

## Pedestrian Death and Injury in Road Accidents in Kolkata in Last Decade: A Major Public Health Challenge

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### Abstract

Every year around the globe more than 1.2 million people die in road accidents. Nearly half of the people killed are pedestrians, cyclist and bikers. The traffic accident situation in Kolkata is really alarming with significant loss of lives and vehicle damages. It is expected to continue if proper corrective measures are not taken. This paper presents the scenario of pedestrians killed in traffic accidents in Kolkata, West Bengal, India. Data on accidents were collected for the period (2005–2013). It was found that a total of 26,803 accident cases were registered with 24,807 victims among whom 16,565 were pedestrians. Therefore, some safety measures should be considered to improve the situation. These casualties will increase if action is not taken. Roads are getting more congested by different sorts of vehicles around the world. Although these vehicles support economic and social growth, it can also cause harm unless safety is considered a priority. Particularly pedestrians, cyclists and bikers are at risk. Innovations should be implemented along with enforcement of new laws to abide by traffic laws in order to save lives.

### Introduction

According to World Health Organization (WHO), world's first road traffic death was reported to occur in 1896. Every year around the globe more than 1.2 million people die and about 50 million or more are injured in road accidents around the world [9]. Nearly half of the people killed are pedestrians, cyclist and bikers. A study concluded that world's ninth biggest cause of death was traffic accident (1990), it also stated that by 2020 road accident would be third most cause of death and injury [8, 9]. According to another report by WHO 3,000 or more people are injured every day. A report by IRNA, Iran having the highest road accident rate in the world, with a total of 38,000 deaths and injured per year [4]. China is the second highest with a road accident death of 89,455 (2006). The scenario in India is somewhat similar [3]. In India, in every 6 minutes one person dies and 10 are injured as stated by BBC (Sep, 2005). About a total of 2,819,518 people died in

road traffic accidents (2005–2012). It also stated that in Mumbai metropolitan area about 35 accidents occur with 15 being killed. This trend also continued with making India rank top most country with highest number of road accidents (2006 – 2008). The number of road accident in Delhi metropolitan area (2012) was nearly 12,000 with 1786 fatal accidents with a decrease of 13.26% from 2011 [2, 10]. The situation in Kolkata is very similar like the other [3]. Kolkata "The City of Joy" has been a source of inspiration for people from all backgrounds of life. The Kolkata metropolitan area is situated along river Hooghly, the capital of West Bengal, in eastern part of India. The most central part of this metropolitan area is under the administration of Kolkata Police (KP), and the number of registered motorized vehicles and slow moving vehicles are about 7,92,273 and 25,960 respectively (2013). Hence, according to these figures the roads are much congested with only 1870 km of road length available for these vehicles and the total road area is 185sq km (as per KP and Kolkata Municipal Corporation (K.M.C.)). In 2012 nearly

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3,937 registered cases of accident occurred among which 3,714 person were victim out of which 498 died from which 276 were pedestrians (55.42%) [6]. In a study on road accident in Kolkata in three years 2007 to 2009, Ghosh *et al* (2013) stated that in Kolkata, pedestrians are the largest victim group of fatalities and injuries of road accidents and furthermore they are even at danger at zebra crossing from motorists [3]. This increase in vulnerability of pedestrians towards road accidents was due to poor road visibility, rash driving, etc. They further stated that police records are the only source of data on road accident but they are several times not properly reported and the data also suggests that there is a lack of proper enforcement and education on road safety in the city [3]. A similar study conducted by Chakraborty and Roy (2005) concluded on the basis of comparative study from 1995 to 2002 in Kolkata the road accidents severity index seem to be higher for the former two years which then came down for the next five years and then began to rise in the last year but most of them were fatal ones [1]. Hence, it can be stated that in the mid years the cause of decrease in the number of accidents were due to some engineering measures as the number of fatalities decreased even due to increase in number of motor vehicles and also its decrease was lower than rest of India [1]. Another such review made on annual basis stated that nearly 50 to 64 percentage of pedestrian get killed or 45 to 77 per cent of pedestrians get injured in road accidents from total victim dead or injured [5]. In the backdrop of various literatures been available on road accident analysis, traffic congestions, accident prediction modeling, etc. on various types of road networks but not much work has been done on impact of road accidents on pedestrians in Kolkata due to lack of sufficient data and hence, this study was undertaken to assess the temporal variation, if any, in the number of pedestrian killed and injured in road accident in Kolkata (2005 – 2013) and also to assess the pattern of, if any, net change in number of pedestrians killed and injured by different vehicles in road accident in Kolkata (2013), along with temporal variation of pedestrian vulnerability index if any (2005–2013).

