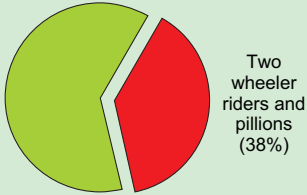
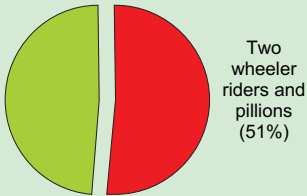




**Fatal**



**Non-Fatal**



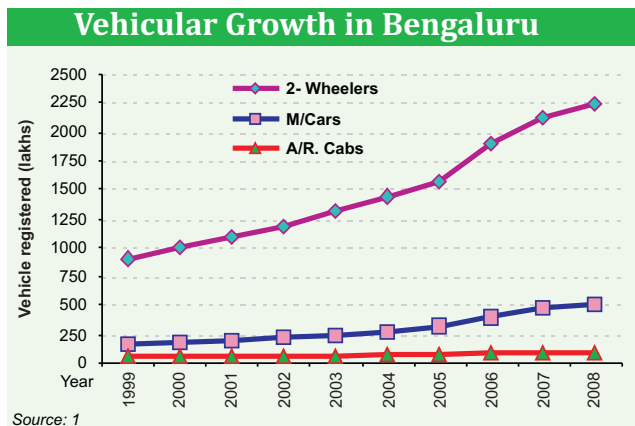
- Three fourths of registered vehicles in India are motorized two-wheelers.
- Two wheeler riders and pillion were the second leading road user category for both deaths (38%) and injuries (51%).
- Three fourths (87%) were amongst men.
- Brain and limb injuries were more frequent in this group.
- More than half (both fatal and non fatal injuries) had not worn helmets.
- While 54% received first aid in a nearby hospital, only 3.4% of fatal injuries were given first aid at crash site.
- More than half of these victims were transported in a private vehicle.

Mr. M was returning home from work on his new motorcycle. It was late in the evening. Tired after a hectic schedule, he picked up his daughter from the dance class. Not wanting to rush through the green light at the next busy traffic junction, he cut down the speed of his motor cycle and took a right turn in front of an auto rickshaw to cut across to the other side of road. Before he realized, the car behind him in speed hit his motorbike. Trying to gain balance, he fell onto the road while his daughter fell on the pavement and hit her head to the curb stone. A crowd gathered and some one shifted both of them to hospital in an auto rickshaw. His daughter was bleeding from the mouth and ears. She died enroute to hospital; while M took another 3 months to recover from his chest injuries.



Travel today is an essential requirement and not a luxury. With growing urban spaces and a variety of reasons to travel, mobility is a fundamental need. In the absence of efficient and reliable public transportation services, people resort to individual modes of travel depending on affordability. With many people unable to afford cars, motorized two-wheelers are an obvious choice. Consequently, the number of people using two-wheelers has been growing steadily in India and in cities like Bengaluru. In the absence of alternate viable solutions, two-wheelers today, are both an individual and a family vehicle.

The motorization pattern of Bengaluru and many other parts of India are distinctly different from those in the West. The phenomenal growth of two-wheelers in recent years is seen by the fact that nearly three fourths of registered vehicles in India and Bengaluru are two-wheelers. In Bengaluru, the number of two-wheelers has increased from 0.7 million in 1996 to 2.2 million vehicles by 2008, an increase by nearly three times (1). In the same period, the number of buses increased from 2,000 to 4,000, while motor cars increased from 0.1 million to 0.5 million. (1)



The greater number of two-wheelers has obviously increased the risk of exposure and hence, two-wheeler injuries are high. There is an increased risk of injury and death as the vehicle moves on two points and hence unstable; the

rider and pillion are exposed and unprotected; can travel at phenomenally high speeds, especially with new category of vehicles.



## The problem

In India, as per the data from National Crime Records Bureau, in 2007 there were 21,872 deaths amongst two-wheelers.(2) This number may be unrealistic as the impacting vehicle is documented rather than the road user category of the injured or killed person. In Karnataka, in the same year there were 1,931 deaths. In Bengaluru, as per the police reports, 346 people were killed and 2798 injured in two-wheeler crashes.

