Bengaluru Road Safety & Injury Prevention Programme: Injury snapshots and activity profile - 2009

National Institute of Mental Health & Neuro Sciences
Department of Epidemiology
WHO Collaborating Centre for Injury Prevention and Safety Promotion
Bengaluru – 560 029, India

Bengaluru City Police

Bengaluru Metropolitan Transport Corporation

Victoria Hospital

Bowring & Lady Curzon Hospital

Bruhat Bengaluru Mahanagara Palike

St. John's Hospital

Sanjay Gandhi Institute of Trauma and Orthopaedics

M. S. Ramaiah Memorial Medical Hospital

Kempegowda Institute of Medical Sciences & Research Centre

Ambedkar Medical College & Hospital

Rajarajeswari Medical College & Hospital

Vydehi Medical College & Hospital

MVJ Medical College & Research Hospital

ESI Hospital Rajajinagar

Sri. Siddhartha Medical College, Tumkur

St. Martha's Hospital

Bengaluru Road Safety & Injury Prevention Programme: Injury snapshots and activity profile - 2009

HOSMAT Hospital

St. Philomena's Hospital

Chinmaya Mission Hospital

Sagar Hospital

Sparsh Hospital

Bengaluru Baptist Hospital

Columbia Asia Hospital

Manipal Hospital

Command Hospital

Suguna Hospital

Ravi Kirloskar Memorial Hospital

D.G.Hospital

Rajiv Gandhi Institute of Chest Disease

K.R.Hospital

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World Health Organization, New Delhi

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Bengaluru Road Safety and Injury Prevention Programme: Injury snapshots and Activity report 2009

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RURAL CENTERES

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Medical Records Department

Mr. Pulla Reddy, Mr. Vivekappa, Mr. Nanjappachar, Mrs. Maria A.

And all other staff working in emergency rooms - medical record divisions of hospitals, Bengaluru Metropolitan Transport Corporation and in all police stations of Bengaluru city

Table of Contents

List of Abbreviations

BRSIPP	:	Bengaluru Road Safety and Injury Prevetion Programme
CMO	:	Casualty Medical Officer
CC	:	Co-ordinating Centre
CCRB	:	City Crime Records Bureau
CDs	:	Communicable Diseases
ER	:	Emergency Room
FIR	:	First Information Report
HICs	:	High Income Countries
ICD	:	International Classification of Diseases
ICECI	:	International Classification of External Causes of Injuries
ICMR	:	Indian Council of Medical Research
IPC	:	Indian Penal Code
LMICs	:	Low and Middle Income Countries
MCCD	:	Medical Certification of Cause of Death
MLC	:	Medico-Legal Case
NCRB	:	National Crime Records Bureau
NIMHANS	:	National Institute of Mental Health & Neuro Sciences
NCDs	:	Non-Communicable Diseases
NGO	:	Non-Governmental Organization
OTC	:	Over The Counter
RMO	:	Resident Medical Officer
RTI	:	Road Traffic Injury
WHO	:	World Health Organization

MESSAGE

R. ASHOKA

Minister for Transport
No: Tm/O/Sms/136/2010

Telephone: Off:
22253835 22033234
Room No. 317, 3rd Floor
Vidhana Soudha,
Bangalore

Dated: 26-02-2010

During the last two to three decades, India is going through a process of rapid motorisation. Bangalore city with its 251akh two-wheeler population, contributing to nearly three-fourths of the total vehicular load, is the highest compared to any other city in India. It is thus imperative that we need to make the roads safe particularly to the Vulnerable Road Users. It is rather unfortunate that nearly 1000 people die due to road traffic injuries in Bangalore and majority are either pedestrians or two wheeler users. Thousands more are injured and become disabled.

A key solution to this human made disaster is making the public transportation systems more robust and reliable. The transport department and the public sector transport corporations in Karnataka have launched new initiatives in this regard. While we try to enhance and improve services there is a need to understand and evaluate the impact of these measures. I am extremely happy that Bangalore Road safety and Injury prevention programme is bringing out the report for the year 2009. I am sure the suggestions and recommendations of the data analysed from hospitals, police and BMTC will be very resourceful.

I would also like to take this occasion, when all the partners of the Bangalore Road Safety and Injury surveillance programme are meeting, to convey my heartiest compliments for being involved in this very important issue in the city of Bangalore. I am sure the daylong deliberations would be highly productive and useful to plan and implement innovative solutions.

(R. Ashoka)

MESSAGE

Over the last few decades there have been fundamental changes in disease patterns among the people of Member States of the WHO South-East Asia Region due to rapid urbanization and economic growth. The pattern of mortality and morbidity with regards to communicable and noncommunicable diseases has changed. From being largely linked to infectious diseases earlier, it is now mainly related to noncommunicable diseases as well as injuries and violence. Road traffic injuries have emerged as one of the leading causes of death and disability in most countries of the Region.

World Health Organization estimates predict that road traffic injury will increase from being the ninth leading cause of death globally in 2004 to be the fifth leading cause of death by 2030.

Road traffic injuries are one of the fastest growing epidemics in the South-East Asia Region, and more than 285 000 people are dying on the roads every year. The trend in road traffic deaths has also been on an upward spiral in recent years. Most of those killed on the roads in accidents are young and aged between 15 and 44 years, thus corresponding to the most economically productive segment of the population. Hence, road traffic injuries lead to a colossal economic burden at both the family and community levels on Member States of the Region.

Almost three quarters of all road traffic deaths in South-East Asia occur among the most vulnerable road users, i.e., pedestrians, motorcyclists and cyclists. The rapid growth of motorized two-wheelers in the Region is a major risk factor in road traffic injuries. These two critical issues should be prioritized during policy decisions on road safety.

Although primary prevention is a far better option to address the huge toll from road traffic injuries than other measures, only a few Member States in the Region have specific preventive measures on road traffic injuries in place. Measures that will reduce injuries and contribute to a healthier future may include appropriate land use planning, setting safety standards for vehicles, designing infrastructure keeping the protection of pedestrians and motorcyclists in mind, promoting safe public transport, and campaigning for the improvement of personal behaviour on roads. To realize this goal and implement these measures it is imperative to develop and sustain strong intersectoral partnerships and collaboration.

To meet the challenge of the rapidly growing road traffic injuries, The WHO South East Asia Regional Office has supported trainings in injury surveillance, injury epidemiology, prevention and care, and road safety planning. This meeting is a very important effort to strengthen our workforce against RTI. The meeting should focus on actions , based on data collected from different sources.

I look forward to the outcome of this meeting and assure you that WHO will continue assistance and collaboration.

Dr Chamaiparn Santikarn
Regional Advisor, Disability,
Injury Prevention and Rehabilitation, WHO/SEARO

MESSAGE

Urbanisation, motorisation, industrialisation, infrastructure development are becoming hallmarks of our growth and development in recent years. Indian cities are growing in a fast and unplanned manner and this is having a major impact on people' lives. Bengaluru city is no exception to this change and visible changes are occurring all around us. Amidst these changes, safety of people has become an important issue for planners and policymakers. In all our cities and in rural areas, road traffic accidents, stress related suicides and other injuries have become a major public health problem and has been a matter of concern for all. Hundreds of people are killed and injured on our roads, at homes and in workplaces of our cities on a daily basis. This human tragedy needs to be addressed by all stakeholders in growth and development, on a regular and continuous basis.

Unfortunately, in majority of the cases, young people in their formative and productive years of life are the victims. The untimely death or hospitalisation of young people brings huge suffering to their families. Majority of these injuries can be prevented, if we aim at developing a proper understanding of injury profiles and patterns in our society, we need to address gaps in our information systems, develop mechanisms for prevention, trauma care and rehabilitation along with building robust policies and programmes for future. All concerned departments of police, transport, urban and rural development, health, law, information and broadcasting, and others need to develop joint and coordinated mechanisms to address the problem.

I am happy to note that the Bengaluru Road safety and Injury Prevention Programme initiated in 2008 has been working towards road safety and injury prevention on a scientific and systematic approach with all partners in the city. Bruhat Bengaluru Mahanagara Palike is the central agency for all development and infrastructure activities in the city and needs to include safety of people on roads, at homes, in schools and in work places.

The 2009 and 2010 programme reports, fact sheets, public health alerts, and strategy documents prepared for the programme will help BBMP, Police, Transport, Urban Development and other city agencies to give due importance for road safety and injury prevention initiatives. We are making efforts to give importance for safety in all our activities.

The Bengaluru Road Safety and Injury Prevention Programme has shown that it is possible to develop good data and provide scientific basis for robust current and future interventions. I strongly hope that this collaborative programme with involvement of BBMP, police, transport, all major hospitals and other partners will be able to develop scientific and systematic road safety and injury prevention programmes to save our young people. I take this opportunity to wish the programme all success and will be happy to extend all possible support in its future activities.

Govinda Raju K H
(IAS, Special Commissioner), BBMP, Bangalore.

MESSAGE

India and China have the largest number of deaths and injuries related to road traffic accidents. More than 1,00,000 people die and 10,00,000 lget injured on the roads every year in India. Unfortunately these incidents have not attracted adequate amount of attention from policy makers and enforcement agencies. Every time a person is dead or injured it leaves behind pain and sufferings for the entire family. Unabated vehicular growth, infrastructure enhancement and changing life styles have aggravated matters for the worse. Majority of these deaths and injuries are preventable, if, road safety is given due importance in all our policies and programmes. Also, the policies and programmes have to be based on scientifically collected data, evidence and research.

Bangalore Road Safety and injury prevention programme initiated in 2008 an example of fruitful cooperation between traffic police and medical fraternity.