## Method

The study has been conducted on pedestrians' death and injury database of Kolkata (latitude: 22°34"N and longitude: 88°34"E; population: 44, 86, 679 (Census, 2011); population density: 24,252 per sq km; growth: 2.05% (decadal) (2001-2011))

pedestrians, as is made available in the public domain [5]. The analyses have been carried out on secondary data [5]. Pedestrian Vulnerability Index is defined as number of pedestrians in victim group per 100 victims of road accident.

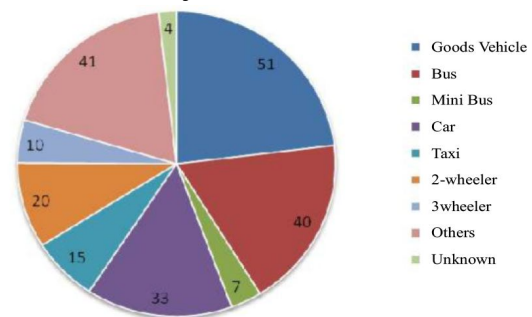
$$P_{vi} = (PV*100)/TV.$$

## Results

Number of pedestrians killed by different vehicles in the year 2013 has been presented graphically in Fig.1A.

**Fig.1A:** Number of pedestrians killed by different vehicles (2013)

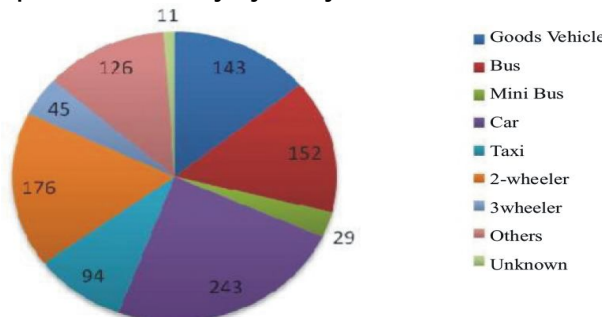
**Pedestrian Killed by Various Vehicles, 2013**



Numbers of pedestrians seriously injured and cases with minor injuries by different vehicles have been presented in Fig.1B and 1C respectively.

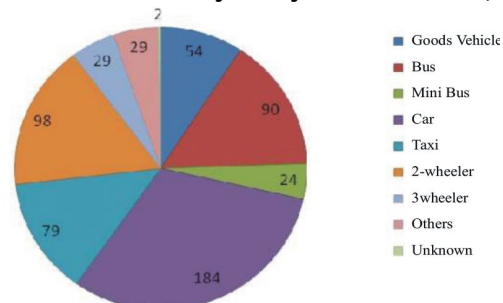
**Fig.1b:** Number of pedestrians seriously injured by different vehicles (2013)

