less experienced riders are more likely to take risks, which makes them more prone to getting into accidents (Lin et al., 2003). On the other hand, older motorcyclists are more often involved in fatal crashes. This is mostly because they react more slowly, have fewer sharp senses, and are less physically strong (De Lapparent, 2006).

In addition to how old a rider is, how much driving experience they have also plays a big part in how motorcycle crashes turn out (Lin and Kraus, 2009). It was found that new riders are much more likely to have crashes and get hurt. Things like not wearing a helmet or going too fast can make crashes worse. For example, Chang et al. (2016) said that riders who don't wear helmets are more likely to get serious head injuries, and sometimes even die, compared to those who do wear helmets.

Vlahogianni et al. (2012) said that use of helmet is best for protection of head injury among motorcyclists. Its legal implementation may reduce the morbidity and mortality thus making journey on motorized two-wheelers much safer. Also, speeding is often linked to more deadly crashes because when you go faster, you can't stop as quickly and you have less time to avoid danger. Plus, when motorcyclists crash into bigger vehicles, they are more likely to get serious injuries. This is because the bigger vehicle has more force, and the drivers of those vehicles may not pay enough attention to motorcyclists (Pai, 2009).

Motorcycles that have a larger engine size can perform better, but they also make it harder for riders to react quickly if there's an accident, which can lead to more serious injuries. Besides the motorcycle itself, other factors like the road's shape, how it's built, the lighting, and how clear the road is can greatly affect how bad an accident is. Schneider and Savolainen (2011) found that parts of the road like curves, the width of the shoulder, and how steep the road is are linked to more severe injuries for motorcyclists.

Haque et al., (2009) also noticed that problems with the road surface, such as being slippery, having cracks, loose parts, bumps, poor markings, or being wet, can lead to more serious accidents. Savolainen and Mannering pointed out that if it's hard to see because of curves, slopes, or not enough light, the injuries can be worse. Riding in the dark without good street lights can greatly increase the chance of a serious or fatal accident, as Sivasankaran, S. K., & Balasubramanian V, (2020) found.

Road accidents, especially those involving two-wheelers, cause injuries that can be minor or life-threatening in both rural and urban areas of Pakistan. Many different things, including human mistakes, technical issues, and environmental factors, lead to these accidents. Environmental factors like air pollution can also

increase the chance of road accidents. A study shows that weather conditions such as rain, fog, wind storms, and temperature can have a big effect on how often road accidents happen (Hammad et al., 2019).

Majority of effective interventions which had been evaluated are not being employed focusing on the motorcyclists and pedestrians that are vulnerable road users. These groups are majority of victims in road traffic crashes. This is particularly true in low and middle-income countries. There is need to focus on these groups by reducing the disparity while implementing specific interventions for addressing this global health crisis (Ameratunga et al., 2006, P.1533-40).

Keeping in view substantial losses suffering to the families and society collectively, it is reasonable to put experimental evidence that multiple interventions have caused purposeful reduction in this health problem and associated economic losses to the community. Legislation in speed control, driving with alcohol consumption, seat belts, safer design of motorized two wheelers and use of helmet are few examples that are being practiced periodically in several countries (Porchia et al., 2014, P.63-75).

A study was conducted in Karachi, Pakistan during 2012 for developing a model of road traffic injury surveillance so that outcome of injuries can be assessed (Razzak et al., 2012). RTI surveillance is considered as optimal for ascertaining the burden, identifying the vulnerable road users and formulate interventions to reduce the impact of injuries. Developing countries like Pakistan are lacking this comprehensive surveillance system in many parts of the country. They developed the data collection methodology, formed the protocols of analysis and worked on forwarding the retrieved information to stakeholders. They concluded that functional surveillance system can be developed and implemented in developing countries.

Meager record keeping of road traffic injuries (RTI), surveillance system and follow-up for hospital treatment are limitations for this study.

MATERIALS AND METHODS

This study employed a retrospective descriptive surveillance design to assess the magnitude and characteristics of road traffic injuries (RTIs) in Lahore, Pakistan. The surveillance was conducted over a three-month period (January 2022 to March 2022) in collaboration with Rescue 1122, Government of Punjab and selected tertiary-care and trauma centers representing major catchment areas of the city. Lahore, a metropolitan city, experiences high vehicular density and mixed traffic patterns, making it a critical site for RTI surveillance.