This programme has two important elements; firstly, it uses information and data to plan and develop activities. Secondly, it works with all stakeholders to develop and support interventions of all partners. Bengaluru City Traffic Police are a major partner in this programme, by facilitating information development and using information in all our activities. Year 2009 and 2010 programme reports, fact sheets, public health alerts and strategy documents will help Police, Transport, Urban Development and other city agencies to give importance for road safety and injury prevention. Fatalities on roads in Bangalore City have seen a significant decline in past two years and we need to continue with this to reduce them further. A welcome development would be a similar decline in number of injuries, primarily due to our interventions.

The Bangalore Road Safety and injury Prevention Programme has shown that it is possible to develop good data and lay a good foundation for present and future activities. Despite limitations in resources and manpower, we are giving major importance for road safety in both B-Trac 2010 and all other activities. I hope this collaborative programme with involvement of traffic police and all major hospitals and other stake holders will be able to develop scientific and systematic road safety and injury prevention programmes to save young lives in the years to come. I also wish that similar programmes come up in other parts of India. I wish the programme all success and will be happy to extend all possible support for the programme.

Mr. Praveen Sood, IPS,
Addl. Commissioner of Police,
Traffic Bangalore City

MESSAGE

ಸಾರಿಗೆ ಇಲಾಖೆ
TRANSPORT DEPARTMENT

At the outset, I extend my warm greetings and it gives me great pleasure to share my views in the Road safety and Injury Surveillance Report being brought out by NIMHANS.

An efficient transport system is the first step in the direction of building a stable and secure State contributing towards economic and cultural ties. Roads and Transport System not only binds people but also plays a crucial role in nation building process.

Road safety is a process and transport department is a major partner in this process. The transport department is building driving tracks in all its regional transport offices to ensure objectivity in testing driving licence aspirants.

The Transport Department aims to establish the following:

- Institute of Drivers Training & Research (IDTR) to impart scientific training especially to drivers transporting hazardous goods to ensure Road Safety.
- Automated vehicle testing centre for issue of fitness certificate to vehicles.
- Electronic driving track for stringent testing before issue of driving licences.
- Networking of emission testing centres to monitor air and noise pollution for cleaner and greener environment.

These developments would yield the desired results if civil infrastructure, like wide Roads, multi-lane roads with dividers, safe pedestrian crosses & improvement in public transport are also brought about by other departments. We in the department, place road safety high on our agenda and wish to undertake all activities for saving lives and prevent injuries.

We extend our whole hearted co-operation to the Bangalore Road safety and Injury Prevention Programme, initiated by NIMHANS along with all other partners.

Bhaskar Rao, IPS,
Commissioner for Transport & Road Safety,
Government of Karnataka

Acknowledgements

The Bengaluru Road Safety and Injury Prevention Programme is a large collaborative and partnership programme with the participation of Bengaluru city police, 30 leading hospitals, Bengaluru Metropolitan Transport Corporation, Bruhat Bengaluru Mahanagara Palike and NGO's. Nearly 500 people from all these organisations have taken keen interest and participated in several activities during 2008 and 2009. Listing all individual names will run into several pages, but we would like to place our immense gratitude to all for building this partnership programme. Specially, thanks to all heads of institutions and nodal officers for taking leadership role in their respective organisations.

Thanks to Prof. D. Nagaraja, Former Director / Vice Chancellor and Prof.S.K.Shankar, Director/Vice Chancellor of NIMHANS for extending all support and encouragement along with taking keen interest in the programme.

Sincere thanks to World Health Organisation, India country office and Indian Council of Medical Research (Department of Health Research, Ministry of Health and family welfare, Government of India) for facilitating Phase 1 of the programme. We are thankful to Dr. Bela Shah, Deputy Director General, Indian Council of Medical research and Dr. J S. Thakur, Cluster focal person for NCDs in WHO, India office, for all help and support in developing the programme. Our sincere thanks to Dr.Margie Peden, Coordinator, Department of Violence and Injury Prevention, World Health organisation, Geneva, and, Dr. Ann Dellinger of the Epidemiology Division of Centre for Disease Control and prevention, Atlanta, USA for all support and encouragement.

We are immensely thankful to Sri. Sanjay Sahay, IGP, State Crime Records Bureau, Sri. Shankar Bidari, Commissioner of Police; Sri Praveen Sood and Sri. M.R. Pujar - Additional Commissioners of Police, Sri. Bhaskar Rao - Commissioner for Transport ; Sri Govinda Raju, Special Commissioner of BBMP; Sri. Zameer pasha, Managing Director of BMTC for all help and support. We thank all their staff for taking keen interest in all activities under the programme.

Special thanks to all our field coordinators (Sri. Manjunath and Sri. Lokesh) and all our field research officers spending tireless hours in police stations and casualty departments of hospitals in facilitating data collection. Sincere thanks to my colleagues Dr. Girish N Rao and Dr. G. Kavita Rajesh for all help from the beginning of the programme. Thanks to Sri. Girish BG and Sri.Chandrashekar for efficient data management and analysis.

Executive Summary

The city of Bengaluru has changed phenomenally during the last decade. The "peaceful and cosy Bengaluru" of 90's has changed to a "Bruhat Bengaluru" in 2010, embracing a population of more than 8 million into its day to day activities. As a senior citizen remarked "the city is a living testimony to what technological and socioeconomic changes can make for a one time peaceful city". The city takes pride in many positive developments of education, information technology, raising living standards, vibrancy and hope for millions. At the same time, the dark side of this growth and development are also serious issues for city planners and administrators.

With marginal and gradual decline of communicable and infectious diseases, injuries, hitherto, referred to as accidents, have emerged as a major public health problem in the country. Injuries have only moved from fifth or third pages of our newspapers to the front page. All television channels continuously beam episode after episode of violence and injury throughout the day; most of the times, the "Breaking news" is nothing but deaths and injuries among people. Even though there is regular public outrage on these issues, injuries are only increasing day after day. Commonly, these are considered as accidents, events due to bad times, or simply act of fate. High Income Countries (HICs) of the world had similar understanding of injuries and were doing, what we are doing today in 1960's and 70's. Research, knowledge, evidence and data changed this understanding and resulted in significant changes in the way problems were addressed. Today, it is well acknowledged that injuries are predictable and preventable.

This knowledge and information came from years of research that resulted in a better understanding of injury phenomenon in terms of burden, characteristics, causes, risk factors, determinants, impact and outcome. Surveillance is one such activity that will help in recognizing the burden of injuries, identifying broad risk factors and causes, prioritizing activities, monitoring and evaluating interventions, capacity development, and stimulating further research. Even though India has considerable experience in Communicable Disease (CD) surveillance, Injury and Road Traffic Injury surveillance are new and its importance is only recently gaining recognition.

Bengaluru Road Safety and Injury Prevention Programme is a collaborative programme between National Institute of Mental Health & Neuro Sciences, Bengaluru City Police, 30 leading health care institutions, Bengaluru Metropolitan Transport Corporation, Bruhat Bengaluru Mahanagara Palike and was facilitated by Indian Council of Medical Research and WHO, India office in 2008. The programme aims at reducing / preventing injuries, improving trauma care and strengthening rehabilitation services using a surveillance approach.

The programme started in 2008 began on a surveillance basis, and has become an ongoing and a continuous activity. In 2008, the major focus was on developing systematic mechanisms for uniform and standardised

data collection from all partner institutions. This phase streamlined number of discrepancies and a systematic approach was developed. Surveillance was developed with available resources and within existing systems along with appropriate strengthening at different levels.

Information gathered during 2009 reveals that - nearly 4,500 individuals died and more than 100,000 were hospitalised due to an injury in the city. Majority of those killed and injured were in younger age groups of 16 to 45 years and predominantly men. Road traffic injuries and suicides are two major injury problems in the city of Bengaluru. Pedestrians, two wheeler riders and pillions, and pedal cyclists were involved in greater numbers. Suicides were commonly due to consumption of organophosphorus compounds and drugs, occurring at a time when the person was alone and at home. Burns, poisoning, falls were other major injuries responsible for deaths and hospitalisations. Trauma care was found to be inadequate and poor requiring immediate strengthening.

In 2009, the major emphasis was on application and utilisation of data to develop programmes, and to provide inputs for policies and programmes. Systematic applications of data can always make a difference to strengthen activities. Number of inputs has been provided for regulatory, engineering, educational and other activities during 2009. Discussions with policymakers and professionals have indicated that the data developed will be useful to develop new activities as well as monitor existing programmes.

It is hoped that 2010 will see a combination of data gathering and data application and also development of focussed activities. Plans are already afoot in this direction. Using surveillance as the first level of activity, additional research activities such as trauma registries, risk factors studies, and multidisciplinary crash and injury investigations are being considered. Capacity development of all sectors related to road safety and injury prevention along with other focussed interventions are planned for 2010 and the coming years. Injury/RTI surveillance data will be a useful tool in the prioritisation process, resource allocation, and monitoring ongoing activities. There are several opportunities to develop and use data to develop scientific programmes for injury prevention and control. It is hoped that this experience and learning will help professionals across the country to initiate activities for road safety and injury prevention on a scientific basis using evidence based approaches. Recognition of the problem, administrative support, training of personnel, monitoring and regular feedback, availability of resources and, most importantly, cooperation of all partners will be the building blocks for our future activities.

Preventing road crashes, suicides and other injuries requires a "proactive approach" rather than a "reactive approach". It requires action to be taken by police, transport, health, urban - rural development, land development authorities, product and vehicle manufacturers, civic authorities, NGOs, public, media and others to see that these injuries do not occur; even if it occurs, it should not lead to deaths and disabilities. Information - data - and evidence is a powerful tool in this process to bring people together for collective actions.