**pedestrians seriously injured by Various Vehicles, 2013**

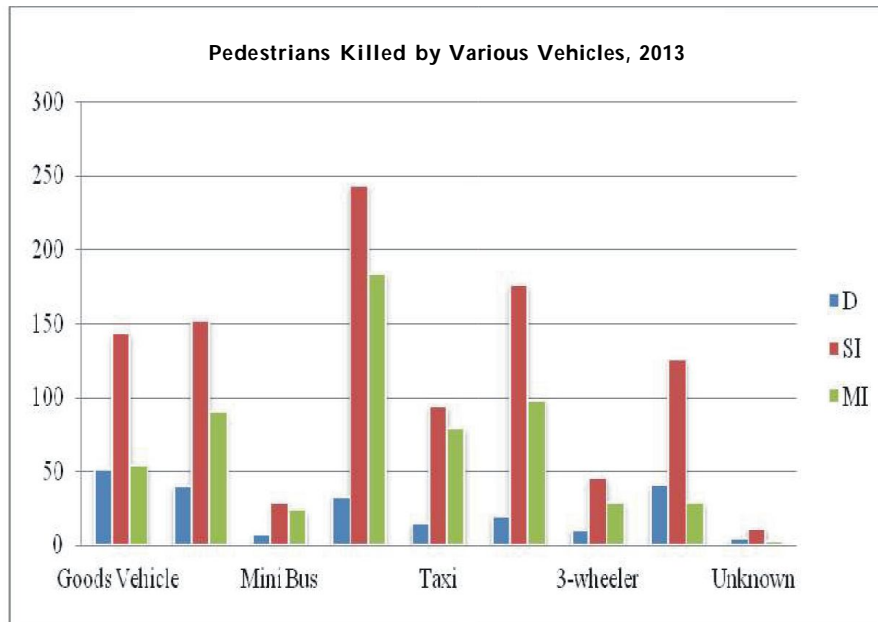


**Fig.1c:** Number of pedestrians with minor injuries by different vehicles (2013)

**pedestrians with minor injuries by different vehicles (2013)**



**Fig. 2:** Number of pedestrians killed and injured by different vehicles (2013)

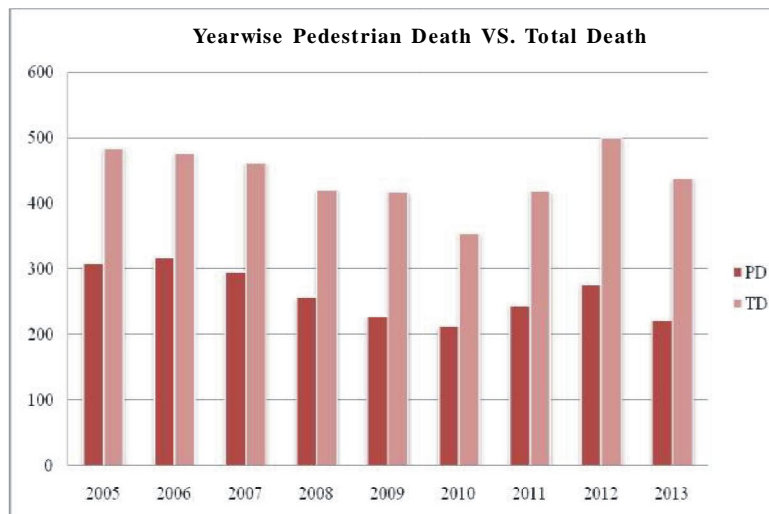


**Table 2:** Year wise Number of pedestrians killed and injured year wise comparison 2005-2013.

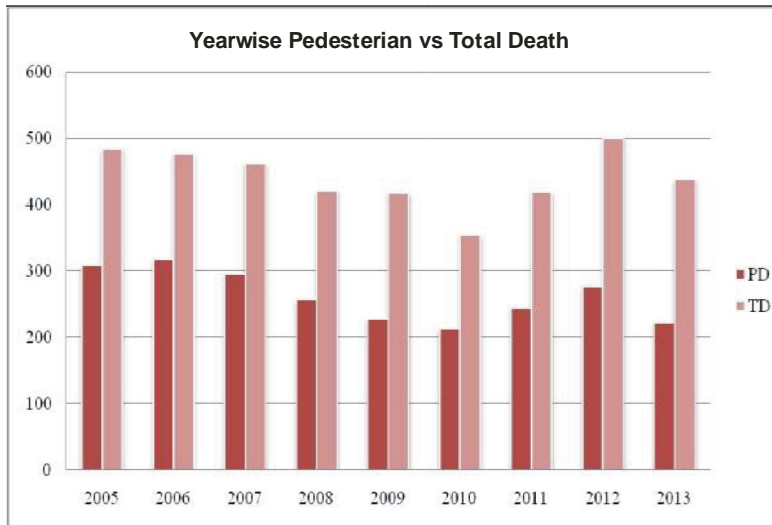
Year	PD	TD	PPD	PI	TI	PPI
2005	308	484	63.63	1152	1647	69.94
2006	316	476	66.38	1237	1752	70.60
2007	295	462	63.85	1373	1861	73.80
2008	256	421	60.80	1638	2124	77.11
2009	227	417	54.43	1449	2004	72.30
2010	212	354	59.88	1416	2239	63.24
2011	244	418	58.37	1247	2420	51.52
2012	276	498	55.42	1478	3216	45.95
2013	221	437	50.57	1608	3577	44.95

(a) PD: pedestrian death; (b) TD: total death; (c) PPD: percentage of pedestrian death; (d) PI: pedestrian injured; (e) TI: total injury; (f) PPI: percentage of pedestrian injured.

