November 2016

Descriptive epidemiology of Karachi road traffic crash mortality from 2007 to 2014

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SHORT REPORT

Descriptive epidemiology of Karachi road traffic crash mortality from 2007 to 2014

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Abstract

According to World Health Organization's estimate for Pakistan, there were 25,781 (95% CI: 20,979-30582) Road Traffic Collision (RTC) fatalities in year 2013. The Road Traffic Injury Research and Prevention Center, collects RTC data on injuries and fatalities from five major public and private hospitals' emergency departments in Karachi. For the eight-year period, from 2007-2014, 9129 fatalities were recorded. Males accounted for 8008 (87.7%) all RTC fatalities. Highest number of fatalities were recorded in the 21-25 age group with 1329 (15.3%) fatalities, while fatalities in 16-30 years old, recorded 3446 (39.7%) of all fatalities out of the total 8684 records for which age information was available. Motorbikes as primary vehicles were responsible for 3871 (44.7%) RTC fatalities out of the 8654, for which this information was available. Among women, housewives were the single largest group to have died as a result of RTCs.

Keywords: Road Traffic Fatalities, Surveillance, Karachi, Pakistan.

Introduction

Globally road traffic crashes (RTCs) killed 1.25 million people in 2013, with ninety percent deaths occurring in low and middle income countries; even though these countries account for merely 54% of registered vehicles globally.[1] According to World Health Organization's estimate, there were 25,781 (95% CI: 20,979-30,582) RTC deaths in 2013 in Pakistan.[1] With an estimated rate of 14.2 RTC deaths per 100,000 population in Pakistan, compared to the rate of 17.4 such deaths globally.[1] Among people in their most economically productive years i.e. 15-29 year olds, RTC is the leading cause of death, while it is the ninth leading cause of death in general for all age groups globally.[1]

Several studies have been published based on RTC injuries and deaths in Karachi based on 'Road Traffic Injury Research and Prevention Center' (RTIRPC) data.[2-9] However, detailed descriptive epidemiology of RTC fatalities were provided in only one study, which reported 1130RTC deaths in the year 2013.[2] A study based on RTIRPC data from September 2006 to August 2007 reported a total of 892 RTC fatalities in Karachi.[8] Using the same dataset for three years i.e. September 2006 to August 2008, another study reported a total of 3097 RTC fatalities.[7] While yet another study reported 5,753 RTC fatalities for the 5-year period from September 2006 to August 2011, using this dataset.[9]

In this study we provide detailed descriptive epidemiology of RTC fatalities in Karachi, using the RTIRPC data for the eight-year period from 2007 to 2014.

Methods and Results

In September 2006, Road Traffic Injury Research and Prevention Center (RTIRPC) was established in Karachi. A unique public-private partnership in Pakistan, financed by community and corporate donors to systematically and prospectively study road traffic crashes in the largest city of country. Now in its tenth year; the injury surveillance project is a collaboration between Jinnah Post Graduate Medical Centre (JPMC), Aga Khan University Hospital, and NED University of Engineering & Technology.

RTIRCP collects RTC data from the emergency departments of five major public and private hospitals in the city: Jinnah Postgraduate Medical Center, Civil Hospital Karachi, Liaquat National Hospital, Abbasi Shaheed Hospital and the Aga Khan University Hospital. Data pertaining to all injured and deceased victims of RTCs brought/admitted to these hospitals are recorded either directly from the victims and/or accompanying persons and then collated at the RTIRPC project office located at Jinnah Postgraduate Medical Center. Data collectors are stationed at these five sites on 24/7 basis, and work in three shifts to ensure that information pertaining to all RTCs victims gets properly collected and recorded. Additional information is also obtained - where needed - from ambulance drivers, police and witnesses ensuring accurate recording of all pertinent information.

