



Helmets



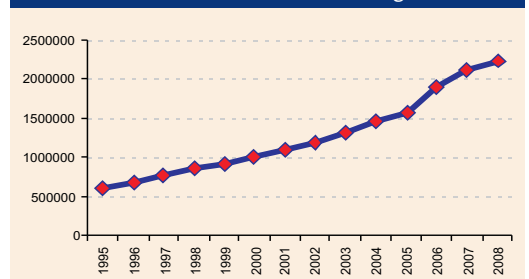
India, and its cities and towns are experiencing an unprecedented and unparalleled motorization in recent times. The motorization pattern in India indicates that nearly three fourths of the total registered vehicles are motorized two wheelers. Even though a significant increase is seen in urban areas, there is a noticeable increase in rural areas also.

In Bengaluru, the number of vehicles has increased by nearly 5 times in the previous decade. (1980: 0.2 million; 1998: 1.13 million; 2008: 3.13 million) The number of motorcycles has increased from 0.8 million in 1998 to 2.5 million in 2007 (1). Consequently, the number of road deaths and injuries has been on the increase, as motorcycle riders and pillions are at an increased exposure and are also unprotected while on roads.

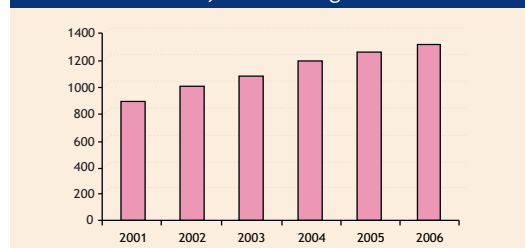
It is estimated that nearly 1,50,000 persons die every year and 4.5 million people are hospitalised due to road crashes every year in India. In Karnataka nearly 9000 were killed, while in Bengaluru, about 1100 persons lost their lives in 2007. The number of people hospitalised and sustaining mild injuries will be 30 and 50 times the number of deaths. Among the various road user categories, two wheeler riders and pillions are at the highest risk of injuries. Available data indicate that nearly 30 to 40% of deaths and injuries occur within this group (2). The officially reported figures are an underestimate as many seeking care in different types of health care institutions are not reported to any agency.

Injury to the brain is one of the most common injuries. NIMHANS studies have reported that nearly 60 to 70% of injured or killed two wheeler riders sustain injury to the brain in a crash. Injury to the head and neck is a major cause of death, serious injury and disability among users of motorcycles. Damage to the brain can result in instantaneous death or serious injury leading to short-term and long-term disabilities and interferes in the day-to-day functioning of an individual. Head injuries also result in significantly higher medical costs than any other type of injuries.

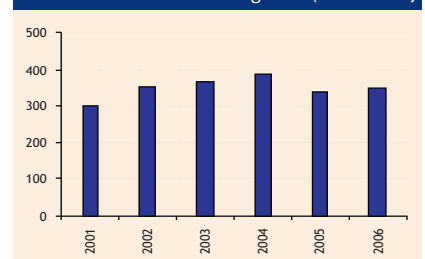
Growth of two wheelers in Bengaluru



Two-wheeler injuries in Bengaluru 2001-06



Two-wheeler deaths in Bengaluru (1996-2006)



Injury mechanisms

During a motorcycle crash, the brain and its contents are damaged through direct contact and through acceleration -- deceleration forces, with each resulting in different types of injuries. In a crash, the rider is thrown forwards / backwards or falls to the side hitting an object depending on collision patterns. When a rider's head hits an object, the forward motion of the head is stopped but the brain continues to move until it strikes the inside of the skull. It then rebounds hitting the opposite side of the skull. The resulting damage can vary from minor



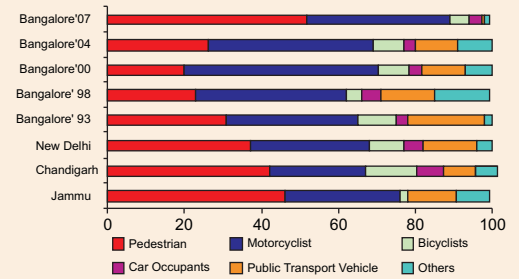
head injuries to instantaneous death depending on the amount of energy transferred to the injured person in a crash. If the rider is unprotected, the amount of energy transfer will be much higher and injuries severe.