Section A

Understanding Injury & Programme description

Bengaluru Road Safety and Injury Prevention Programme is a collaborative programme between 30 hospitals, Bengaluru City Police, Bengaluru Metropolitan Transport Corporation, Bruhat Bengaluru Mahanagara Palike and was facilitated by Indian Council of Medical Research and WHO, India office in 2008. The programme is coordinated by the WHO Collaborating Centre and the department of Epidemiology at NIMHANS. The programme aims at reducing / preventing road traffic injuries, suicides and other injuries, improving trauma care and strengthening rehabilitation services using a surveillance approach.

Section A

Understanding Injury & Programme description

Bengaluru Road Safety and Injury Prevention Programme is a collaborative programme between 30 hospitals, Bengaluru City Police, Bengaluru Metropolitan Transport Corporation, Bruhat Bengaluru Mahanagara Palike and was facilitated by Indian Council of Medical Research and WHO, India office in 2008. The programme is coordinated by the WHO Collaborating Centre and the department of Epidemiology at NIMHANS. The programme aims at reducing / preventing road traffic injuries, suicides and other injuries, improving trauma care and strengthening rehabilitation services using a surveillance approach.

A1. Introduction

The "Incredible India" is on the move and changing at a fast pace. In recent years, we have witnessed an increase in motorization, industrialization, migration, urbanization and feeling the impact of overall globalisation. The influence of print and visual media is also much larger today, compared to the past. Consequently, our life styles along with habits and value systems are changing fast.

This change has seen a decline of some communicable diseases, while Noncommunicable diseases and injuries are on the increase. In this changing scenario, Injury and violence is a leading cause of death and disability. This change is palpable across the country and Bengaluru is no exception to this change.

Everyday, we read, listen or witness, injuries in our day to day lives. Over time, it has moved from 5th to 3rd to 1st page of our newspapers. Some days, it is not uncommon to see the entire page of our newspapers filled with news about injury and violence. On television channels, even on prime time, injury and violence has occupied the centre stage. Many times, the "Breaking News" is only deaths due to road crashes, suicides, mass burns and blood loaded violence. It has become common to see blood and broken limbs on our roads, at homes or in work places. No single day passes in our lives without injuries making a direct or indirect appearance.

Naturally so, because, Injuries are common and affect all people, more so the productive age groups and sections of our society. Road traffic injuries, falls, burns, poisoning, occupational / work related injuries, suicides, violence / assault and animal bites are all common injuries. Individuals in 5-44 years and men are affected most. Greater vulnerability is seen among people in middle and lower income strata of society and injuries make them poorer further due to its economic impact and lack of access to quality care. The maximum brunt of injuries is felt by the health sector as it has to provide care for affected individuals and families. As India is yet to recognise injury and violence as a public health problem, there are no visible policies and programmes to effectively address this problem. Injury prevention and control in India is publicly glaring, politically invisible and professionally missing.

It is only recently, injuries are acknowledged as a major killer in our society, more through media and occasionally (now becoming frequent) in professional circles. Systematic and scientific efforts in injury prevention and control are yet to begin. Among several injuries, Road traffic Injuries (RTIs) and suicides have been recognised as major injury problems. As injuries are linked to number of sociocultural issues and happen at individual and family level, they are treated as individual issues. As police and judiciary are involved, they are considered as police and legal problems. Since everyone uses roads and vehicles, they have become road and transport problems. With its relation to infrastructure development and expansion, they are urban problems. Despite the health sector bearing the maximum impact due to policies and programmes of other sectors, they are still not considered as public health problems.

While injuries have declined in many developed parts of the world, it has been steadily rising in India. The need to adopt and suitably modify lessons from HICs is crucial for injury prevention and control in India to avoid repetition of mistakes and to make appropriate decisions by recognition of principles. The last four decades of research and policy developments across the world have shown that injuries are predictable, preventable, and needs a systems approach. Due to non-recognition of the problem and absence of coordinated, integrated and intersectoral approaches, injury prevention and control is at cross roads and without direction in India.

Recognition of the problem requires good quality, reliable and representative information; and this is vital to formulate injury prevention programmes. Injury prevention and control should be evidence based and data driven. However, in India, comprehensive information is often lacking or, at best, patchy. Though police data on injuries are available to a limited extent, health sector information has been totally missing. Further, even the collected information is not systematically and scientifically analysed to develop a better understanding of injury pattern, profile and determinants. The available data are not

aptly utilized in policy and programme development. Nevertheless, the scenario has begun to change and time is appropriate to give a major push and direction for this area.

There have been several initiatives at different levels in India to address the growing problem, and some of this is happening in the area of road safety. International and national developments have paved the way for this change. The World report on Road Traffic Injury Prevention (1), World report on Violence & Health (2) and few national reports (3, 4, 5) have brought to light a number of activities to be undertaken for control of injuries. Road Traffic injury surveillance initiatives in 2007 / 08 in select cities of India on a pilot basis by the Indian Council of Medical Research (6), activities in suicide and violence prevention, an active judiciary and NGO network, report of the National Commission on Farmers (http://krishakayog.gov.in/) and Prevention of Domestic Violence Act (http://ncw.nic.in/DomesticViolenceBill2005.pdf) are some examples. Although road safety has been acknowledged as an important issue in many states and cities, other safety issues like home safety, work safety, safety aspects at public places etc. have not been given due importance and also need to be addressed.

With this in view, the present Bengaluru Road safety and Injury Prevention programme was initiated in 2008 to develop systematic activities in prevention, trauma care and rehabilitation programme for RTIs and other injuries based on data and evidence.

A 1.1 Injuries are biomechanical in nature and not accidents

Historically, injuries have always been referred to as accidents and the term "accident" implies the inevitable nature of the event and connotes that nothing can be done about it. 'Injury' by definition means that there is a body lesion due to an external cause, either intentional or unintentional, resulting from a sudden exposure to energy (mechanical, electrical, thermal, chemical or radiant) generared by agent - host and environmental interaction (9). When this generated energy is transferred and exceeds the physiological tolerance of an individual it leads to tissue damage. Apart from this, injury can also occur due to the sudden withdrawal of a vital requirement of the body like oxygen in case of drowning, asphyxiation etc. In short, injury is the damage caused to the body due to a rapid and sudden exposure to energy beyond his / her tolerance levels. It is an acute event, occurs in varying severities and with chances of repeated occurrence. Prevention of injuries is possible by acting on one or all three areas of this interaction and thus can be modified, predicted, and prevented.

A 1.2 Injuries can be classified

Firstly, injuries are classified as intentional, unintentional and undetermined injuries, based on intent of injury occurrence. Unintentional injuries are also referred to as accidental injuries though not really accidental in nature, while intentional injuries are self-inflicted or caused by others. The latter include suicides, homicides, injuries due to violence against women, children and elderly, those due to wars, riots and conflicts, etc.,

A second common method of classifying injuries is according to the mechanism which caused the injury, like road traffic crashes, poisoning, falls, fires/burns, drowning, fall of external objects and others.

A third method of classifying injuries is according to place of occurrence like road injuries, home injuries, sports injuries and work related injuries based on place of occurrence of injury.

The fourth method is based on anatomical types and location of injuries depending on body organs injured like head injuries, facial injuries, injury to long bones etc. The nature and type of injuries are documented as fractures, contusions, haemorrhage for care and management.

International Classification of Diseases (11) and International Classification of External Causes of Injuries (12) are commonly used for systematic and scientific classification of injuries all over the world. A particular classification chosen is primarily determined by the purpose of a (or more) programme(s), research focus and availability of resources. Commonly, the first three methods (viz., intent, mechanism, and place) are preferred for prevention, as changes can be made in products and environment, and injury occurrence can be prevented for future.

Some of the professional concerns that have been raised about lay beliefs in the field of modern injury control have not held up to scientific scrutiny. One example has to do with the word "accident". For the last few decades of the twentieth century, national and international safety advocates lamented the public's persistent use of that term.

The magnitude of the automotive injury problem in the pediatric population remains as great as it is largely because of the perpetuation of a societal ethic that automotive injuries are accidents. The word accident suggests that the injury event was determined by fate and, therefore, was unpredictable and unavoidable [Rosenberg, Rodriguez, & Chobra 1990, p.1086].

The most important reason for this delay in the use of science to control injuries, and one which persists to some degree even today, is the sense of fatalism towards trauma. Injuries are still called accidents.... [Rivara, 2001, p.3].

The term accident has been banned by the U.S. National Highway Traffic Safety Administration (National Highway Traffic safety Administration, 1997), as well as the British Medical Journal (Davis & Pless, 2001). At meetings of injury control professionals, audiences have been known to hiss, if an invited speaker from another field inadvertently included the word in his or her remarks. In 1996, I addressed this issue by fielding a national random-digit-dialled telephone survey that assessed adult in interpretation of the word accident.Eighty-three percent of respondents associated preventability with the term (Girasek, 1999). Scores of studies have now established that most adults believe a majority of accidents and injuries are preventable (Chiappone & Kroes, 1979; Colver, Hutchinson, & Judson, 1982; Duan, 2004; Green, 1997; Hooper, Coggan, & Adams, 2003; Hu, Wesson, Parkin, & Rootman, 1996; Roberts, Smith, & Bryce, 1995).

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A2. Understanding injuries is the basis for preventive strategies

Historically, in 1970, William Haddon Jr., proposed a matrix for consideration of all factors involved in injury causation at different time periods and at various levels (13). This involved identifying what can be done for people, products and the environment before injury, during an injury and after its occurrence (Table 1). This concept has revolutionized injury prevention since 1970s all over the world, and can be used to analyze any type of injury, identify interventions that might prevent such an event from happening again or reducing the harm done.

Injuries occur due to a combination of agent, host, vector and environment factors. The epidemiological triad of agent, host and environment has been used in our understanding of communicable diseases earlier, and injuries too have similar dimensions like any other public health problem. There is a clear need to understand injury mechanisms to develop intervention programmes.