We analyzed the data in terms of frequencies and

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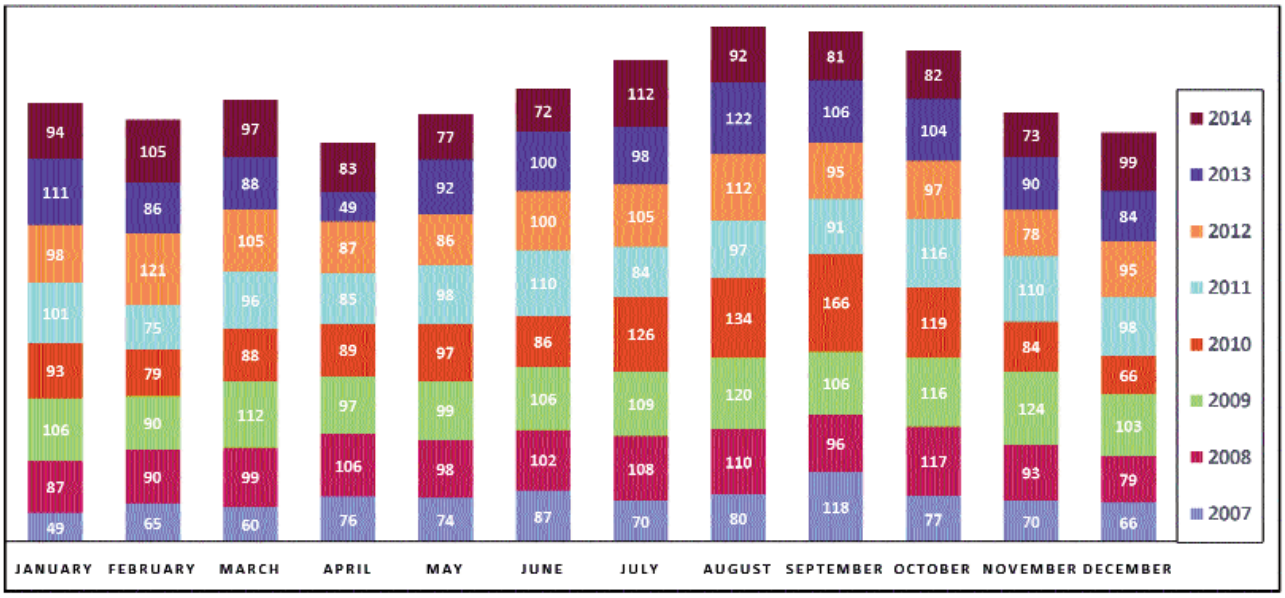
Table-1: Epidemiological characteristics of RTC's fatal victims in Karachi from 2007 to 2014, disaggregated by gender.