**Fig.3:** Year wise comparison in numbers of pedestrian death vs. total death



**Fig.4:** Data presentation on number of pedestrians vs. total injured year wise comparison

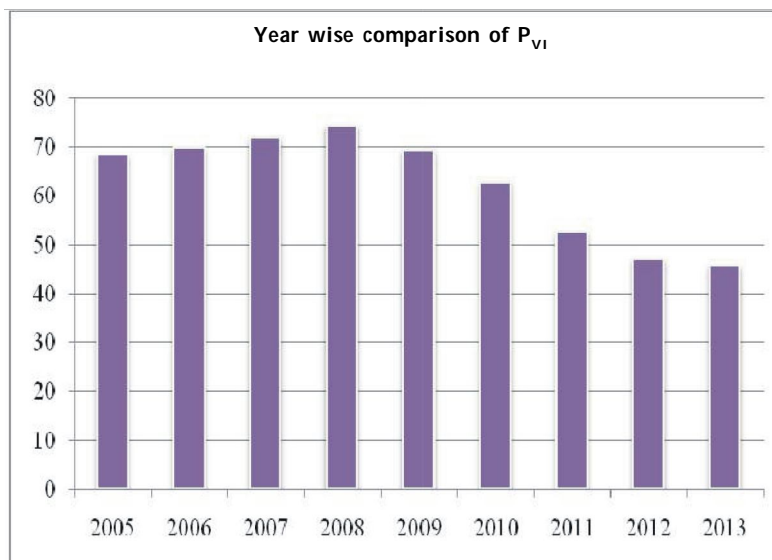


**Table 3:** Year wise (2005–2013) number of death in pedestrians and total victims in road accident

Year	PV	TV
2005	1460	2131
2006	1553	2228
2007	1668	2323
2008	1894	2545
2009	1676	2421
2010	1628	2593
2011	1491	2838
2012	1754	3714
2013	1829	4014

(a) PV: total number of pedestrians in victimized group; (b) TV: total victims of road accident  
 A comparison regarding year wise Pedestrian Vulnerability Index ( $P_{VI}$ ) has been presented in Fig.5.

**Fig.5:** Year wise comparison of  $P_{VI}$



## Discussion

It is very much evident from the above representation of data that the scenario for the pedestrians in Kolkata is not that safe. It is clear that after 2008, number of pedestrian killed in road accidents followed a decreasing fashion but again increased from 2011 and even in the case of injury 2008, 2012 and 2013 have been on the higher side compared to other years. Previous studies have shown different types of accidents in organized sector in West Bengal [6, 7] and Present study focused on pedestrian death in road accidents in Kolkata and it has been found that the numbers of death and injury cases are increasing. So in order to reduce the number of such deaths of pedestrian certain general safety measures needs to be not only followed but also strictly enforced by the law and jurisdiction of the state and along with them certain counter measures need to be taken which are as follows:

- Installation of railings of certain height along footpaths which are only opened near zebra crossing, it can lower the number of accident cases by not allowing the pedestrians to cross roads on will when the traffic signal is green and even if a vehicle loses control it will collide with the railings and not cause harm or fatal injury to the pedestrian on footpath.
- Increase in number or presence of police personnel or home guards near zebra crossings and even number of surveillance tools to ensure proper monitoring of traffic rules are followed and ensuring additional safety for daily commuters and pedestrians.
- Increase in number of proper bus stops where commuters board or get off when the bus has stopped it can decrease such road accidents significantly.
- Better road designs of intersection, signs, dividers or islands, etc.
- Enforcement of fines if found to disobey traffic laws.
- Designing and installation of motion sensors along the stop line if the car stops at signals after it crosses the stop line sometimes it is evident in day to day the drivers stops at zebra crossing in a hurry.
- The behaviors of vehicle drivers cannot be predicted due to their tendency to overtake and over speed at free road and young drivers and

motorists even in lanes. So change in behavior may help to reduce accidents fatalities.

- Home guards and Police personnel to help elder citizens to cross the road.
- To increase the gap between two lanes of highways.
- Avoiding parking of vehicles on sides of road.
- Use of sidewalks, footpaths and underpass by pedestrians and not by hawkers, etc.

The vulnerability index for pedestrians showed progressive increase from 2005-2010 than showed a decreasing trend it might be due to implementation of certain equipments to monitor and control road accidents even in contrast to the increasing vehicle number in the city.

## Conclusion

In conclusion it may be mentioned that pedestrians are vulnerable group in the victim group of road accident cases.

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