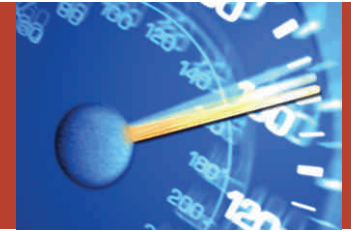




Speed Management



Road traffic injuries (RTIs) are a leading cause of death, disability and socio-economic losses in India. It is estimated that nearly 1,50,000 persons would have died due to road crashes in 2007. In Karnataka, there were 7,939 deaths and 43,280 serious injuries in 2006. In Bengaluru, it is estimated that nearly 1100 deaths and 40,000 hospitalisations would have occurred in 2007. Nearly three fourths of these deaths and injuries occurred in the age group of 15-44 years and among vulnerable road user categories of pedestrians, motorcyclists and bicyclists.

RTIs occur due to complex interaction of several factors on roads, in vehicles, and among people, in a scenario where clearly defined road safety policies and programmes are lacking. As more vehicles and young drivers get added to the existing road environment, conflicts are bound to occur and will definitely increase in the coming years. The city of Bengaluru has nearly 3.2 million vehicles on roads.

Mobility and speed

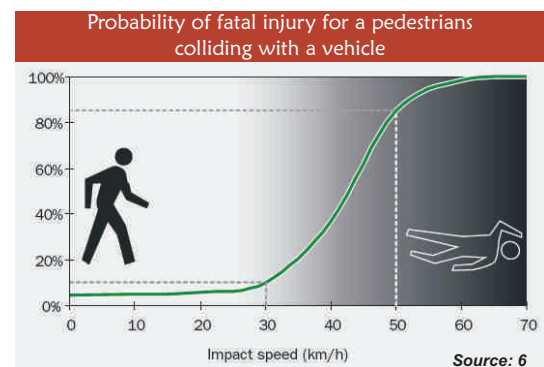
Excessive and inappropriate speed has been recognized as one of the major contributing factors for increasing road crashes. In a situation where rapid mobility is considered essential, speed management gets lesser importance, as rapid movement of vehicles is given more importance. Despite enormous research in road safety in high-income countries, speed management still remains a big challenge. Speeding generally includes driving beyond prescribed speed limits of a given area or driving too fast for the given conditions, but within the limits (1). On Indian roads, it is important that mobility and safety should go hand-in-hand for health and safety of people. Safety should be given greater importance as deaths and broken limbs are difficult to repair and replace.

Speeding and road crashes

Majority of those killed and injured on Bengaluru roads are pedestrians, two wheeler occupants and bicyclists. Data from BISP show that 51% and 24% of those killed and injured were pedestrians, while two-wheeler occupants were 38% and 51%, respectively (2). Heavy vehicles like cars, buses and trucks collided with large number of pedestrians. Similarly, two-wheeler riders had collided with heavy vehicles in 55% of crashes. Data from crash reporting and analysis of public buses for the year 2007

revealed that, buses had collided with pedestrians, motorcyclists and bicyclists in 28%, 40% and 7% of crashes. Apart from those who died, many survived with serious injuries. It is acknowledged that excessive speed was a contributory factor in more than half of crashes.

Excessive speed is a key risk factor for road crashes and greater severity of the injuries in the event of a crash. In crashes occurring at higher speeds, there is greater generation and transfer of mechanical energy to the affected person. When the transfer of energy occurs to the human body in excessive amounts, damage to body organs occur when it exceeds the physiological





tolerance. The level of damage to the body is influenced by the shape and rigidity of the colliding object along with velocity of the impact.

Even though no accurate data on speeding is available in the city, anecdotal evidence, informal observations, crash reports and a look at the city roads indicate that speed is a major contributing factor. In a qualitative study of brain injuries at NIMHANS, injured persons reported and admitted that they were traveling in high speed at the time of crash (4). Even though there were other contributing factors for crashes, speeding and overtaking were observed to be major risk factors for crashes.