Characteristics	Men (%) N = 8008	Women (%) N = 1118	Missing N = 3
Occupation			
Professional	107 (1.3)	14 (1.3)	0
Skilled	749 (9.4)	3 (0.3)	0
Semi-Skilled	206 (2.6)	2 (0.2)	0
Unskilled	1260 (15.7)	40 (3.6)	0
Student	776 (9.7)	141 (12.6)	0
House Wife	0	481 (43.0)	0
Law Enforcement	88 (1.1)	0	0
Drug Addict	56 (0.7)	0	0
Retired	71 (0.9)	2 (0.2)	0
Other/Unclear	1062 (13.3)	54 (4.8)	3
Missing	3633 (45.4)	381 (34.1)	0
Vehicle Involvement (Primary)			
Motorbike	3446 (43)	425 (38.0)	0
Mini Van/Coaster	240 (3.0)	45 (4.0)	1
Bus/Minibus/Coaster	875 (10.9)	148 (13.2)	0
Truck	387 (4.8)	37 (3.3)	0
Taxi	45 (0.6)	11 (<1.0)	0
Bicycle	94 (1.2)	0	0
Car	637 (8.0)	143(12.8)	0
Water/Oil Tanker	148 (1.8)	17 (1.5)	0
Rickshaw	117 (1.5)	28 (2.5)	0
Dumper	148 (1.8)	14 (1.3)	0
Trailer	186 (2.3)	14 (1.3)	0
Loading Pickup	213 (2.7)	51 (4.6)	0
Loading Truck - Other	5 (<0.1)	1 (<0.1)	0
Animal Cart	8 (<0.1)	1 (<0.1)	0
Push Cart	1	0	0
Train	167 (2.1)	19 (1.7)	0
Qing-qi Rickshaw	2 (<0.1)	1 (<0.1)	0
Others	876 (10.9)	99 (8.9)	1
Missing	410 (5.1)	64 (5.7)	1
Vehicle Involvement (Secondary)			
Motorbike	492 (6.1)	33 (3.0)	0
Mini Van/Coaster	103 (1.3)	12 (1.1)	0
Bus/Minibus/Coaster	459 (5.7)	70 (6.3)	0
Truck	307 (3.8)	34 (3.0)	0
Taxi	31 (0.4)	1 (0.1)	0
Bicycle	87 (1.1)	2 (0.2)	0
Car	449 (5.6)	34 (3.0)	0
Water/Oil Tanker	140 (1.7)	18 (1.6)	0
Rickshaw	114 (1.4)	21 (1.9)	0
Dumper	237 (3.0)	30 (2.7)	0
Trailer	275 (3.4)	23 (2.1)	0
Loading Pickup	198 (2.5)	20 (1.8)	0
Loading Vehicle - Other	29 (0.4)	4 (0.4)	0
Animal Cart	11 (<0.1)	1 (<0.1)	0
Push Cart	6 (<0.1)	0	0
Train	1 (<0.1)	0	0
Qing-qi Rickshaw	5 (<0.1)	4 (0.4)	0
Others	402 (5.0)	21 (1.1)	0
Missing/Not Applicable	4662 (58.2)	799 (71.5)	3
Driver/Passenger Status			
Rider of 2-Wheeler	3222 (40.2)	171 (15.3)	0
Driver of 3-Wheeler	33 (0.4)	0	0
Driver of 4-Wheeler	272 (3.4)	1 (0.1)	0
Driver of >4-Wheeler	22 (0.3)	0	0
Pillion Passenger	323 (4.0)	184 (16.5)	1
Passenger	912 (11.4)	171 (15.3)	0
Pedestrian	2756 (34.4)	544 (48.7)	1
Others	242 (3.0)	13 (1.2)	0
Missing	226 (2.8)	34 (3.0)	1
Type of collision			
Head-on	403 (5.0)	22 (2.0)	0
Rear-end	1066 (13.3)	130 (11.6)	0
Hit Object	144 (1.8)	7 (0.6)	0
Merging	6 (0.1)	0	0
Side Swipe	279 (3.5)	48 (4.3)	0
Right Angle	147 (1.8)	8 (0.7)	0
Missing	5963 (74.5)	903 (80.8)	3
Type of location			
Intersection	1508 (18.8)	209 (18.7)	0
Mid-block	4957 (61.9)	748 (66.9)	1
U-Turn	6 (0.1)	1 (0.1)	0
Flyover	94 (1.2)	8 (0.7)	0
Bridge	114 (1.4)	14 (1.3)	0
Underpass	9 (0.1)	3 (0.3)	0
Missing	1320 (16.5)	135 (12.1)	2
Arrival/brought at trauma center/emergency by:			
Ambulance	5313 (66.3)	703 (62.9)	1
Police	125 (1.6)	10 (0.9)	0
Private	938 (11.7)	198 (17.7)	0
Public	342 (4.3)	51 (4.6)	0
Missing	1290 (16.1)	156 (14.0)	2