### Deaths and Injuries among two-wheeler riders



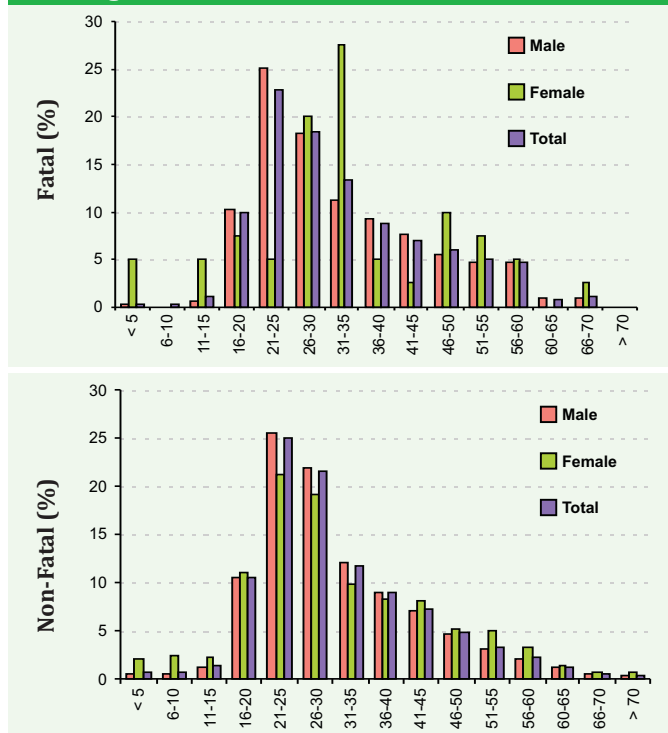
Data from the Bengaluru Injury Surveillance Programme (3) revealed that:

- ❖ Two-wheeler deaths and injuries are on the increase from nearly 200 deaths in 2000, it has increased to nearly 400 in the last few years.
- ❖ Two wheeler riders and pillion were the second leading road user category for both deaths (38%) and injuries (51%).
- ❖ 346 persons died and 13,400 were injured in the city. The actual number of deaths could be around 400 with hospitalization of 20,000 persons, due to under-reporting and coverage of 21 hospitals under the programme.

## Profile and pattern

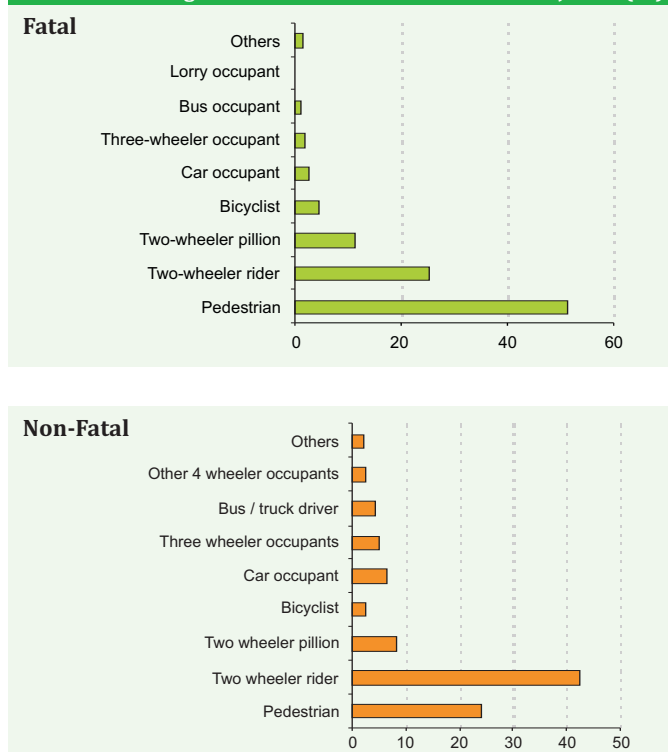
- ❖ Nearly three fourths of fatal and 82% of the non fatal two-wheeler injuries were in the age group of 16 – 45 years with majority of them in 20 – 30 years.
- ❖ Three fourths (87%) of both fatal and non-fatal injuries in two wheeler riders occurred among men. Women in < 15 yrs and > 40 yrs were involved also involved in road crashes in larger numbers.