Figure 1: Epidemiological model of an injury caused by a motorcycle collision

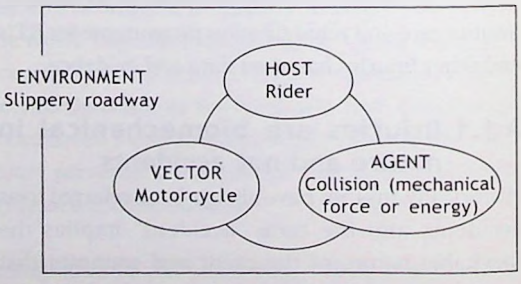

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Table 1 shows the case of an injury to a motorcycle rider involved in a motorcycle collision. Here, the host is the rider, vector is a motorcycle, agent is the mechanical force or energy and environment is the road. Similarly, in an act of interpersonal domestic violence in which a man causes injury to his wife, the host is the injured person, the agent is the energy (physical assault), the vector is also the person inflicting injury and, the environment include

domestic situation and societal norms and values that allow for such behaviours to occur.

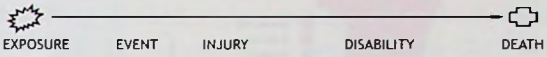
Using a model of this type helps in identifying factors involved in an injury. This would help policymakers, professionals, product manufacturers and others to identify situations and target interventions to prevent such injuries from happening in the future or reduce the harm done when they happen. For instance, in the first example, there may be factors about the rider, the motorcycle or the road that contributed to the crash. One or more of these can be changed in order to prevent such incidents in the future. Interventions that might be done by thinking about these elements. These can include implementing helmet & drink drive laws, reducing speeds, increasing visibility of two-wheelers and/or riders, strengthening brake & light systems, improving pre hospital & emergency care and overall safety improvement of roads and others.

Table 1: Example of Haddon's matrix as applied to two wheeler road traffic injury

	Human	Vehicle	Environment
Pre-event	Increase awareness about helmet wearing, drink driving, safe driving, etc.	Increase visibility of vehicle	Implement safety features on roads
Event	Early transfer to hospital and required care	Better braking systems of two wheelers	Crash protective road side stationary objects
Post-event	Rehabilitate and improve health care services	Improve safety technologies and compo-nents	Facilities for early rescue of injured persons

Use of injury spectrum is another useful method to understand injuries. This method (figure 2) maps an injury over time, starting with its exposure, followed by the event, through the occurrence of injury time finally resulting in disability or death. Understanding this time spectrum can help in developing interventions that can either prevent injury or lessen the impact of injury.

Figure 2: The injury spectrum



Based on this understanding, injury prevention and control is broadly classified as primary prevention, secondary prevention and tertiary prevention. Primary prevention involves preventing the event from occurring or preventing it from leading to injuries. This involves taking all necessary steps to see that injuries do not happen and includes all activities that are done to make people, products and their environment safer. Secondary prevention involves early diagnosis and appropriate management of an injury. Most of the times health professionals are involved in providing care and services for injured people. This includes all activities right from application of basic first aid at the place of injury to stopping an injury from having serious consequences. Tertiary prevention aims at improving the final outcome and involves preventing further complications through rehabilitation programmes.

A3. Injury in India

The National Crime Records Bureau (NCRB) at national level (15), state crime records bureau at the state level, district and city bureaus at district and city levels, respectively, are designated official agencies in India for collecting, compiling and disseminating injury data in India. Since majority of injuries and injury deaths are considered as medico legal events, they are commonly reported to police.

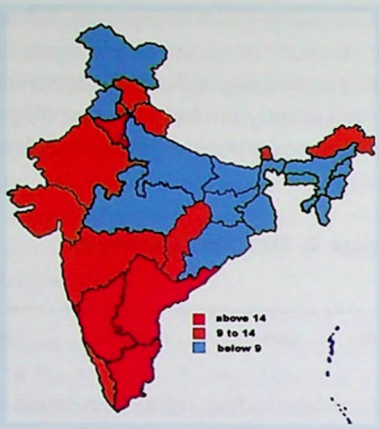
A 3.1 National reports

As per NCRB 2008 nearly 485,008 injury deaths and 2.4 million injuries were reported in India in 2008. RTIs and suicides, being 2 major injuries, accounted for 118,239 and 125,017 deaths, respectively. Southern Indian states reported higher number of deaths, reasons for which can be several varying from increased occurrence to better reporting systems and reasons are not clearly delineated.

A 3.2 Million Death study

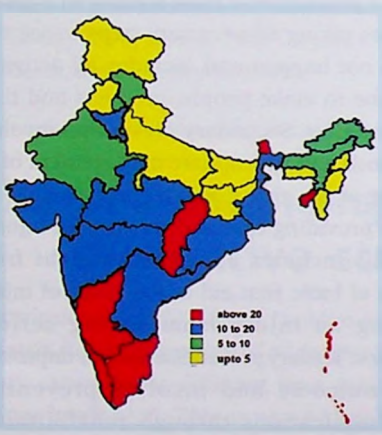
The million death study report based on the special survey of deaths carried out under Sample Registration System (SRS) provides comprehensive details of deaths in India (16). The causes, based on

Figure 3: State wise distribution of RTIs in India, 2008
(Rate / 100,000 population; National average 10.8/ population)



State	Rate	State	Rate
Goa	20.3	Madhya Pradesh	10.8
Haryana	19.6	Arunachal Pradesh	10.4
Tamil Nadu	19.2	Mizoram	8.0
Andhra Pradesh	17.2	Jammu & Kashmir	7.8
Karnataka	15.3	Orissa	7.8
Chandigarh	13.6	Punjab	7.7
Chhattisgarh	13.6	Uttar Pradesh	6.3
Sikkim	13.2	Tripura	6.3
Rajasthan	12.9	Meghalaya	5.8
Delhi	12.2	Assam	5.7
Himachal Pradesh	12.1	West Bengal	5.4
Maharashtra	12.1	Nagaland	5.3
Kerala	11.5	Jharkhand	5.2
Gujarat	11.3	Manipur	5.0
Uttaranchal	11.2	Bihar	3.7

Figure 4: State wise distribution of Suicides in India, 2008
National Average - 10.8/100,000 population



State	Rate/100,000	State	Rate/100,000
Sikkim	48.2	Himachal Pradesh	9.6
Kerala	25	Arunachal Pradesh	9.1
Tamil Nadu	21.7	Rajasthan	7.9
Tripura	21.3	Chandigarh	7.7
Karnataka	21.2	Delhi	7.6
Chhattisgarh	20.8	Mizoram	4.2
Goa	17.5	Meghalaya	3.3
Andhra Pradesh	17.4	Punjab	3.3
West Bengal	16.8	Jharkhand	3
Maharashtra	13.4	Jammu & Kashmir	2.5
Orissa	12.2	Uttar Pradesh	2.1
Haryana	11.1	Uttaranchal	2
Gujarat	10.9	Nagaland	1.9
Madhya Pradesh	10.9	Manipur	1.3
Assam	9.9	Bihar	1.1

Verbal autopsy techniques referred to as "RHIME" or Representative, Re-sampled, Routine Household Interview of Mortality with Medical Evaluation method adapted a well defined and established methodology. The assignment of cause of death was done through a process of medical evaluation by two independent trained physicians.

In total, NCDs were the leading causes of death in the country for 42% of all deaths. Communicable diseases, maternal, perinatal and nutritional constituted 38% of the deaths. Injuries, of both intentional and unintentional types, contribute for a total of 10 % of deaths. Several ill-defined causes for which causes were difficult to determine account for 10% of deaths. Injuries are one among the top ten leading causes of death, with similar number of deaths in both urban and rural areas, even though specific conditions vary.

An interesting finding from the study is the high deaths due to injuries in the younger age group of 15-24 years. Deaths in this age group are due to road traffic injuries, intentional self-harm and other un-intentional injuries. Every 3rd death in this age group is due to an injury. Motor vehicle crashes were high among men, while suicides were more among women.

A 3.3 WHO estimates

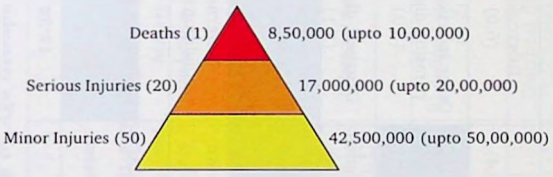
As per the Global Burden of Disease study report, there were 1,117,000 deaths due to injuries in India contributing for an estimated 10.8% of deaths in 2005 (17). It is estimated that RTIs and suicides

contributed for 202000 and 188000 deaths, respectively. Nearly 66.7% of deaths occurred in younger age groups, predominantly among men.

A 3.4 Independent studies

A recent national review (17) has estimated that a million injury deaths and 30 million hospitalizations occur every year. The review highlighted and estimated that in 2005, 8, 50,000 (nearly a million) persons lost their lives and 17,000,000 hospitalized (Figure 5). If unchecked, numbers are likely to increase to 1,200,000 deaths and 24,000,000 hospitalizations of serious injuries by 2015. Road traffic Injuries, suicides, burns, poisoning, violence are all major causes of deaths and disabilities. Recent studies (18,19,20) using verbal autopsy methods have shown that injury deaths contribute for 13–18% of total deaths varying from place to place.