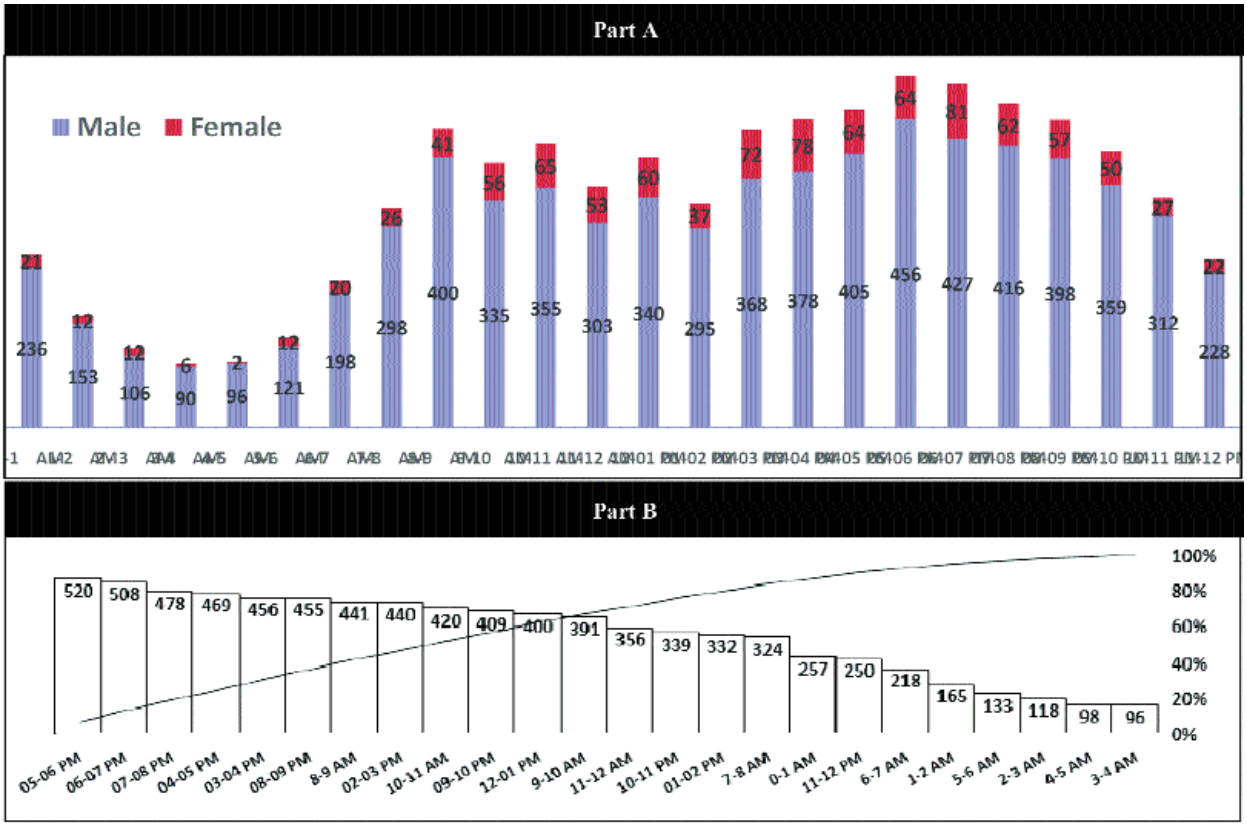
Next column >>>

percentages for all the epidemiological characteristics of RTC fatalities, disaggregated by sex, using STATA 14. For the eight-year period i.e. from the year 2007 to 2014, cumulatively 9129 deaths were recorded. Males accounted for 8008 (87.7%) deaths; information about sex was missing for 3 (0.03%) records. Figure 1 shows the number of fatalities, for each month, by the year. The highest number of fatalities during this eight-year period were recorded for the third quarter of the year i.e. July to September; accounting for 2538 (27.8%) of all fatalities. Highest number of monthly fatalities were recorded for the month of August with 867 (9.5%) fatalities, while lowest number of fatalities were recorded for April with 672 (7.4%). Figure-2 depicts the cumulative number of fatalities by the hour of day from 2007 to 2008, disaggregated by sex. Information on time was not available for 1056 (11.6%) records; hence this figure is based upon 8073 records. The part B of this figure depicts the one-hour time interval fatalities data in a Pareto chart that plots each 1-hour time interval bar in descending order of frequency, with a cumulative frequency line superimposed upon the bars and right-hand axis showing