Helmet mechanism

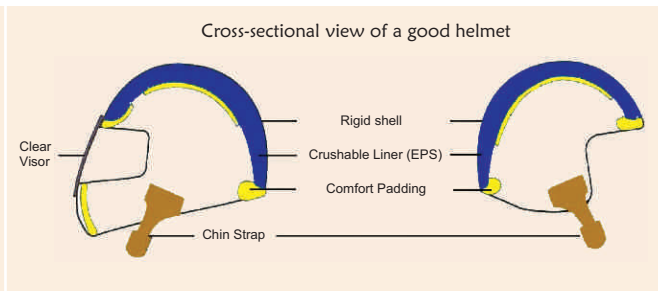
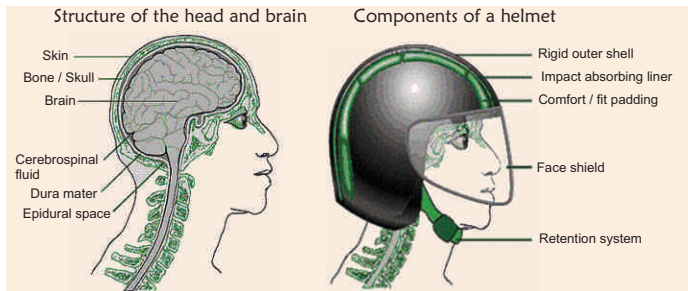
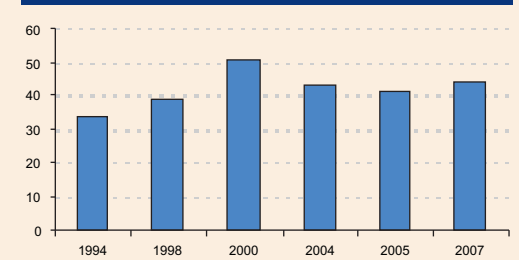
A helmet primarily reduces the impact of the collision and thereby consequent injury to the brain by (3)

- ❖ Acting as a mechanical barrier between the skull and the impacting object.
- ❖ Reducing the deceleration of the skull, and hence the brain movement.
- ❖ Providing a cushioning effect through the padding thermocole lining which absorbs the impact and brings the head to a halt slowly.
- ❖ Spreading the force of the impact to a larger area so that energy is distributed through the outer shell of a helmet.
- ❖ The shell also protects against penetration of the skull by any sharp pointed objects.
- ❖ Keeping the helmet on the head in a crash through chinstraps.

Road user categories in road deaths in India



Two wheelers involved in various hospital studies



Source: 4

Available helmets

Generally, there are different types of helmets used by the people. These are full-face helmets, open face helmets and half head helmets. In high-income countries, different types of helmets are available even for children to be used during cycling and other sports activities. Half head helmets do not offer any protection in the event of a crash.



Helmets and head injuries

As per WHO, "wearing a helmet is the single most effective way of reducing head injuries and fatalities resulting from motorcycle crashes. Motorcyclists who do not wear helmets are at a much higher risk of sustaining head injuries and from dying from these injuries" (4). Research in the past two decades has shown that wearing a helmet reduces the risk of severity of injuries by about 72%, decreases the likelihood of death by 39% and consequently brings down the costs of healthcare (4). Previous studies by NIMHANS have shown that the risk of death and severe brain injury increases by more than 2 times in the absence of helmet, neurological disability is increased by one and half times, and the extent of hospitalization and healthcare costs are considerably higher for care of an injured person due to a crash (3).

Helmet legislation in Bengaluru and Karnataka

Since November 2006, the city of Bengaluru and parts of Karnataka have legislation in place covering riders of motorcycles. Similar laws exist in few other states and cities of India.