Inclusion criteria was set to include motorized two-wheeler deceased and injured brought to Tertiary Care Hospitals Emergency Department irrespective of their age and gender, consented injured or deceased persons. Exclusion criteria includes patients with trauma other than a road side crash for example with history of fall or fight. Study population was all motorized two-wheeler riders. Sampling frame was Motorized two wheelers, riding in Lahore city.

Data were entered and analyzed using SPSS version 26.0. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize the findings. Permission for data collection was granted by Rescue 1122 and hospital administrations. All information was kept confidential, and patient identifiers were excluded from the dataset.

RESULTS

Magnitude of road traffic accidents relating to motorized two-wheelers was determined by collecting the data from Rescue 1122, Government of Punjab Road Traffic Injuries Surveillance System based in Lahore, Pakistan. Data of victims, injured as a result of road traffic accidents involving motorized two-wheelers and brought to three main tertiary care hospitals of Lahore was selected. Data of the injured persons brought to Lahore General Hospital, Jinnah Hospital and Mayo Hospital was retrieved for period of three months, January, 2022 to March, 2022.

Data was summarized to know total quantity of accidents involving all vehicles, total quantity of accidents involving motorized two-wheelers, total number of accidents due to other vehicles like car, rikshaw, truck, moving cart, bicycle, total number of male and female victims, age of victims belonging to three categories <25 years, 25-50 years, >50 years, five main hotspots of the accidents.

Lahore General Hospital – January, 2022

Total accidents all vehicles	455
Total accidents motorized two-wheelers	310
Total accidents other vehicles	145
Total male injured	390
Total female injured	65
Injured age group <25 years	187
Injured age group 25-50 years	232
Injured age group >50 years	36
Hot spots of accidents	Chungi umer sidhu Kote lakhpat industrial Gajumata ruhi nala Kahna stop Qainchi chowk

Lahore General Hospital – February, 2022

Total accidents all vehicles	538
Total accidents motorized two-wheelers	377
Total accidents other vehicles	161
Total male injured	456
Total female injured	82
Injured age group <25 years	234
Injured age group 25-50 years	243
Injured age group >50 years	61

Lahore General Hospital – March, 2022

Total accidents all vehicles	665
Total accidents motorized two-wheelers	504
Total accidents other vehicles	61

Total male injured	544
Total female injured	121
Injured age group <25 years	210
Injured age group 25-50 years	381
Injured age group >50 years	74

Jinnah Hospital – January, 2022

Total accidents all vehicles	689
Total accidents motorized two-wheelers	567
Total accidents other vehicles	122
Total male injured	577
Total female injured	112
Injured age group <25 years	118
Injured age group 25-50 years	497
Injured age group >50 years	74
Hot spots of accidents	Kanal bank road Thokar chowk Shaukat khanum chowk Wapda town circle Pindi stop

Jinnah Hospital – February, 2022

Total accidents all vehicles	765
Total accidents motorized two-wheelers	664
Total accidents other vehicles	101
Total male injured	636
Total female injured	129
Injured age group <25 years	169
Injured age group 25-50 years	514
Injured age group >50 years	82

Jinnah Hospital – March, 2022

Total accidents all vehicles	886
Total accidents motorized two-wheelers	731
Total accidents other vehicles	155
Total male injured	743
Total female injured	143
Injured age group <25 years	126
Injured age group 25-50 years	664
Injured age group >50 years	96

Mayo Hospital – January, 2022

Total accidents all vehicles	313
Total accidents motorized two-wheelers	203
Total accidents other vehicles	110
Total male injured	274
Total female injured	39
Injured age group <25 years	73
Injured age group 25-50 years	171
Injured age group >50 years	69
Hot spots of accidents	Chuburji orange line station Band road Saghian bridge Moon market Civil secretariate chowk

Mayo Hospital – February, 2022

Total accidents all vehicles	416
Total accidents motorized two-wheelers	310
Total accidents other vehicles	106
Total male injured	347
Total female injured	69
Injured age group <25 years	142

Injured age group 25-50 years	191
Injured age group >50 years	83

Mayo Hospital – March, 2022

Total accidents all vehicles	493
Total accidents motorized two-wheelers	359
Total accidents other vehicles	134
Total male injured	422
Total female injured	71
Injured age group <25 years	168
Injured age group 25-50 years	231
Injured age group >50 years	94

DISCUSSION

The magnitude of road traffic accidents (RTAs) relating to motorized two-wheelers in Lahore during the three-month period from January to March 2022 was assessed using data attained from the Rescue 1122 Road Traffic Injuries Surveillance System. Data were collected from three tertiary care hospitals: Lahore General Hospital (LGH), Jinnah Hospital, and Mayo Hospital.