### Age-sex distribution of Two-wheeler RTAs

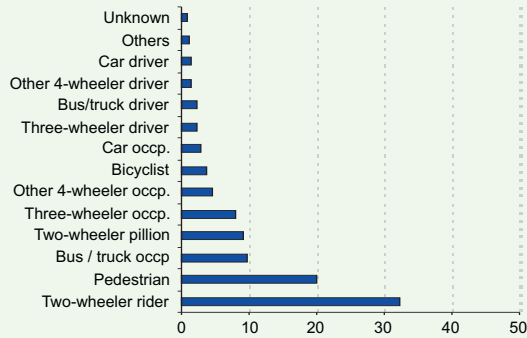


- ❖ Among non-fatal injuries, almost 60% were educated beyond the secondary school and 36% were graduates. 14% of them were either skilled labour or professionals and 17% were engaged in business.
- ❖ 54% of the injured were married.
- ❖ Killed and injured riders were represented in 26% fatal and 42% nonfatal crashes, while pillions were present in 11% and 9%, respectively.

### Road User Categories in urban fatal and nonfatal injuries (%)



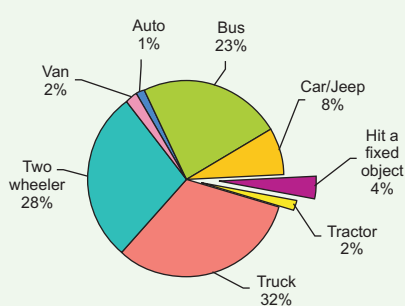
## Road User Categories in rural nonfatal injuries (%)



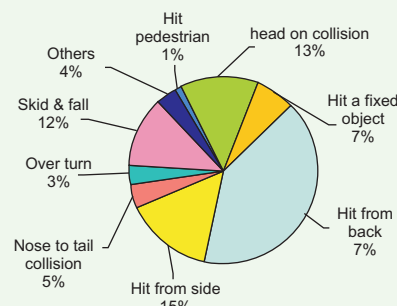
## Risk factors

- Nearly 65% of crashes occurred on city/ municipal roads and 15% were on highways.
- More than half the deaths among two - wheeler riders and pillion was due to collision with trucks (32%) and buses (23%). Injuries were severe in these crashes and hence, deaths were higher. Other two wheeler (28%) and cars (8%) collided with the vehicle of injured person in one fourth of crashes.
- Rear end collisions (40%) (with majority of roads becoming one ways), side angle collisions (15%), head on collisions (13%) and skid and fall (12%) were the common collision patterns.
- Among those who had suffered fatal injuries, more than half of the two-wheelers were moving at high speed at the time of crash.
- More than half of the injured and killed motorcyclists had not worn helmets, indicating need for up scaling enforcement.
- 7% of the non-fatal injuries and 2% of the fatal injuries occurred under the influence of alcohol at the time of crash. This number could be much higher as this information was not documented in all crashes. The earlier Bengaluru drinking and driving programme documented alcohol in 11% of police checks and 38% of hospital registrations.(4)

### Collision pattern of two-wheeler rider/pillion



### Type of collision among two-wheeler rider/ pillion

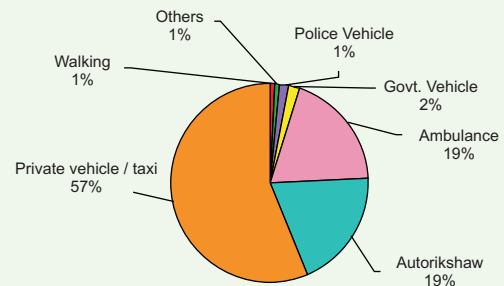


According to a recent study conducted by Insurance Institute for Highway Safety in USA, presence of anti lock braking systems (ABS), were found to reduce fatal motorcycle crashes per 10,000 registered vehicle years by 38 % compared with those vehicles without ABS (5).

## Emergency care

- Only 20% of the fatally injured had received some type of first aid; among non-fatal injuries, 54% had received first aid. For those with fatal injuries, only 3.4% had been given first aid at the place of the injury, while almost 45% of those given first aid had been taken to nearby private or government hospital.
- 55% of the injured patients were transported to the hospital in a private vehicle or taxi with 20% of them being brought in an autorickshaw; only 20% had used ambulance services.
- 92% of the injured had visited at least 1 hospital before being referred to the study hospital
- 34% of the injured reached a hospital within 1 hour.