Figure 5: India Injury Pyramid, 2005



Limited studies have been undertaken in recent years by individual researchers. A summary of Indian studies is available in the report entitled "Injuries in India: A National Perspective" (17). In Bengaluru, few studies have been undertaken by NIMHANS on epidemiological, preventive and public health aspects of road traffic injuries, brain injuries, suicides and violence (www.nimhans.kar.nic.in/epidem/WHO). In New Delhi, TRIPP at IIT has made significant contributions in road safety and transport management (http://web.iitd.ac.in/~tripp/). Few medical colleges and engineering and transport departments have also undertaken studies in their respective areas of interest. Individual researchers have also undertaken studies on Road traffic Injuries (20, 21), suicides (23) and violence (24). A few national studies and surveys have been carried out by Ministries (25). Studies and reports available from independent agencies like WHO, World Bank, IndiaClen, NGO's and other agencies have added substantial information. However, these have been stand alone - one time studies and provided useful information for policy making process and to recommend interventions. Regular, continuous and timely information has not been available for any Indian city or for the country. The Bangalore Road safety and Injury Prevention Programme is the first of its kind being undertaken in India . Details of the programme are available at http://www.nimhans.kar.nic.in/epidemiology/bisp/sr1.pdf and in the recently published report from Indian Council of Medical Research (6).

A4. Injury in Karnataka

As per data from NCRB, a total of 12,222 suicides and 8,814 RTI deaths followed by 1,844 homicidal deaths were reported for the year 2008 in Karnataka. In the same year, 184,226 persons were injured as per police reports with a ratio of nearly 1:6.

A5. Underreporting of Injuries

Injuries are underreported in all parts of the world (26) due to several reasons. In India, while official statistics are able to capture large majority of deaths, non-fatal injuries of various severities are highly underreported. For each death from injury, there are many more injures that result in hospitalization, treatment in emergency departments or treatment by practitioners in formal and/or informal health sectors. Data from HICs & studies from India indicate that for every person killed by injury, approximately 30 persons are hospitalized and roughly 50 - 100 more are treated in hospital emergency rooms (1, 17). Studies in Bengaluru and Haryana have shown that injury problems are much higher in the community than officially reported figures (26, 27). Thus, it is essential to realise that in the country, number of deaths due to injuries could be much higher than official figures.

Table 2: Top 10 causes of death by Age Groups in India: Male

Rank	<1	1-4	0-4	5-14	15-24	25-69	70+	All Ages
1	Perinatal conditions (49.2)	Diarrheal diseases (22.0)	Perinatal conditions (36.9)	Unintentional injuries: Other (19.4)	Unintentional injuries: Other (14.7)	Cardiovascular diseases (26.3)	Cardiovascular diseases (26.5)	Cardiovascular diseases (20.3)
2	Respiratory infection (20.5)	Respiratory Infections 21.4)	Respiratory infections (20.7)	Diarrheal diseases (15.2)	Intentional self-harm (14.3)	Tuberculosis (11.4)	COPD, asthma, other respiratory diseases (15.7)	COPD, asthma, other respiratory diseases (9.3)
3	Diarrheal diseases (9.0)	Other infectious and parasitic diseases (15.5)	Diarrheal diseases (12.3)	Other infectious and parasitic diseases (13,5)	Motor vehicle accidents :; ;;, (12.4)	COPD, asthma, other respiratory diseases (10.1)	Senility (13.1)	Tuberculosis (7.1)
4	Other infectious and parasitic diseases (7.9)	Unintentional injuries: Other (9.3)	Other infectious and parasitic diseases (9.8)	Respiratory infections (8.4)	Ill-defined conditions (7.2)	Malignant and other neoplasms (7.8)	Diarrheal diseases (7.3)	Diarrheal diseases (6.7)
5	Congenital anomalies (3.4)	Malaria (6.6)	Ill-defined conditions (3.5)	Malaria (8.1)	Cardiovascular diseases (6.3)	Digestive diseases (6.1)	Malignant and other neoplasms (4.6)	Perinatal conditions (6.4)
6	Ill defined conditions (2.9)	Ill defined conditions (5.3)	Uninrentional injuries: Other (3.4)	Ill-defined conditions (5.4)	Tuberculosis (6.0)	Unintentional injuries: Other (5.0)	Tuberculosis (4.5)	Respiratory infections (5.4)
7	Nutritional deficiencies (1.8)	Nutritional deficiencies (4.3)	Congenital anomalies (3.0)	Motor vehicle accidents (5.3)	Other infectious and parasitic diseases (5.2)	Ill-defined conditions (4.8)	Ill-defined conditions (4.4)	Malignant and other neoplasms (5.4)
8	Unintentional injuries: Other (1.5)	Fever of Unknown Origin (3.1)	Nutritional deficiencies (2.4)	Malignant and other neoplasms (3.8)	Diarrheal diseases (5.1)	Diarrheal diseases (4.0)	Unintentional injuries: Other (3.7)	Unintentional injuries: Other (5.2)
9	Malaria (0.9)	Congenital Anomalies (1.9)	Malaria (2.4)	Digestive diseases (2.9)	Malaria (4.8)	Intentional self-harm (3.3)	Respiratory infections (3.4)	Ill-defined conditions (4.6)
10	Fever of unknown origin (0.9)	Digestive Diseases (1.6)	Fever of unknown origin (1.5)	Fever of unknown origin (2.5)	Maternal conditions (-)	Malaria (2.4)	Fever of unknown origin (2.8)	Senility (4.0)

Ref: http://cghr.org/publications/FINAL%20REPORT-Millon% 20Death%20study%202001-2003%20-phase%201.pdf

Table 3:Top 10 causes of death by Age Groups in India: Female

Rank	<1	1-4	0-4	5-14	15-24	25-69	70+	All Ages
1	Perinatal conditions (43.1)	Diarrheal diseases (25.2)	Perinatal conditions (29.2)	Diarrheal diseases (19.6)	Intentional self-harm (16.9)	Cardiovascular diseases (22.5)	Cardiovascular diseases (24.8)	Cardiovascular diseases (16.9)
2	Respiratory infection (23.3)	Respiratory Infections (23.3)	Respiratory infections (23.3)	Other infectious and parasitic diseases (16.7)	Maternal conditions (12.6)	Malignant and other neoplasms (11.8)	Senility (18.4)	Diarrheal diseases (9.9)
3	Diarrheal Diseases (10.6)	Other infectious and parasitic diseases (16.2)	Diarrheal diseases (15.3)	Unintentional injuries: Other (12.0)	Unintentional injuries: Other (9.1)	COPD, asthma, other respiratory diseases (10.4)	COPD, asthma, other respiratory diseases (12.4)	COPD, asthma, other respiratory diseases (8.0)
4	Other infectious and parasitic diseases (8.8)	Malaria (6.6)	Other infectious and parasitic diseases (11.2)	Respiratory infections (11.1)	Tuberculosis (7.5)	Tuberculosis (8.3)	Diarrheal diseases (9.8)	Respiratory infections (7.1)
5	Ill defined conditions (3.2)	Unintentional injuries: Other (6.2)	Ill-defined conditions (3.4)	Malaria (10.7)	Ill-defined conditions (7.2)	Diarrheal diseases (6.6)	Unintentional injuries: Other (4.6)	Senility (6.5)
6	Congenital anomalies (2.8)	Nutritional deficiencies (5.1)	Nutritional deficiencies (3.2)	Ill-defined conditions (4.6)	Diarrheal diseases (7.2)	Ill-defined conditions (6.0)	Ill-defined conditions (4.5)	Perinatal conditions (6.2)
7	Nutritional deficiencies (2.3)	Ill defined conditions (3.9)	Malaria (3.0)	Fever of unknown origin (3.3)	Cardiovascular diseases (6.3)	Unintentional injuries: Other (4.1)	Fever of unknown origin (3.9)	Malignant and other neoplasms (6.0)
8	Unintentional injuries: Other (1.3)	Fever of Unknown Origin (3.1)	Unintentional injuries: Other (2.9)	Digestive diseases (2.8)	Malaria (4.6)	Digestive diseases (3.5)	Malignant and other neoplasms (3.5)	Ill-defined conditions (5.0)
9	Malaria (1.3)	Digestive diseases (1.8)	Congenital anomalies (2.3)	Motor vehicle accidents (2.1)	Other infectious and parasitic diseases (4.4)	Malaria (3.4)	Respiratory infections (3.4)	Tuberculosis (4.7)
10	Fever of unknown origin (0.9)	Congenital anomalies (1.3)	Fever of unknown origin (1.6)	Malignant and other neoplasms (2.0)	Motor vehicle accidents (1.7)	Intentional self-harm (2.6)	Tuberculosis (2.6)	Unintentional injuries: Other (4.5)

Ref: http://cghr.org/publications/FINAL%20REPORT-Millon% 20Death%20study%202001-2003%20-phase%201.pdf