Generally, as crashes reduce in central areas of the city due to excessive vehicular congestion, it has been increasing in peripheral areas (ring roads), on highways and in residential areas, where excessive speed is a major contributing factor. One look at these areas during evenings, nights, and early mornings would confirm this observation. Data from Bengaluru Injury Surveillance Programme revealed this observation to be true as areas on the outskirts of the city and residential areas reported severe crashes resulting in more number of deaths and severe injuries (2). In a recent study on highway crashes on a national highway from Bengaluru, speeds were observed to be high and collision between speeding vehicles had resulted in higher number of deaths.

Causes of speeding

Various reasons as to why people speed on roads has not been clearly understood by research in recent years. Some of the contributing factors are - covering the required distance in shorter period of time, fun and pleasure seeking, nature and quality of roads, type of vehicles, false perceptions on safety, increasing productivity and greater returns, traffic conditions, enforcement practices, presence of speed zones – signage's - speed limits and knowledge and practice of road users. Road rage manifested as high speed is also a recognized phenomena in Bengaluru and other cities. Generally good roads promote speed, while poorly maintained roads decrease speed. However, on the roads of Bengaluru, it is not uncommon to see people speeding and even overtaking from both sides on poorly existing roads. In addition, young drivers are more likely to speed and end up in crashes, resulting in more deaths and hospitalisations.

Importance of speed management

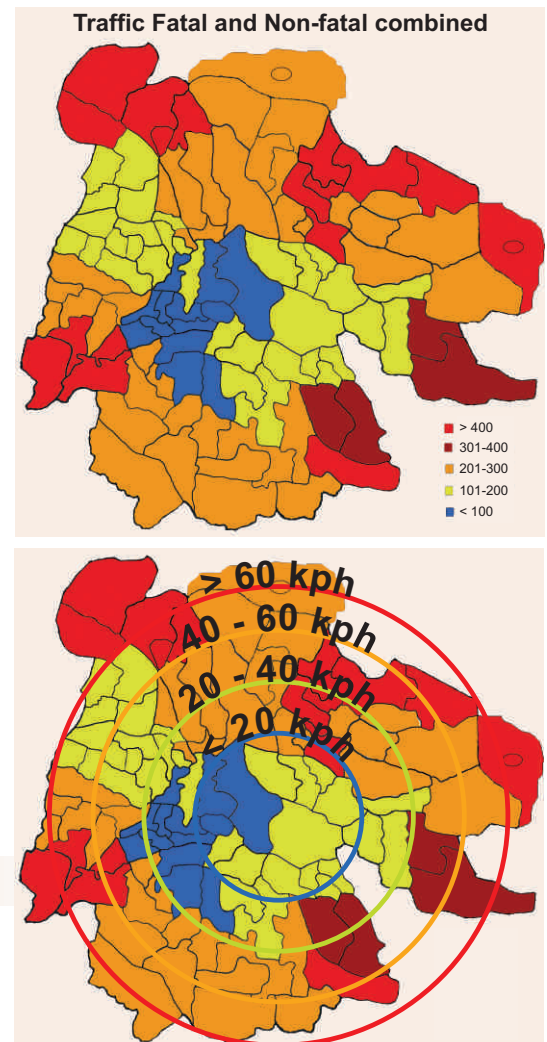
If greater attention is given to the tolerance of the human body to injury when designing road and transport systems, there could be substantial benefits when crashes occur, meaning they may not lead to serious injury or death (1). Paradoxically, most traffic systems and environments do not consider human behaviour, tolerance and limitations, while designing transport systems.

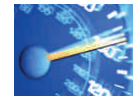
By driving in excessive speeds, it is more likely that the rider will lose control of the vehicle, fail to anticipate hazards on road and can also create confusion for other road users to misjudge the speed of his / her vehicle. Importantly, the stopping time and distance for a speeding vehicle will be longer at greater speeds.

Speed Management - Systems approach

Speed management requires an appropriate mix of engineering, enforcement and education strategies and approaches. To formulate effective speed management strategies, it is important to have an understanding on speed measurements, nature of traffic mix and flow, data on crash factors, design of the roads, land-use patterns and nature of road users.