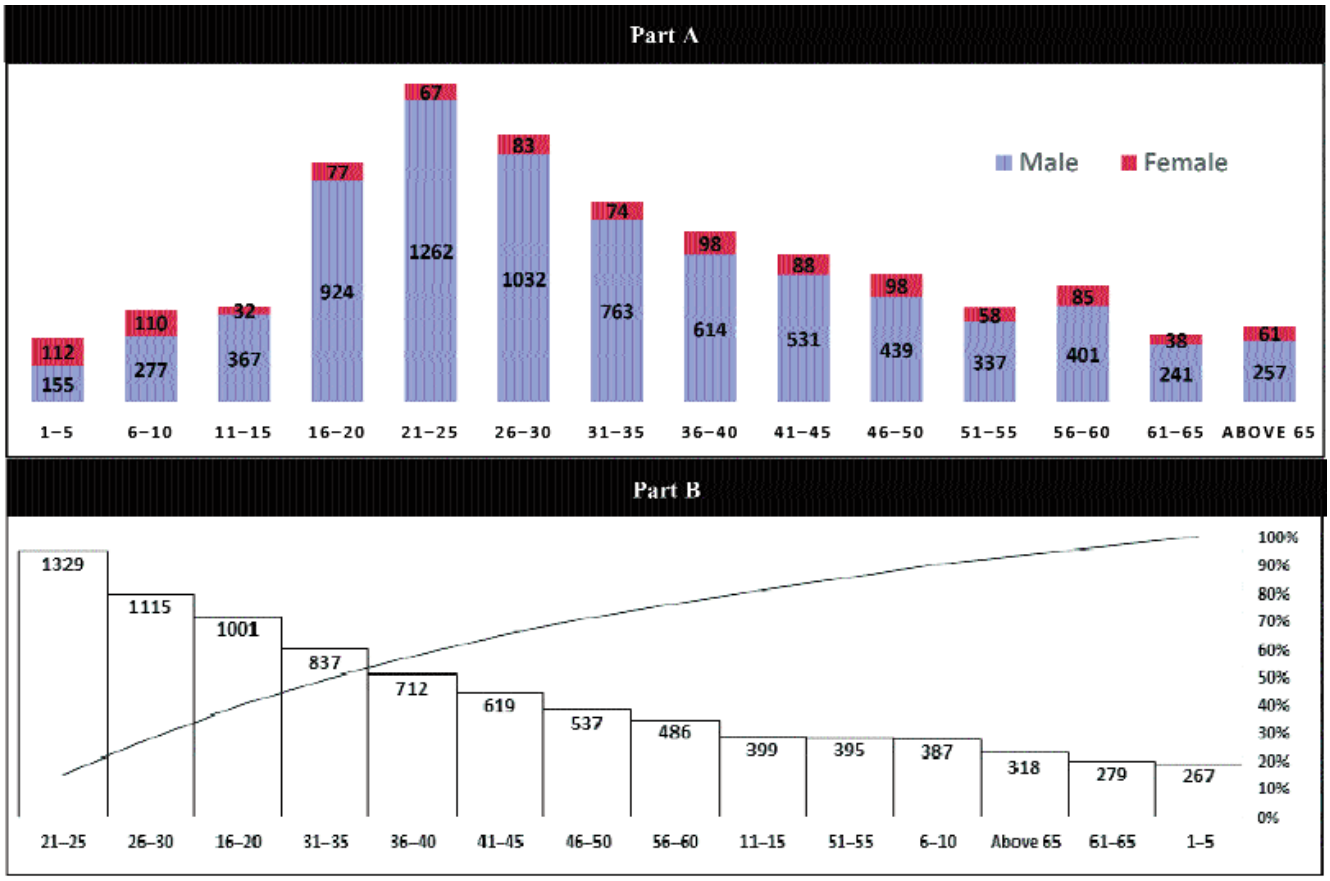
Each stacked bar represents the number of cumulative fatalities by month, with year colour-coded from 2007 to 2014.

Figure-1: Cumulative fatalities by each month of the year from 2007 to 2014.



Part A shows the cumulative fatalities by the hour of day, disaggregated by sex. While part B shows the Pareto chart with cumulative fatalities by the hour of day, plotted in descending order of frequency, with a cumulative frequency line on the right hand axis as percentage of the total. Based on 8073 records for which time info was available.

Figure-2: Cumulative fatalities by the hour of day from 2007 to 2014.



Part A shows the cumulative fatalities by the 5-year age intervals, disaggregated by sex. While part B shows the Pareto chart with cumulative fatalities by the 5-year age intervals, plotted in descending order of frequency, with a cumulative frequency line on the right hand axis as percentage of the total. * Based on 8681 records with age info.