Table 4: Top 10 causes of death by Age Groups in India; Person

Rank	<1	1-4	0-4	5-14	15-24	25-69	70+	All Ages
1	Perinatal conditions (46.3)	Diarrheal diseases (23.8)	Perinatal conditions (33.1)	Diarrheal diseases (17.4)	Intentional self-harm (15.6)	Cardiovascular diseases (24.8)	Cardiovascular diseases (25.7)	Cardiovascular diseases (18.8)
2	*Respiratory* infection (21.8)	*Respiratory* Infections (22.5)	Respiratory infections (22.0)	Unintentional injuries: Other (15.7)	Unintentional injuries: Other (11. 8)	COPD, asthma, other respiratory diseases (10.2)	Senility (15.7)	COPD, asthma, other respiratory diseases (8.7)
3	Diarrheal diseases (9.7)	Other infectious and parasitic diseases (15.9)	Diarrheal diseases (13.8)	Other infectious and parasitic diseases (15.1)	Ill-defined conditions (7.2)	Tuberculosis (10.1)	COPD, asthma, other respiratory diseases (14.1)	Diarrheal diseases (8.1)
4	Other infectious and parasitic diseases (8.3)	Unintentional injuries: Other (7.5)	Other infectious and parasitic diseases (10.5)	Respiratory infections (9.7)	Motor vehicle accidents (6.9)	Malignant and other neoplasms (9.4)	Diarrheal diseases (8.5)	Perinatal conditions (6.3)
5	Congenital anomalies (3.1)	Malaria (6.6)	Ill-defined conditions (3.4)	Malaria (9.4)	Tuberculosis (6.8)	Ill-defined conditions (5.3)	Ill-defined conditions (4.4)	Respiratory infections (6.2)
6	III defined conditions (3.0)	Nutritional Deficiencies (4.8)	Unintentional injuries: Other (3.2)	Ill-defined conditions (5.0)	Maternal conditions (6.5)	Digestive diseases; (5'1>	Malignant and other neoplasms (4.1)	Tuberculosis (6.0)
7	Nutritional deficiencies (2.0)	III defined conditions (4.5)	Nutritional deficiencies (2.8)	Motor vehicle accidents (3.7)	Cardiovascular diseases (6.3)	Diarrheal diseases (5.0)	Unintentional injuries: Other (4.1)	Malignant and other neoplasms (5.7)
8	Unintentional injuries: Other (1.4)	Fever of Unknown origin (3.1)	Malaria (2.7)	Malignant and other neoplasms (2.9)	Diarrheal diseases (6.2)	Unintentional injuries: Other (4.6)	Tuberculosis (3.6)	Senility (5.1)
9	Malaria (1.1)	Digestive diseases (1.7)	Congenital anomalies (2.7)	Digestive diseases (2.9)	Other infectious and parasitic diseases (4.8)	Intentional self-harm ' (3.0)	Respiratory infections (3.4)	Unintentional injuries: Other (4.9)
10	Fever of unknown origin (0.9)	Congenital anomalies (1.5)	Fever of unknown origin (1.5)	Fever of unknown origin (2.9)	Malaria (4.7)	Malaria (2.8)	Fever of unknown origin (3.3)	Ill-defined conditions (4.8)

Ref: http://cghr.org/publications/FINAL%20REPORT-Millon% 20Death%20study%202001-2003%20-phase%201.pdf

A6. Information requirements for injury prevention and control

Information available through national reports indicates the number of fatal and nonfatal injuries, age – sex profiles, state and city wise distribution, education and occupation levels, road user categories for RTIs and a vague distribution of causes. Information reported is based on information received from different places. Detailed examination into some of this data reveals that much of the required information (especially with causes or risk factors) is unavailable or remains unclassified.

In India, as RTIs and other injuries are medico legal events, a lot of information is collected in detail as part of routine police investigation. However, the collected information is not used for prevention and control, but more for administrative and legal purposes. Numbers are also collected by different agencies like transport department, City Corporation and others for their own use. In addition, total information is not available in the public domain for researchers and policy analysts. Thus, information is piecemeal, fragmented and not integrated.

To formulate effective injury prevention and control (IPC) programmes, information is required on what types of injuries are occurring? Who are the affected people? What are their characteristics? Where are injuries occurring? How are injuries occurring? What are the risk factors and causes? What are the agent – host – environment factors that can be modified? and other detailed information. This is a similar understanding developed for many other public health problems like malaria, tuberculosis, HIV/Aids and others. This will facilitate designing programmes for prevention, improving trauma care and rehabilitation in IPC activities.

A7. A Surveillance approach

"Surveillance" is a public health activity, referring to ongoing, continuous and systematic collection, analysis, interpretation and dissemination of health information (14). Injury surveillance, in a similar context refers to collection, analysis, interpretation and dissemination of injury data with the overall aim of developing policies and programmes for effective prevention and control of injuries. It includes gathering information on individual cases or assembling information from records, analyzing and interpreting information, reporting and providing feedback into programmes. Surveillance is a continuous activity with an inbuilt feedback mechanism and an action component. It helps in recognising existing and changing burden and pattern of injuries, identifying new / emerging problems, prioritising and selecting interventions and measuring the impact of interventions in a timely manner. Surveillance data can be a meaningful input to several programmes and activities of various ministries, government departments, health professionals, transport, police, NGOs, and all others interested in injury prevention.

Importance of injury surveillance

Reliable information on the burden, pattern, trends and causes of injuries are required to develop systematic policies, programmes and interventions. In India, lack of reliable information on injury burden & impact has been one of the major barriers for absence of systematic programmes for injury prevention and control. Consequently, ad hoc, and at times, unscientific interventions are proposed and implemented, and so far, these have not made any significant change. Injury problem has not been defined due to absence of systematic information. Systematic activities like allocation of resources, human resource and capacity development, systematic efforts for care and management, injury prevention interventions, and others have not received much importance. Hence, injuries have been a clearly neglected problem and a hidden epidemic for many decades, even though evidence exists that the burden is huge (17).

Surveillance generates data that helps in understanding the:

- Magnitude of the problem and its characteristics

- Changing trends
- Populations at risk
- General and select risk factors, and
- Impact of interventions

Local, regional and national injury surveillance systems can provide data required for planning and delivering effective injury prevention programmes to communities and to the country at large. It will help planners and administrators to take appropriate action on a continuous and regular basis. Further, it helps societies to advocate for positive changes that are required for safety of everyone.

- Often, it is thought that RTI / Injury surveillance requires building entirely new systems involving huge resources. This is not true. Alternatively, it can be built within existing systems using available resources. The existing systems and methods can be improved, strengthened and utilized to develop information that is required for injury prevention and control programmes.

Any surveillance programme has to be operational and sustainable, and hence, should be

- Simple
- Acceptable
- Sensitive
- Reliable
- Representative
- Sustainable
- Timely
- Cost effective and, most importantly,
- Useful

- It is crucial to highlight that injury surveillance provides broad and specific information (depending on the extent and depth of surveillance) and should be supplemented with data from focussed, targeted and specific studies (like trauma registries, risk factor studies etc.) to obtain further insights. Thus, injury surveillance is often the first step in the larger information systems.
- The essence of surveillance is to collect small quantities of good, reliable and useful information (by well defined methods) and apply it to develop policies, programmes and interventions.

Bengaluru Road safety and Injury Prevention Programme

Details of the surveillance programme undertaken in 2007 – 08 have been reported earlier and are available at http://www.nimhans.kar.nic.in/epidemiology/bisp/sr1.pdf and only salient points are highlighted below.

A8. Goals, purpose and objectives

The overall goal of BRSIPP is to achieve a reduction in injury (RTI and others) deaths, hospitalisations and disabilities in Bengaluru.

The purpose and objectives of Bengaluru Injury / Road traffic Injury Surveillance Programme are to:

- Collect and analyse data from selected participating health care institutions, police sources and transport sector on specific aspects of RTIs, sucides and other injuries.
- Facilitate application and utilization of data for planning and implementing intervention programmes through various policies and programmes.

A9. Preparatory Phase (March - June 2007)

Stake holder's involvement

All stakeholders in injury prevention and control including ministries of health, police, transport, urban and rural development, social welfare, education, industries and commerce, media, NGOs and others need to be involved in surveillance, prevention and control activities. In Bengaluru, stakeholders from - Police (Traffic, Crime and Law

and Order), Health (Directorate of Health Services, Directorate of Medical Education, officials from Integrated Disease Surveillance Programme and all hospital administrators), Heads of major hospitals (Directors, Chief Executive Officers, Senior administrators), Transport (transport department and Bengaluru Metropolitan Transport Corporation), Bruhat Bengaluru Mahanagara Palike, social welfare, urban development, National Highway Authority and Non-Governmental Organizations working with injury issues were contacted, sensitised and involved in the programme.

As it is an inter-sectoral and coordinated activity, stake holders contribution in terms of need for data, what type of data is required, how will it be collected , steps involved in the development and mechanisms of data collection and utilisation - application were discussed in preliminary discussions during the meeting. The roles and responsibilities were specified and agreed upon by all stake holders.

A10. Focus of surveillance

Under the present programme, data is being collected on Road traffic injuries, falls, burns, poisoning, suicides and assault/violence. While the focus is on all injury causes, the major thrust is on road traffic injuries and suicides as identified by stakeholders. It was decided to include occupational and other injuries in later stages of the programme.

Surveillance cameras & Blackberry

The year witnessed massive induction of technology in traffic management with 160 surveillance cameras being installed at important junctions. These cameras helped the police in deciding on remedial measures fast wherever there were traffic woes. The police kept utilising Blackberry and decided to phase out paper notice for traffic violations.

These initiatives brought remarkable improvement in road users' behaviour. Says Praveen Sood: "People changed for two reasons: fear of being caught by the police and imposition of fine. Things will change if the improvement comes from within."

Bangalore City is at least one year ahead of Mumbai, Kolkata, Delhi, Hyderabad and Chennai in terms of usage of technology in traffic management, claims Sood.

Drop in fatal accidents

The dip in the number of road accident-related deaths has been apparent this year. Compared to the previous years, the number of accidents and deaths came down.

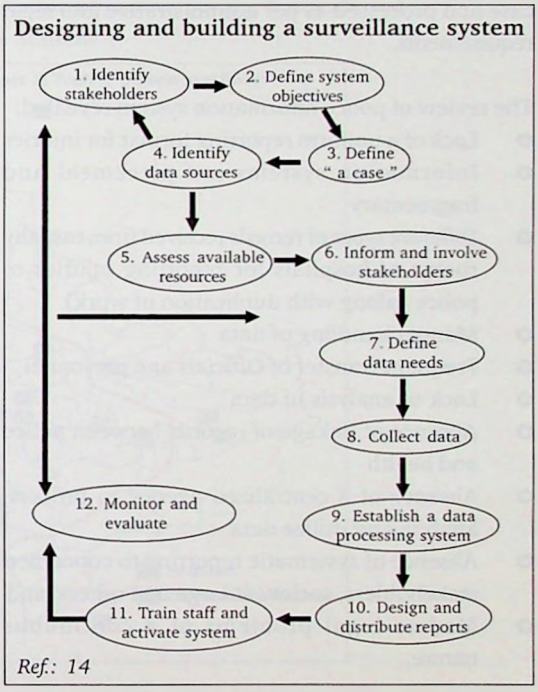
Last year, 892 deaths were reported, while the figure for this year so far is 740. The number was 981 in 2007. This despite inclusion of areas upto Devanahalli and Chikkajala.