### Mode of transportation for two wheeler injuries

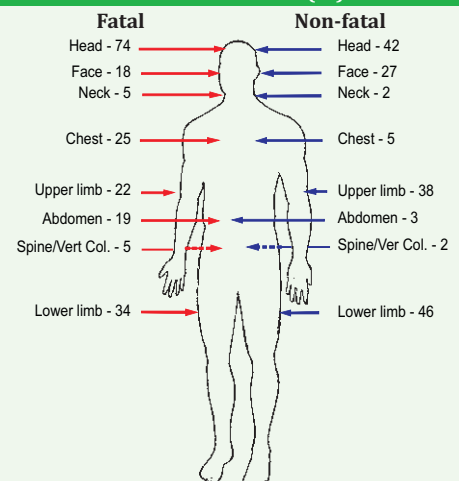


## Impact

- More than 50% of the injured belonged to moderate to severe categories, with one third being mild injuries.
- Nearly one in six of the injured (12%) were either brought in a semi-conscious or unconscious state to the casualty with 1% brought dead.
- Three fourths of fatal and half of injured had sustained injuries to their head and face, while limb injuries were present in more than 50% of killed and injured.
- Polytrauma was present in nearly one fourth of those injured and killed.

- Injury to vital organs of chest and abdomen were noticed in 40% of fatal and 8% of nonfatal injuries.

### Body Parts injured in two wheeler involved crashes (%)



## Prevention and control

In the coming years, the numbers of two-wheelers are likely to increase phenomenally along with an increase in motorcars. Hence, efforts should be made to make two-wheelers safer on the roads and mandate / educate drivers to adopt safe behaviors during driving. Safety of two wheeler riders and pillions should be an integral part of larger city based road safety programme. To promote safety of two-wheeler riders and pillions, some specific known/proven interventions include

- ❖ Formulating road safety policies with a focus on safety of two-wheeler riders and pillions.
- ❖ Scientific design and maintenance of roads.
- ❖ Separating two-wheelers and other slow moving traffic from heavy and speeding vehicles (on all possible roads).
- ❖ Strict enforcement of traffic regulations.
- ❖ Broader and focused speed control mechanisms.
- ❖ Avoiding carrying children on two wheelers.
- ❖ Control of drinking and driving.
- ❖ Strict driver licensing mechanisms and systems (graduated driver licencing systems are found to give benefits).
- ❖ Mandatory helmet legislation and enforcement.
- ❖ Design of safer vehicles.
- ❖ Increasing visibility of two wheeler riders and pillions (bright coloured helmets, use of reflective materials, etc.).
- ❖ Banning unlicensed and young drivers on roads.
- ❖ Improved trauma care practices.
- ❖ Increasing research to understand situation – circumstances – characteristics and risk factors of two wheeler crashes,

It is important to note that road users graduate from using roads under parental/care givers supervision to independent usage on their own. As teenagers they acquire

a two-wheeler and start using it independently along with their friends. Use of motorcycles continue till alternative transport patterns emerge in their life. Given teenage behaviours of risk taking, seeking pleasure, thrill on roads and others, it is essential to make them safe on roads by combined measures of road engineering, safe vehicle, visible enforcement and increasing awareness. Driving without drinking at lesser speeds, wearing helmets and proper driving habits should be instilled in their minds from the early days. Parents, teachers, law makers, police officials, road engineers, transport officials and other should actively take part in reducing road deaths.

Undoubtedly, mobility and safety should be integrated and implemented for reducing two-wheeler rider / pillion deaths and injuries. Many interventions of today rely on increasing awareness among road users, especially among two wheeler road users. However, this in itself is unlikely to bring changes. Programmes should be developed based on data, implemented by coordinated activities, monitored by designated safety organization and evaluated for reduction of deaths and injuries. It is important that everyone drives safe and reaches home safe.



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Bengaluru Injury / Road Traffic Injury Surveillance Programme is a collaborative Programme between Bengaluru City Police, 25 hospitals, Bengaluru Metropolitan Transport Corporation and Bruhat Bengaluru Mahanagara Palike. The programme is coordinated and implemented by National Institute of Mental Health & Neuro Sciences and facilitated by Indian Council of Medical Research and World Health Organization, India office. The programme aims at reducing / preventing injuries, improving trauma care and strengthening rehabilitation services.



Published by NIMHANS with support from World Health Organization, India Office, New Delhi.  
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