Figure-3: Cumulative fatalities by 5-year age intervals from 2007 to 2014.

the percentage of the total. Highest number of cumulative fatalities occurred in the hour of 5-6PM with 520 (6.4%). While time period from 5-8PM recorded 1506 (18.7%) of all fatalities. Lowest number of fatalities occurred during 3-4AM with 96 (1.2%) fatalities.

Figure-3 depicts the cumulative number of fatalities by 5-year age intervals from 2007 to 2014, disaggregated by sex. Age and/or sex information was not available for 448 (4.9%) records; hence this figure is based upon 8681 records. The part B of this figure depicts the 5-year age interval fatalities data in a Pareto chart that plots each 5-year age interval bar in descending order of frequency, with a cumulative frequency line superimposed upon the bars and right-hand axis showing the percentage of the total. Highest number of fatalities were recorded for the 21-25 age group with 1329 (15.3%) fatalities. While fatalities in 16-30 years old recorded 3445 (39.7%) of all fatalities. Lowest number of fatalities were recorded in the 1-5 year olds with 267 (3.1%); proportionately, highest number of fatalities within any age group among females were also recorded in this age group i.e. 112 (42%). Figure-4 depicts the cumulative number of fatalities by the twelve primary and secondary types of vehicle involvement, disaggregated by sex. For primary vehicle status, information was missing for 475 (5.2%) records, while for secondary vehicle involvement, information was missing or not applicable for 5464 (59.9%) records. Cumulatively, motorbikes as primary vehicles were responsible for 3871 (44.7%) fatalities out of the 8654 for which this information was available. While motorbikes, as secondary vehicle involvement, were responsible for 525 (14.3%) fatalities out of the 3665 records for which this information was available/applicable.

Table-1 shows the number and percentages of cumulative fatalities for the eight-year period, disaggregated by sex in