Stern action

The police adopted zero tolerance in handling traffic violations. There was positive response from BMTC as the police recovered Rs 25 lakh in form of fine amount from it. Moreover, the BMTC drivers visited traffic management centre to learn more on safe driving.

Staff not enough?

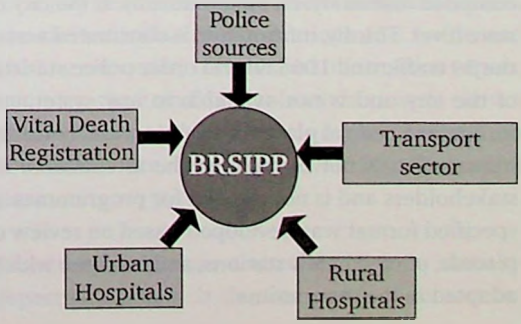
The staff strength to handle complex Bangalore traffic problems seems to be insufficient. Presently, the department has a strength of 2,500 of all ranks, besides assistance of 250 home guards. But, Sood views it differently. "It is not a question of adding more men, but that of utilising technology effectively. If we are able to utilise technology effectively, we can yield results within existing staff. The department spent 15,000 man days to train 3,000 policemen for five days, he added.



A11. Surveillance Mechanisms

The different agencies collecting injury related information in the city of Bengaluru are police, hospitals, transport, city corporation vital registry division, and NGOs. Accordingly, these sources are strengthened and are being used to collect data on a regular basis. The sources of data under the present programme include police records for RTI and other injury mortality information - BMTC data for fatal bus crashes - vital division records for deaths in the city for injury mortality information – and hospital data for nonfatal injuries.

Figure 6: Sources of information for injury



A11.1. Data on fatal injuries

Data on injury mortality is collected from police sources as previous studies had shown that majority of deaths are reported to police. Bengaluru City Police collect information on various aspects of RTIs and other injuries (any unnatural death) under the "medico-legal" rubric. All deaths due to road crashes, suicides, homicides and other unnatural (suspicious) deaths are considered medico-legal and police are entrusted with the primary responsibility of documenting information. Information is based on the formats provided by NCRB. A review of the road crash death and other injury death records revealed that large body of information is collected on every case and processed as per administrative and legal requirements.

The review of police information system revealed:

- Lack of a uniform reporting format for injuries
- Information systems are piecemeal and fragmentary
- Different types of records received from casualty rooms of hospitals for reporting injuries to police (along with duplication of work)
- Manual handling of data
- Frequent transfer of Officials and personnel
- Lack of analysis of data
- Absence of linkage of records between police and health
- Absence of a centralized agency to process, analyse and utilize data
- Absence of systematic reporting to concerned stakeholders, society at large and others, and
- Medico legal problems of a continuous nature.

A major limitation of this approach has been that information on preventive aspects that can be helpful for planners and policymakers are not clearly available. Secondly, the collected data is not compiled and analyzed systematically at the city or state level. Thirdly, information is distributed across the 39 traffic and 106 law and order police stations of the city and is not available in any systematic format in a central place for examination. Fourthly, information is not brought to the attention of all stakeholders and is not applied for programmes. A specified format was developed based on review of records, piloted in few stations, and has been widely adapted in the programme.

A11.2. Data on nonfatal injuries from hospitals

Since hospitals and health professionals (doctors, nurses, specialists, technicians, medical record staff, etc.,) provide care for injured persons across the city and round-the-clock, information is gathered in medical records as per the practices followed by individual hospitals. An inventory of few hospitals prior to the beginning of the surveillance programme revealed that the methods, practices and procedures varied from hospital to hospital. The way information is recorded is often dependant on practice of the doctor and huge variations and discrepancies are seen. A review of the system indicated that information is not collected on injury nature, causes, situation, circumstances, and use of protective equipments or pre-hospital care details, except the source of referral. The diagnostic and management details are written in detail to document care for patients. There is no central agency or organization within the health sector that collects information from all the hospitals, analyses and processes data and brings it on a common format to develop intervention programmes. As there was no uniformity, it was decided in the stakeholders meeting that all hospitals will adopt a system of documenting information in a uniform manner using a common format of "Emergency Trauma Care Record", supplemented by training and sensitisation programmes.

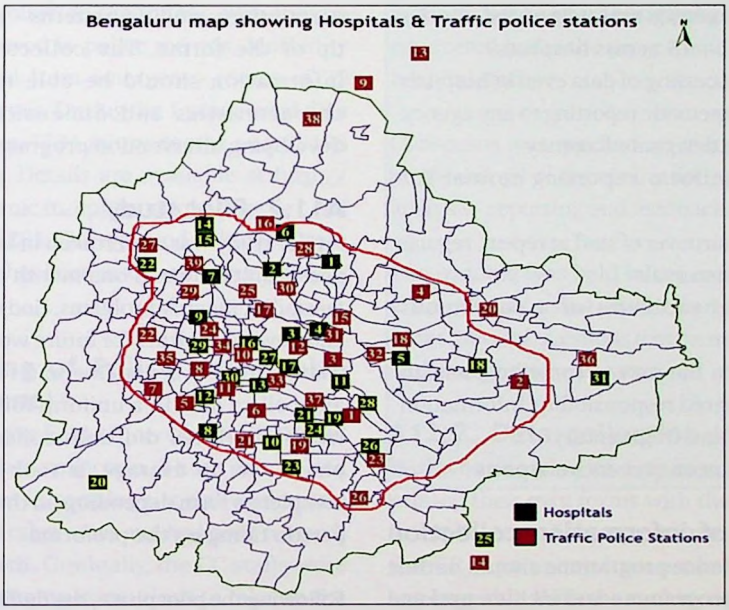
A11.3. Selection of surveillance sites

As per the decision in the stakeholders review meeting it was decided that injury death information will be extracted from 39 traffic as all RTI deaths are reported to police authorities on a regular basis soon after the occurrence of an event. In addition, data from BBMP and BMTC crashes are collected separately and pooled together to make final conclusions. For nonfatal injuries, data is being collected from 30 urban hospitals and 1 rural hospital and it was estimated that these hospitals would cover nearly 60-70% of injury registrations and hospitalisations. The hospitals were chosen based on the criteria of geographical coverage, availability of round the clock trauma care, location of the hospitals and willingness to participate. Participation is purely voluntary in the programme (Fig. 7).

Limitations of Health Sector Information

- Rudimentary information systems on RTIs and other injuries
- No uniform data formats in the hospitals
- The death certificate does not mention injury as associate or antecedent condition, even when injury has been cause of death; injury deaths are reported to police separately
- Information on injury patterns, profile and causes not available
- Data on pre-hospital care factors not elicited
- Data on injury care and disability details are not available, analyzed or reported
- Hospitals do not use ICD-10 classification or the ICECI classificatory systems
- Overburdened and overstretched emergency staff in hospitals (more so in public sector hospitals)
- Injury surveillance system is absent in the country
- No information system with in the health sector
- Lack of resources (money, manpower, time and other facilities)
- Very few hospital based studies

Figure 7: Map of Bengaluru showing the location of various partner hospitals and Traffic Police Stations



A11.4 Inventory of hospitals and scoping study

To identify the caseload in emergency rooms, type and nature of personnel available, type of documents maintained, information flow and other aspects, a scoping study was undertaken in the beginning. The study highlighted that various categories of personnel were available in institutions depending on the type of organization. Commonly, in medical college teaching hospitals - casualty medical officers, nurses, residents, postgraduate students, interns and medical record personnel work round the clock to provide care for patients. In other hospitals, primarily of a private nature, casualty medical officers and nurses are the only routine personnel.

A11.5 Time of data collection

For injury deaths, the point of information collection was the individual police stations (35 traffic and 103 law and order) and the first information report, summary sheet and available extracts were chosen as the source of information. At present, no documents are being reviewed by the central team.

In the hospitals, data was collected from casualty departments, as it is the first point of contact for

injury patients. Data is collected in the form of an "Emergency Trauma Care Record". It was also agreed that data would be collected uniformly in a standard format along with training of all involved personnel. Information was collected as part of the history taking process or soon after treatment procedures were completed.

The review of the existing hospital information system revealed that:

- Information collected in detail on patient care and management
- Information collection depends on attending physician
- Different types of records maintained in casualty rooms with duplication of work (number of records maintained for injuries varied from 1 – 15 across hospitals)
- No central processing of data even in hospitals
- Absence of systematic reporting to any agency, as there is no designated agency
- Lack of a uniform reporting format for injuries
- Transfer and turnover of staff at repeat, regular and frequent intervals
- Medico legal problems of a continuous nature
- Reluctance on the part of some hospitals to undertake shared responsibility. Information is piecemeal and fragmentary
- No information on preventive aspects

A11.6 Focus of information collection

Any injury surveillance programme should outline core data for the programme and include optional items depending on the need. The focus of information gathering was on

- Basic identification and brief socio-demographic details
- Information on Injury and death (place, type, activity, intent)
- Details of road traffic deaths (where, who, how and selected risk factors)
- Details of other types of injury and deaths (intent, place, type),
- Pre-hospital care (first aid, transport, referral)
- Management and outcome

It was decided to focus on core data elements with scope for expansion in due course of time. The responsibility of identifying personnel to complete the surveillance form was left to individual hospitals. An operation-training manual (available on request) was developed for training of all involved personnel from police and health. The manual included description of purpose of collecting information, various variables – brief description – coding patterns - methods of filling up of the forms. The collected and analyzed information should be able to unravel injury characteristics and dimensions and, help in developing intervention programmes.

