

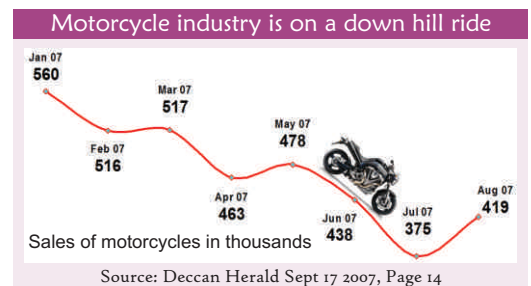
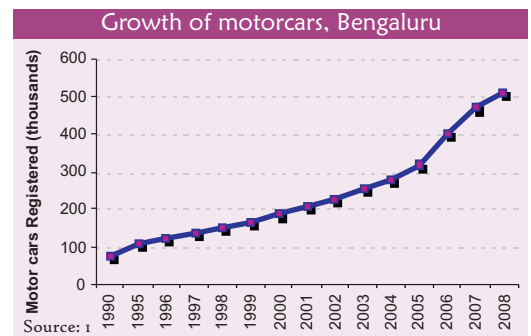


Seat belts



With increasing motorization in India, the transport patterns of people are changing significantly. The unprecedented and unparalleled motorization has brought in different types of vehicles and younger drivers on Indian roads. Beginning from 1990s, the proportion of motorcars on Indian roads is increasing significantly. Even though, motorized two wheelers of more than 100 brands occupy a major space, motorcars are also increasing at a rapid pace.

Among the total registered vehicles in India, motorcars contribute for 9% of total vehicles, a doubling in total numbers in the last decade. Depending on future economic growth and patterns, the numbers will change in the coming years. Undoubtedly, road safety priorities should be directed towards making pedestrians, bicyclists and motorized two wheeler occupants safer; nevertheless, safety of motor car occupants should also be given importance as increase of these vehicles is in the early days. Depending on the economic growth, it will be known as to how far motorcars will increase in the coming years. Increased purchasing power of the people, greater manufacturing of motorcars, increasing media advertisements and infrastructure expansion will certainly lead to increasing number of motorcars, though not at a pace compared with motorcycles. Efforts at this early stage will strengthen safety of car occupants in the years to come.



Even with motorcar occupants being protected within their vehicles, there are chances of their increasing death and injuries. Undoubtedly, collision of motorcars with pedestrians and two wheeler occupants results in greater deaths and injuries in latter groups; however the chances of car occupants getting injured is also higher. It is common to see cars colliding with stationary objects like trees, poles, medians etc., apart from their involvement in crashes with heavy vehicles. Irrespective of the collision patterns, it is important for car occupants to be safer in their vehicles, as on an average four to five people travel in these vehicles.

To formulate safety policies and programmes for car occupants, data is not readily available in India. Hence, much of the safety technology is borrowed from High Income Countries. So far, almost all studies have indicated the greater involvement of vulnerable road users like pedestrians, two wheeler occupants and bicyclists in road crashes in India. As the number of motorcars are relatively small compared to total vehicles, it is important to formulate and implement safety strategies for car occupants also, so that, people get used to safety practices from early days with increasing motorcars.

History of seat belts

Seat belts were invented by George Cayley in the late 1800s, and were first introduced in aircrafts. The use of seat belts in cars was advocated for the first time in 1920's.



Edward J. Hock invented the safety belt first used by the Ford Motor Company as standard equipment. The three-point seat belt (the so-called CIR-Griswold restraint) was patented in 1951 by the Americans Roger W. Griswold and Hugh De Haven. Saab was the first car manufacturer to introduce seat belts as a standard in 1958. In the following years, many car manufacturers introduced seat belts as a standard practice, even though debates about cost continued. In 1955, Ford offered for the first time lap belts as an option. In 1956, seat belts were offered for consumer automobiles within the "Lifeguard" safety package due to safety drive promoted by some safety professionals. In Volvo cars, seat belts were introduced as standard equipment. In the early days, as seen in many other areas, it was ridiculed, not accepted, but started coming to the attention of public. By 1965, most automobiles were sold with standard front seat belts; rear seat belts were made standard in 1968. In 1970, the state of Victoria, Australia, passed the first law making seat belt wearing compulsory for drivers and front-seat passengers. Today all High Income Countries have mandatory seat belt laws, making it compulsory for car occupants to use seat belts. A major reason has been the contribution of research from health sector, which has established the point that seat belts save lives. (2)