A systems approach is strongly recommended to manage speeds in an effective way. (1) The aim of this safe system is to achieve a road system that allows for human error without leading to death or serious injury. It focuses on addressing





A review of the studies on speed limits changes from several countries (South Africa, Belgium, Finland, France, UK, Germany, USA and New Zealand) where a speed limit was reduced or a new limit was introduced found a reduction in road crashes ranging from 8% to 40% (5) Research in United States of America examined the effect of changes in speed limits on deaths on rural interstate highways. Road crash deaths in the groups of states that raised their speed limits from 65 to 70-75 mph rose by 38% and 35% respectively, relative to fatality levels in the states that did not change their speed limits (6)

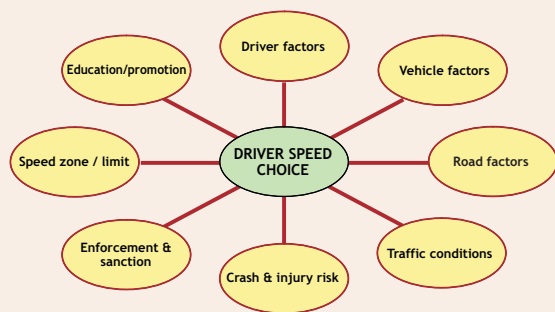
various factors involved in specific crash types. The safe system aims to minimize the severity of injury when crash occurs and is based on the principle that road users should not die because of system failings. The fundamental premise of the system is that key risk factors that contribute for crashes are identified and understood based on traffic, crash and injury data collection and analysis systems. The key elements of the system are to manage speeds (by careful and scientific development of infrastructure, vehicle safety improvements and enforcing appropriate speed limits), improving vehicle safety (making vehicles safer, provision of seat belts, other supportive features), setting and enforcing appropriate speed limits.

Road functions need to be understood properly and appropriate speed limits should be set and enforced based on the purpose for which particular categories of roads are used. An understanding of traffic movements of vulnerable road users in defined geographical areas is crucial for speed management. As many vulnerable road users are unprotected and are directly exposed, it is important to set speed standards to accommodate movement of these categories of road users and understanding their needs. Hence, clear directives are required for permissible speeds on Indian roads in cities, rural areas and on highways.

Periodical review of legislation and enforcement depending on the type and nature of traffic flow is essential as speed management depends on these factors. Setting speed limits on a scientific basis for different categories of roads depends on different functions of the road and its usage by various road users. Scientific and systematic understanding of existing speeds on different categories of roads needs to be developed. Speed surveys can be conducted in number of ways by both observational methods and through Sample surveys.

Enforcing speed limits by different mechanisms requires the use of technology along with enforcement and information to public on various speed limits in a way that people understand the importance of speed regulations.

Between 1987 and 1988, 40 states in the USA raised the speed limit on interstate highways from 55 mph (88 km/hr) to 65 mph (104 km/hr). This resulted in an increase in average car speeds of about 3 mph (5 km/hr). Over the same period there was an increase in deaths on these roads of between 20 and 25%. (7)



Speed management tools

Many tools that are available for effective speed management rely on the principles of engineering, enforcement and education. As no single tool can provide effective results, it is essential to have an appropriate mix depending on the local conditions.

Some of the common tools include - classifying roads based on purpose and fixing appropriate speed limits, appropriate and visible signage's, staggering traffic flow, speed warning signs, elevated pedestrian crossing facilities, speed humps at strategic locations, restricting

speeds at entrance and exit to heavy traffic generators, developing roundabouts, separation of vulnerable road users through fencing, medians, footpath etc., monitoring speeds through speed cameras and several others broadly falling under the engineering methods. In recent years, several intelligent transport systems incorporate elements of speed control and adaptation in different settings

Enforcement strategies include formulating road rules and speed limitations, use of speed cameras, automated enforcement systems, appropriate penalties for violations and others.