Across all three hospitals, a high burden of RTAs was recorded. Motorized two-wheelers consistently constituted the majority of the cases in each month. Lahore General Hospital reported 455, 538, and 665 total RTAs in January, February, and March, respectively. Motorized two-wheelers accounted for 68.1% in January, 70.1% in February, and 75.8% in March. Jinnah Hospital recorded the highest RTA counts, with 689, 765, and 886 cases in January, February, and March, respectively. Motorized two-wheelers represented 82.3%, 86.8%, and 82.5% of these totals. Mayo Hospital documented 313, 416, and 493 cases in January, February, and March, respectively, with motorized two-wheelers accounting for 64.8%, 74.5%, and 72.8%.

In all hospitals and months, male victims predominated. The proportion of male victims ranged from 80.2% to 87.8%, while female victims constituted only 12.2% to 19.8%. The predominance of male victims (>80%) may be attributed to gender roles in Pakistan, where men are more likely to drive motorcycles, work in delivery or transportation services, and commute long distances. Similar patterns have been reported in Karachi, Peshawar, and other South Asian cities. Female victims, though fewer, are often pillion riders and may be more vulnerable due to lack of helmet use.

The 25–50 years age group was most affected across all hospitals, followed by those <25 years, and the least affected were those >50 years. For instance, in March 2022 at Jinnah Hospital, 75% of the injured were aged 25–50 years, compared to 13.9% aged <25 years and 11.1% aged >50 years. Similar patterns were observed at all three hospitals. The predominance of the 25–50 years age group reflects high economic activity and commuting needs. The <25 years group ranks second in accident frequency, potentially due to risk-taking behavior, lack of experience, and poor adherence to safety measures. These trends are consistent with studies from India, Bangladesh, and Vietnam, where working-age adults are the most frequent RTA victims.

Frequent accident locations varied between hospitals but consistently included major intersections, industrial areas, and heavily trafficked urban roads: Lahore General Hospital: Chungi Umer Sidhu, Kot Lakhpat Industrial Area, Gajumata Ruhi Nala, Kahna Stop, Qainchi Chowk. Jinnah Hospital: Kanal Bank Road, Thokar Chowk, Shaukat Khanum Chowk, Wapda Town Circle, Pindi Stop. Mayo Hospital: Chuburji Orange Line

Station, Band Road, Saghian Bridge, Moon Market, Civil Secretariat Chowk. Identified hotspots, such as Chungi Umer Sidhu, Thokar Chowk, and Band Road, are known for heavy traffic flow, mixed vehicle types, pedestrian activity, and inadequate implementation of traffic laws. This is consistent with geographic information system (GIS)–based studies identifying these intersections as high-risk.

The present findings demonstrate that motorized two-wheelers are the leading category of vehicles involved in RTAs in Lahore, accounting for 65%–87% of all reported accidents over the study period. These results align with prior research from Pakistan and other “low- and middle-income countries (LMICs)”, where motorcycles are common mode of transport and major source of road traffic injuries because of high exposure, unsafe driving behaviors, and inadequate traffic law enforcement. Jinnah Hospital consistently reported the highest case numbers, possibly due to its catchment area including high-density traffic zones and multiple accident-prone intersections. Mayo Hospital recorded lower totals but a similar proportion of motorcycle-related injuries.

CONCLUSION

This three-month surveillance of road traffic injuries in Lahore reveals a substantial and rising burden of motorized two-wheeler–related accidents across all major tertiary care hospitals. Motorcycles consistently accounted for the majority of RTAs (65%–87%), predominantly affecting males in the 25–50 years age group, the most economically active segment of the population. The consistent dominance of two-wheeler injuries underscores their critical role in the city’s injury burden and mirrors trends observed across low- and middle-income countries. The concentration of crashes around high-traffic intersections and industrial areas highlights systemic urban transport and enforcement challenges, including inadequate road user segregation, weak helmet compliance, and insufficient law enforcement.

These findings call for urgent, evidence-based policy interventions focusing on two-wheeler safety. Strengthened helmet legislation and enforcement, improved road engineering at identified hotspots, targeted public awareness campaigns, and data-driven traffic management reforms are essential to mitigate this preventable burden.

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