Seat belt tips

Without Seat belt



With Seat belt



Mechanism of action

Investments in research to understand crash mechanisms resulted in developing safety aspects for car occupants in the last three to four decades. Car drivers and passengers can get injured due to the impact of the collision in the event of a crash. Many times, the driver may suddenly apply brakes resulting in forward movements of his body. In high speeding crashes, the driver or the front seat passenger may even be ejected out of the vehicle. A similar mechanism is also seen when the driver collides with a stationary object on the road. In all these crashes, irrespective of single or multiple vehicle involvement, the driver and passengers are thrown forwards and can sustain injuries to head, chest and abdominal organs.

A seat belt, (also called a safety belt), is a safety harness designed to keep the occupant of a vehicle inside the vehicle and reduce / minimize rapid movements that may result from a collision or a sudden stop. As part of an overall occupant restraint system, seat belts are intended to reduce injuries by stopping the wearer from hitting hard interior elements of the vehicle or other passengers (the so-called second impact) and by preventing the passenger from being thrown from the vehicle.

The presence of a seatbelt protects the occupant from rolling forwards, being ejected outside and, in turn hitting objects within the car. Secondly, properly fastened seat belts distribute the forces of rapid deceleration over larger and stronger parts of the body, such as the chest, hips, and shoulders. The seat belt stretches slightly to slow down the body movement. The difference between the belted person's stopping distance and the unbelted person's stopping distance is significant, and often the difference is between life and death. Thirdly, it holds the occupant in the same position by keeping him / her in their seat and hence, will not be thrown around during a crash. An added advantage is that a person who is belted will cause less number of injuries to others as well.

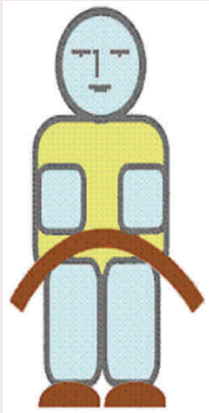
There are several technological improvements that have occurred in the type, positioning, quality and nature of seatbelts in the last few years. Currently, all cars, including Indian cars are fitted with seatbelts as per specified standards. The various kinds of seat belts available are

1. Three point lap and diagonal seatbelt, (supposed to be the most effective and also easy to use).
2. Lap belt, (helps in maintaining the seating position of the passenger and hence prevents ejection).
3. Single diagonal belt, (helps in protecting the upper portion of the body, but is not very effective in preventing ejection).
4. Full Harness, that gives good protection against both ejection and injury from interior contact during crashes.

Globalisation, transfer of technology and international standards has strengthened safety of car occupants across countries. Today, there are even technologies available which indicate that the driver and the front seat occupant should use seatbelt through sensors.

Importance of seat belts

Several safety strategies (anti skid wheels, better braking systems, improved quality of wind shields, air bags, child restraints, etc.,) have been designed and implemented to make car occupants safer in high-income countries of the world. These revolve around improving safety standards and crashworthiness of motorcars apart from many



environmental changes on the road. Some of these technologies are also seen in cars manufactured in India as part of larger technology transfer. Today many Indian cars come with seat belts, even though its use remains abysmally low. Safety mechanisms have also been implemented for car occupants to regulate their behaviour by enforcement of laws and regulations. These strategies have been implemented through combined measures of engineering, enforcement and public education through a systems approach.

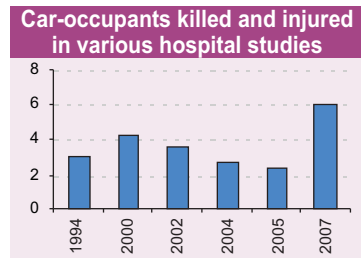
Among these strategies, use of seatbelts has been one of the important methods developed to make car occupants safer. Even though this technology has been in existence since 1960s, it has been accepted as an important strategy since 1980s, and has come into prominence in the last decade. According to the National Highway Traffic Safety Administration (NHTSA), seat belts reduce the risk of fatal injury to front-seat passenger car occupants by 45% and the risk of injury by 50%. For light truck occupants, seat belts reduce the risk of fatal injury by 60% and injury by 65% (3). Seatbelts combined with air bags, child safety seats and others are known to increase protection for passengers inside motorcars to a considerable extent. As many people failed to use seatbelts on a voluntary basis, it was considered essential to introduce laws that would make every car driver and passenger wear seatbelt compulsorily.