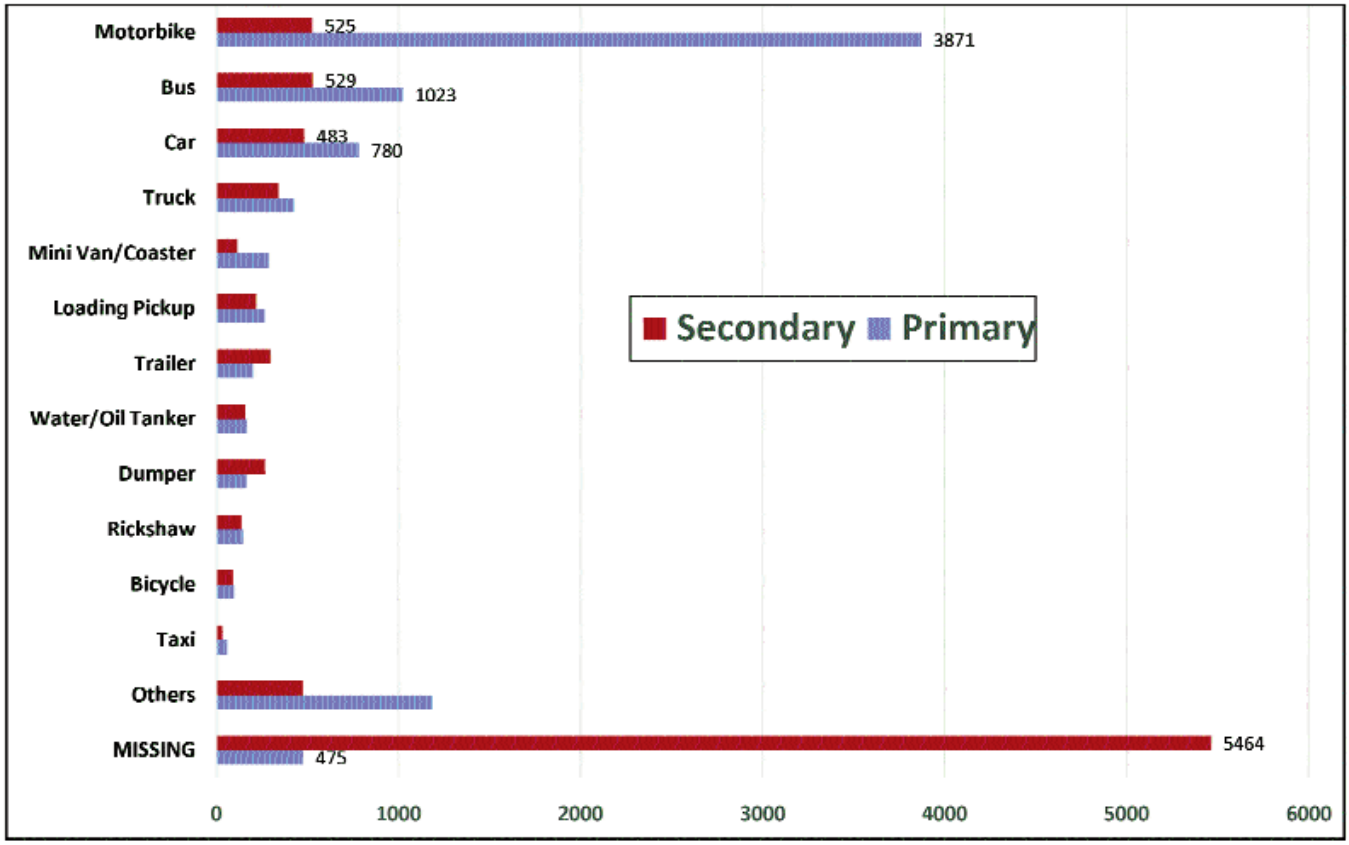


Figure-4: Cumulative fatalities by primary and secondary vehicle involvement from 2007 to 2014.

terms of occupation, driver/passenger status, type of collision, type of location, mode of arrival at the trauma centers, and detailed primary and secondary vehicle involvement status. Information on occupation was missing for 4014 (44%) of fatalities; in the remaining 5115 records, most fatalities were recorded in the unskilled group with cumulatively 1300 (25.4 %) fatalities. Information on driver/passenger status was missing for 261 (2.9%) fatalities; in the remaining 8868 records, cumulatively most fatalities were recorded for riders of 2-wheelers with 3393 (38.3%). Information on type of collisions was missing for 6869 (75.2%) of fatalities; in the remaining 2260 records, cumulatively most fatalities were recorded for rear-end collisions with 1196 (52.9%). Information on type of location where fatalities occurred was missing for 1457 (16%) fatalities; in the remaining 7672 records, cumulatively most fatalities were recorded for mid-block with 5706 (74.4%).For arrival at trauma center or emergency department, information was missing for 1414 (15.5%) fatalities; in the remaining 7715 records, most fatal victims were brought in an ambulance with 6017 (78.0%).

Discussion

Results from the cumulative eight-year RTIRPC fatalities data echo trends reported globally, as well as from the previous studies using this dataset.[1-9] Males overwhelmingly succumbed to death owing to RTCs in Karachi. Highest number of fatalities were recorded in the 16-30 years old age group, accounting for about 40% of all fatalities; primarily in males. A quarter of all deaths were recorded for unskilled individuals, again primarily in males. Among women, housewives were the single largest group to have died as a result of RTCs. The second largest group to have died as a result of RTCs, both for males and females was 'students'.

Regarding driver/passenger status; over a third of all deaths were recorded for riders of two-wheelers i.e. individuals using motorbikes or bicycles. The whopping death tool among motorbikes was triangulated in terms of primary and secondary involvement of vehicles, where motorbike users were recorded to have substantially higher fatalities, compared to all other vehicle types. However, these frequencies need to be

interpreted with caveats owing to sizable missing information for some of these descriptive epidemiological characteristics of RTC. For type of collisions; rear-end collisions accounted for over half of all deaths for which this information was available. While type of location where fatalities were reported; 'mid-blocks' accounted for almost three-quarters of all fatalities for which this information was available. Regarding time of fatalities; the month of August recorded highest cumulative number of fatalities, with 5-6PM being the hour when proportionately most fatalities were recorded.

The RTIRPC is a unique dataset with a wealth of information on pattern and profile of RTC morbidity and mortality for the largest metropolitan city of Pakistan. In its decennial year now, since its inception, a more in-depth look in terms of time series analysis is warranted to better understand the temporal profile of RTC fatalities and injuries.

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