Increasing public awareness and improving compliance towards speed restrictions is an important activity. This requires communicating proper information to public on speed related aspects and increasing their safety behaviour on roads. This can be effectively done through increasing public perception of being detected by police, speed compliance initiatives, campaigns and public education programmes and several others.



THE MOTOR VEHICLES ACT, 1988 NOTIFICATION

No. TRD 16 TDK 2005, Bangalore, dated 10th May, 2005; Karnataka Gazette, Extraordinary No. 1042, dated 28-5-2005
In exercise of the powers conferred by sub-section (2) of Section 112 of the Motor Vehicles Act, 1988 (Central Act 59 of 1988), the Government of Karnataka – is satisfied that it is necessary to restrict the speed of motor vehicles specified in column (2), of the table below in the interest of public safety or convenience or because of the nature of the road or bridge hereby fixes the maximum and minimum speed limits specified in column (3) thereof.

Class of Motor Vehicle	Maximum speed per hour in km.			
	Near Educational Institutions	Ghat Roads	In the city limits*	All other places
If all the wheels of the vehicles are fitted with pneumatic tyres and the Vehicle is not drawing a				
a) Motor-car	25	40	40	70 to 90 on National Highways
b) Motor-cycle	25	40	40	50
c) Autorickshaw	25	30	30	40
d) Light Motor Vehicle other than a transport vehicle	25	40	40	60
e) Light Motor Vehicle arid, a transport vehicle	25	40	40	60
f) Medium or Heavy Passenger Motor Vehicle	15	35	35	60
g) Medium or Heavy Goods vehicles	15	35	35	60

* Bangalore, Mysore, Mangalore, Hubli-Dharwad, Belgaum and Gulbarga

Data requirement for speed management

- ❖ Traffic mix & patterns
- ❖ Traffic volume and traffic flow
- ❖ Crash history data
- ❖ Road characteristics
- ❖ Land development practices
- ❖ Intersection type
- ❖ Free travel speed
- ❖ Safe Overtaking



In recent years, a body of knowledge and evidence exists to understand speed as a major risk factor, measures to control speed through combined approaches of engineering, enforcement and education along with greater use of technology to manage speeds. Managing speeds on urban roads, rural roads and on highways requires a systems approach. There is need to understand number of factors that contribute to promoting speeds and finding locally effective applicable solutions. A right mix of different tools is likely to lead to greater results by decreasing deaths and injuries on roads. Speed management should be obviously be based on local data.

With the addition of vehicles onto roads and some improvement in infrastructure, it is essential to recognize and develop measures for appropriate speed management. This also requires a major investment in research to understand the complexities on our roads. There are several technologies and regulatory approaches that are available to effectively manage speed on our roads. If this is not given due priority in the design and development of traffic and transport systems, the public health burden of road traffic injuries will continue in the coming years. All vehicle users should reach home safe and society should ensure that they reach home safe by building road transport and safety in an integrated manner.

Post license, off road drivers training is usually not effective in reducing risk. Researchers believe that this is because additional training to increase driving skill tends to lead to higher risk driving because of a belief that faster speeds can be driven with enhanced driving skills.

Suggested reading

1. Speed management: a road safety manual for decision-makers and practitioners. Geneva, Global Road Safety Partnership, 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. OECD/ECMT Transport Research Centre: Speed management report, Paris 2006
4. Gururaj G, Shastry KVR, Chandramouli AB, Subbakrishna DK, Kraus JF Traumatic brain injury. National Institute of Mental Health and NeuroSciences, Bengaluru. Publication No. 61, 2005.
5. Managing Speeds of traffic on European Roads (MASTER)Final report European Commission. Project of the 4th framework programme, 1998 (<http://virtual.vtt.fi/master/>)
6. Patterson TL et al. The effects of increasing rural interstate speed limits in the uSA. Traffic Injury Prevention, 2002.
7. Transportation Research Board. Managing Speed. Review of the practice for setting and enforcing speed limits. Special report 254, National Academic press, 1998.

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.