Injuries among car occupants

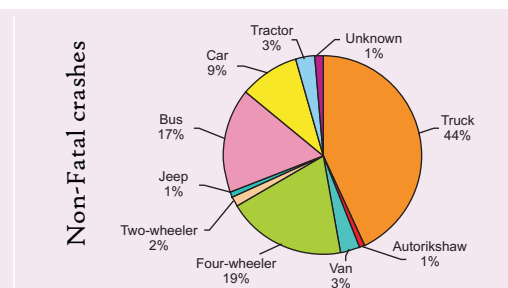
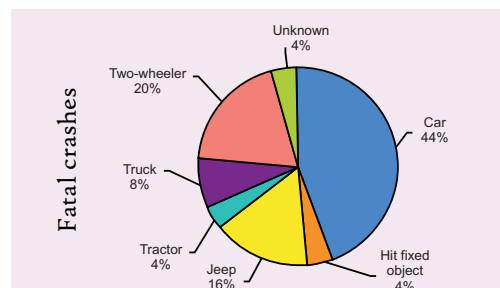
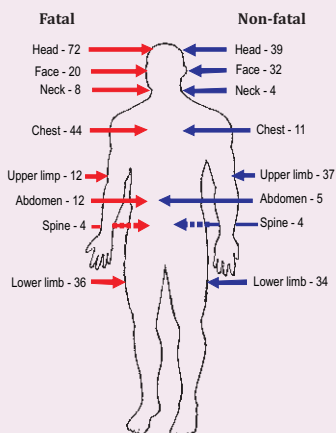
Information on nature, extent, severity along with crash mechanisms is essential to develop safety mechanisms for car occupants. However, such information is not readily available in India and needs to be developed in the coming years. Data from the National crime records bureau identify the driver of the impacting vehicle and not the injured or the killed person nor the crash characteristics.

Available data from in NCRB (4), indicate that

- ❖ In 2006, 9% of involved vehicles (impacting vehicles) were motorcars in India.
- ❖ In Karnataka, the numbers were 6%.
- ❖ Studies from NIMHANS in the last few years has revealed that the proportion of injured and killed car occupants over a period of time has increased from 2% in 1994 to 7% in 2007. It indicates a general pattern as the methodology in each of the studies has been different.
- ❖ Data from the current BISP(5) showed that
 - ❖ Among fatal injuries, 1% were car drivers and 2% were car occupants.
 - ❖ Among non-fatal injuries, 2% were car drivers and 5% were car occupants.
 - ❖ Cars had collided with another car / jeep in more than 50% of deaths.
 - ❖ Among those killed, 62% and 38% were single vehicle and multiple vehicle crashes
 - ❖ Injury to head, chest & abdomen were 72%, 44% & 12%, respectively among fatal injuries.
 - ❖ Head, chest and abdomen were injured to the extent of 39%, 11% and 5% among non-fatal injuries.
 - ❖ Polytrauma was present in 28% of deaths and 18% of injuries.
 - ❖ Among those hospitalized, 26%, 56% & 18% were mild, moderate and severe injuries.
 - ❖ Nearly 54% were hospitalized for longer periods of time.



Body parts injured in Car Occupants





Existing law on seat belts and implementation status

Realizing the limitations and difficulties of modifying human behaviour by educational methods alone, regulatory approach by making mandatory use of seatbelts is considered essential. The Indian Motor Vehicles Act, section 125 stipulates that all motorcars should be fitted with seat belts. The state governments have the responsibility of implementing these laws through appropriate notification and legislation. However, it is common to see many early vehicles without seat belts and even when present, people not using the same. The existing penalty for not using seatbelt in Bengaluru is Rs. 100 for the first offense and Rs. 300 for repeat offence.

The status of implementation of seat belt law reveals that on an average only 500 people have been penalized for not wearing seat belts at Rs. 100. It is anybody's guess, as to what difference would Rs. 100 make for a wealthy car driver.