The Karnataka Motor Vehicles rules, 1989 Rule: 230 Wearing of protective headgear:

- 1) Every person while driving or riding a motor cycle of any type, that is to say motor-cycles, scooters and mopeds shall wear protective headgear of such quality which will reduce head injuries to riders of two-wheeler resulting from head impacts.
[Provided that sub-rule (1) shall not apply to a person driving or riding a Motor Cycle with not more than eleven metric brake horse power.]
- 2) A protective headgear referred to in sub-rule (1) should be one which has been approved by the Indian Standard Institute Standard No. IS 41551-1976.
- 3) Each protective headgear shall be permanently and legibly labelled, in a manner such that the label or labels can be easily read without removing padding or any other permanent part with the following:
 - a) Manufacturer's name or identification;
 - b) Size;
 - c) Month and year of manufacture;
 - d) The mark of Indian Standard Institute.
- 4) The headgear shall have minimum three adhesive type retro-reflective red colour stripes on the back of the headgear which will illuminate during the night. The stripes should be of the size of 2 cm x 13 cm and affixed horizontally to the headgear.

Even though Indian Motor Vehicles Act has mandatory helmet legislation, the notification and implementation of the law is the responsibility of individual states. For variety of reasons, Indian states have not notified the law, and when introduced, are partial in nature. It is important that all Indian states notify the law and enforce in full spirit.

Promoting helmet usage

Considering the benefits of helmets use among motorcyclists, efforts have been made to encourage motorcyclists to use helmets. In a country with 75 % of vehicles being two wheelers, it is essential to promote helmet use among all motorcyclists. Many education programmes and campaigns are undertaken to provide information for public to use helmets. Given the limitations of education programmes per se (cost, time, language, continuity, etc.) in changing human behaviour to accept safety practices, it is essential to have legislative and regulatory approaches in the interest of saving lives. Hence, legislation and enforcement are considered very important and the Indian Motor Vehicles Act has included compulsory use of helmets under its legal provisions. Thus, many Indian cities and states have helmet legislation in place. Studies by different countries have also shown that the presence of motorcycle helmet legislation and enforcement decreases the number of deaths due to brain injuries, while the absence or repeal of the law increases the number of deaths and serious injuries.

Legislation is one component of promoting safety. The legislation has to be enforced along with increasing public awareness by police to increase helmet use in the society. Some important people friendly and maximizing methods of enforcement are as follows-

- ❖ Political support is crucial for implementation of law. Helmet legislation and enforcement is a broader societal safety mechanism for reducing injuries and deaths among motorcycle riders and pillions.
- ❖ Continuous dialogue with provision of scientific information through multimedia channels should be undertaken over a period of time. Several sections of the society like students union, two wheelers associations, and citizen's forums should be involved to clear misconceptions and to communicate the scientific advantages of helmet laws.
- ❖ All officials from transport and police should be sensitized and implementing officials should be trained on advantages of helmet laws and methods of enforcement.
- ❖ The first one or two months of implementation should also be a period of intense information dissemination (should continue later also) with people friendly – non-harassing enforcement activities.
- ❖ Government and private outlets should be identified for making helmets available, rather than roadside outlets. Sale of helmets through regulated and notified outlets should be encouraged.
- ❖ Helmet manufacturers need to be informed to manufacture all helmets in brighter and reflective colors (preferably white or orange or yellow) as this would increase the visibility of two wheelers and pillions in darkness. Reflective tapes on helmets should be encouraged.
- ❖ The penalty for not wearing helmets should be clearly informed through all media channels prior to the beginning of enforcement. The penalty should be sufficient enough to encourage helmet usage.
- ❖ The enforcing police agencies should be people friendly and humane in approach while implementing the law. Unnecessary harassment, exploitation and corruption should not be permitted during the course of implementation.
- ❖ The enforcement strategy should be focused more towards extension – peripheral – residential and business areas (ring roads, extension areas, twilight areas).
- ❖ Helmet laws are easy to enforce and are visible. Thus, the policy should be to cover all areas and not just central / prominent areas, cover 24 hours, and should be uniform in nature (weekends, holidays, etc.) .
- ❖ The revenue collected from the public should be pooled into a central road safety fund and should be utilized for augmenting resources for road safety literacy across the society.