Due to lack of importance given to this safety measure and lack of resources in actual implementation, it is given lesser priority for implementation. Secondly, it is important that policymakers and enforcement officers need to be aware of the importance of enforcement to make it a larger societal practice. Thirdly, the penalties for not using seatbelts should be sufficient enough to deter individuals with noncompliance of the law. Fourthly, it is important that all cars are fitted with seatbelts for both front and rear seat passengers. Finally, strict enforcement to ensure, should be combined with education to increase use.

Seat Belt cases booked by Bengaluru Police



Source: Bangalore Mirror, Oct 7, 2008



The overall goal of road safety is to make every road user safer, irrespective of the vehicles he/ she is using. With car population bound to increase in the coming years though at a pace influenced by motorization patterns, it is important to make car occupants safer in the coming years. Among the different strategies, use of seatbelt is found to provide maximum benefits. It is important to recognize the availability of a technological measure for safety and to put necessary mechanisms in place to make car occupants safer. Enforcement should be given equal importance in the coming days to increase usage of seatbelts by enforcing the law along with public education activities.

The Central Motor Vehicles rules, 1989 as amended by The Central Motor Vehicles (first amendment) rules 2003.

33a [125. Safety belt collapsible steering column, auto-dipper and padded dash boards.—

1) One year from the date of commencement of the Central Motor Vehicles (Amendment) Rules, 1993 the manufacturer of every motor vehicle other than motor cycles and three-wheelers of engine capacity not exceeding 500cc, shall equip every such vehicle with a seat belt for the driver and for the person occupying the front seat.

34 [(1-A) The manufacturer of every motor vehicle of M-I category shall equip every motor vehicle with a seat belt for a person occupying the front facing rear seat:

Provided that the specifications of Safety Belt Assemblies and Safety Belt Anchorages in motor vehicles shall conform to AIS:005-2000 and AIS:015_2000 specifications, respectively, as may be amended from time to time, till such time as corresponding Bureau of Indian Standards specifications are notified;

Provided further that on and Ibl Octobr,2002, the specification of Safety Belt Assemblies and Safety Belt Anchorages in motor vehicles shall conform to AIS:005-2000 and AIS:015-2000 specifications, respectively.]

37 [125-A. Safety belt, etc., for construction equipment vehicles.—One year from the date of commencement of the Central Motor Vehicles (Amendment) Rules, 20GO, the manufacturer of every construction equipment vehicles other than an agriculture tractor shall equip every such vehicle with a seat belt for the driver and for the person occupying the front seat, and with a rear view mirror.]

Suggested reading

1. www.rto.kar.nic.in/bng-veh-stat.htm accessed on 11th Nov 2008
2. http://en.wikipedia.org/wiki/Seat_belt
3. Motor vehicle traffic crash fatality and injury estimates for 2000, National Highway Traffic Safety Administration, November 2001.
4. National Crime Records Bureau. Accidental deaths and suicides in India. Ministry of Home Affairs, New Delhi, Government of India, 2007.
5. Bengaluru Injury Surveillance collaborators group. Bengaluru Injury/Road Traffic Injury Surveillance Programme: A feasibility study. National Institute of Mental Health and Neuro Sciences, Bangalore. Publication No.68, 2008.

Reducing deaths, hospitalizations, disabilities and economic costs of road crashes requires an intersectoral and integrated approach. Many high income countries around the world have shown a significant decline in deaths and injuries due to implementation of programmes through combined measures of engineering, enforcement, education and emergency care. The success of these programmes are due to development of evidence based / data driven programmes from many partners, better coordinations mechanisms, integrated approaches and development of lead organization(s) focusing on safety. Research / data / evidence formed the formation for many of these activities. Managing road safety was based on development of system wide approaches and rational decision making. Road crashes occur due to multiple causes and prevention and control involves many partners ranging from health, police, transport, judiciary, urban and rural development, excise and many others and many difficulties are seen in coordination and implementation of programmes. To overcome these factors, establishment of a lead agency to coordinate all activities were set up with required administrative powers, support, budget and the teeth to implement programmes. Lessons need to be learnt and mere concern and anguish on deaths and injuries is just not enough. There is a need for clearly defined road safety policy, programme and a defined plan of action for the coming years to save lives and limbs.