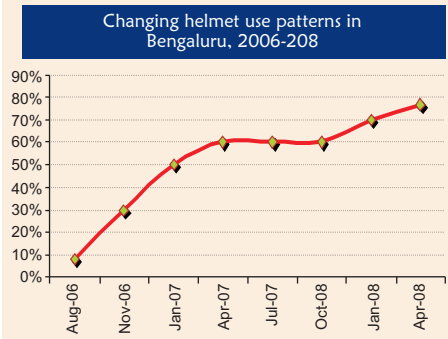


- ❖ Safety assessment and promotional activities need to be initiated simultaneously for improving the quality of helmets.
- ❖ Health professionals need to actively get involved in health promotion and strengthening helmet usage activities.
- ❖ Periodic campaigns and education programmes will help the society to accept the law. Most importantly, once the law is introduced it should not be repealed nor relaxed at any cost. Repeal or weakening of law will result in decreased use and increasing deaths and injuries.
- ❖ The law needs to be monitored to identify the benefits over a period of time. Since road safety information systems are not strong and realistic enough to recognize the impact of the law, it needs to be adequately strengthened with the development of hospital and police based Road traffic injury surveillance systems to track changes over time.

For helmet legislation and enforcement to be really effective, it is important to have random -- visible -- uniform enforcement across the entire geographical area. Secondly, it is equally important that almost all motorcyclists wear helmets.

Current status

Studies by NIMHANS have shown that the helmet usage rate has increased from less than 5% in 2005 to 60% by 2008 in Bengaluru. However, it has been observed that many people continue to use half head helmets, nonstandard helmets and damaged helmets. The latter types do not provide protection in the event of a crash. Further, enforcement is not total especially in peripheral and outer parts of city.



Tips for proper helmet usage

To obtain maximum benefits from helmet usage,

- ❖ Buy a comfortable and standard helmet of your own
- ❖ Always use a helmet while riding
- ❖ Encourage your pillion to use a helmet
- ❖ A bright coloured helmet increases your visibility on the road
- ❖ Always strap the helmet to keep it on the head in the event of a crash
- ❖ Use a full-face helmet for maximum protection



It is important that all Indian states introduce helmet legislation and enforce the law in totality. Once introduced, it has to be implemented totally and not to be repealed nor relaxed, as the mere presence of law will not change the pattern or the outcomes. Systematic - people friendly enforcement by the police department is very crucial to reduce brain injury mortality, morbidity, disability, and economic losses in the coming years. Programme monitoring and evaluation and periodical information to public on the presence of law with penalty levels are crucial for success of this intervention. Since motorcycle riders and pillion in 15-49 years are the highest involved group, enforcement should be primarily targeted at them. Helmet legislation and enforcement should be combined with other road safety strategies like speed management, reducing drinking and driving, road engineering measures, increasing visibility and others to have maximum impact.

Suggested reading

1. www.rto.kar.nic.in/bng-veh-stat.htm accessed on 11th Nov 2008.
2. 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.
3. G. Gururaj, Head injuries & Helmets: Helmet Legislation and Enforcement in Karnatak and India, National Institute of Mental Health & Neuro Sciences, Bangalore 2005.
4. Helmets: a road safety manual for decision-makers and practitioners. Geneva, World Health Organization, 2006
5. Ulmer RG, Preusser DE. Evaluation of the repeal of motorcycle helmet laws in Kentucky and Louisiana. Washington D.C., National Highway Traffic Safety Administration, 2003 (<http://www.nhtsa.dot.gov/people/injury/pedbimot/motorcycle/kentucky-lao3/> accessed 4 July 2006).

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.