A11.7 Pilot study

A pilot study was undertaken in both police stations and hospitals over a one month period to examine feasibility, identify problems, find remedial solutions and develop logistics for future work. The pilot study showed that it is possible and feasible to transfer and collect data in a uniform format. Trained staff from NIMHANS did data collection during this phase. On an average, it took 3 - 5 minutes to complete a form depending on the experience of the person filling up the proforma.

Following the pilot phase, the findings were discussed with stakeholders and nodal officers. The proforma was revised accordingly. The revised police and hospital format was accepted as the core data element form with provision for addition of information at later stages of the programme.

A12. Implementation Phase (June 2007 - June 2008)

Information was collected from Police, transport, city corporation and hospital sources from January - December 2007 (police and transport) and April 2007- 2008 (hospitals), respectively, by combination of different methods. Overall mortality information (all cause deaths) was also collected from the vital statistics division of Bengaluru Mahanagara Palike for the year 2005 (latest year for which data was available). Injury mortality information was collected from police sources. Since the transport department collects data from most of the fatal and serious non-fatal road traffic injuries and since the focus is different, it was collected separately, even though some of it is captured in police records. Morbidity data was captured from emergency rooms of 25 participating hospitals. During the 1 year period data was collected from 4334 injury deaths and 68498 non-fatal injuries. Details are available at http://www.nimhans.kar.nic.in/epidemiology/bisp/sr1.pdf and in the report (28). The type and volume of data that was collected has been discussed in our previous report (28).

A12.1. Training of Police and health personnel

In the beginning, the field officers from NIMHANS were trained in data collection. These people had basic qualifications in sociology, social work, rural development, or in other areas and had prior research experience in health. Gradually, the CC staffs were withdrawn encouraging institutions to take up the activity on their own.

In the police department, the writers of police stations were invited for training programmes. Since capacity development is a systematic activity, repeat programmes were done to improve contents and quality of data. The training focussed on understanding contents of proforma, definitions used, method of entering and coding, checking for completeness and other aspects.

In the hospitals, training of casualty staff (casualty medical officers, nursing personnel and medical records staff) was crucial to ensure completeness, coverage and uniformity in data collection. It was essential to do this in a phased manner, as there were large numbers of people to be trained (due to frequent change of personnel). The training focussed on purpose of the programme, persons responsible for data collection, nature of information being collected, coding patterns, and ensuring safety of completed forms to be collected. Training was also offered to different personnel depending on roles and responsibilities of the personnel. In the rural areas, staffs from district hospital and Siddhartha Medical College hospital were trained on the various aspects of the programme in a similar manner. Series of training programmes have been conducted under the programme for both police and hospital staff.

Consensus was reached on many of the items and methodology of data collection - pooling - transfer - analysis - reporting and feedback of the programme.

The training was held in the local language and in a simple way using local examples and colloquial terms. Several questions that came up were answered and changes incorporated.

A12.2. Data collection logistics

With continuation of activities, all hospitals have printed their own forms with their names and logo in duplicate carbon copy formats (essential to note that ER departments have not been computerised in any hospital). With the evolution of the programme, it is proposed to shift from paper-based forms to online transmission depending upon the availability of computer facilities. In the hospitals, information is being collected from injury patients in emergency rooms. It was agreed that data would be collected in casualty departments soon after completing treatment procedures or as part of history taking process. Different modalities of operations were evolved in different situations.

From the police records and primarily from FIRs, the station staff completed the forms soon after investigations were completed or during the course of investigation. These trained staff send the completed forms to the nodal officer in police

Section B:

Data and Information

TIMES CITY 4 Jan 2010 3

Good news! Fatal accidents come down

Road Dividers And Strict Law Enforcement Contributed To Streamlining Of Traffic

A T Subrahmanya | TNN

Bangalore: Here is some cheering news in the New Year: accident rates have come down. For the second year running, the number of fatal accidents in Bangalore has reduced by nearly 10%, according to numbers collated till November 30. The traffic police say the numbers don't lie.

The reasons attributed to this fall are the BBMP's road dividers which saw driving discipline and strict enforcement of traffic rules.

Traffic police records show the number of fatal accidents was 843 where 868 lost their lives. Last year, 884 fatal accidents were reported in which 892 died. Even the non-fatal accidents showed a dip, with 3,433 cases compared to last year's figure of 4,508.

The number of fatal accidents in 2006, too, came down compared to 2005. Traffic officials say even after adding December figures, the total fatal accidents for 2009 would be 780 or 788, which would be lesser than last year's 864.

Interestingly, the encouraging figures for various cases have gone up. The number of cases booked under the MV Act, IPC Act and towing cases was 21.89 lakh by November-end itself compared to last year's tally of 19 lakh, which itself was a raise from 13 lakh recorded in 2007.

Even the fine collected under these cases crossed Rs 30 crore by November end compared to last year's Rs 27.41 crores. Traffic police say that total fine collected is likely to touch Rs 35 crores for 2009 once the December figures are tabulated.

The number of fatal accidents started rising from 2005, with 756 accidents and 881 in 2006 and reaching the highest at 907 in 2007. But for the last two years, the numbers are sliding down.

WHY ACCIDENTS ARE LESS

Attributing to additional commissioner of police (traffic) Praveen Sood, credit for the reduction must go to the traffic police and BBMP. "The concrete road divider built by the Public has contributed a lot to streamlining of traffic and reduced the number of head-on collisions which resulted in deaths. Also strict enforcement of rules by the traffic police has helped to a great extent," he says.

FOCUSED ENFORCEMENT

He says contrary to popular perception, traffic police had focussed on three major violations — overspeeding, drunken driving and a simple yet common violation, signal jumping. All three violation cases have increased significantly over the last one year indicating that traffic police are proactive in enforcing regulations, which in turn could be one of the reasons behind accidents coming down.

Acting against overspeeding, drunken driving and signal jumping means acting against three factors and yet major causes of accidents.

YEAR	ACCIDENTS	KILLED
2005	756	838
2006	881	915
2007	907	981
2008	864	892
2009	682 (till Nov 30)	686

YEAR	ACCIDENTS
2005	6,702
2006	5,661
2007	7,489
2008	6,908
2009 (till Nov 30)	5,627

The data collected from different sources in 2009 has been presented in this section. The purpose of this section is not to describe the epidemiology of RTIs and other injuries, but to highlight the type of data that will be available in a surveillance programme. The data description highlights the current profile and patterns of RTIs and other injuries, and provides directions for linking number of other activities. This approach should help in deciding usefulness of surveillance activities. The nature and depth of analysis can be decided based on specific inputs and requirements for programmes.

THE TIMES OF INDIA, BANGALORE THURSDAY, JULY 30, 2009

TIMES CITY

Slow down, for your own good

Traffic Interceptors With Speed Guns Deployed On Road To BIA

WIND IN THEIR HAIR

Overspeeding and other cases from interceptors on Bellary Road in 2009

- January: 1,067 cases, Rs 9.1 lakh fine collected
- February: 1,047, Rs 4.3 lakh
- March: 2,721, Rs 8.1 lakh
- April: 1,114, Rs 5 lakh
- May: 1,117, Rs 5.66 lakh
- June: 1,545, Rs 8.5 lakh
- Total: 10,779, Rs 45 lakh

IN NUMBERS

- 2008: 74 fatal accidents, 80 dead; 414 non-fatal accidents, 572 injured
- 2009 (till June): 32 fatal accidents, 37 dead; 166 non-fatal accidents, 170 injured.

A T Subrahmanya | TNN

Bangalore: Bikers zooming on the road to Bangalore International Airport, slow down. Traffic police on their hi-tech interceptor vehicles are waiting to stop a few. The speed limit for two wheelers, contrary to popular belief, is only 60, and not 80 km/hour.

Devanahalli Road's unseen menace may seem enticing to motorcycle enthusiasts, but the rising number of accidents has the police stepping up their guard. Two interceptors have been deployed on the stretch covering five police stations. For the record, there have been 106 fatal and 665 non-fatal accidents on this road since January 2007.

Speed guns on the interceptors are being used to catch those crossing the lawful limit. "Naturally, motorcyclists aren't allowed and none of those even claim that the speed shown on the ticket is incorrect," a police officer said. The problem is that most people are not even aware of the limit and start arguing, he added.

WHAT'S THE LIMIT?

Adding to the confusion, till recently, was the absence of signboards indicating speed limit for two-wheelers. But that has been rectified now. There are clear boards put up, indicating the limits: 60 km/hour for two wheelers, 80 for four-wheelers and 40 for heavy vehicles.

Police say there are nearly 120 cases of overspeeding registered on the road every day. An officer said there are only nine interceptors in the city, two of which are used on this road.

Additional commissioner of police (traffic) Praveen Sood said, "There was some confusion earlier, but now there are signboards indicating the limits. We are not very strict with two wheeler riders but those speeding too much have to be stopped and fined."

Speed limit within the city is 50 km/hour but the rule is not enforced strictly for practical reasons, he added.

The City of Bengaluru

The city of Bengaluru is a recognizable landmark on the national and global map for its technological, educational and economic growth. The city of Bengaluru, as per the boundaries delineated by BBMP was identified for the programme and a brief profile of the city is given in Table 5.

What changed in Bengaluru in 2009

The city of Bengaluru moved ahead in several areas. Some important changes that are of relevance to injuries are highlighted below as illustrative examples.

- In the year 2009, the city added 348,707 vehicles onto its roads. Among them, 233,699 were two wheelers, 122,910 were cars and other vehicles like buses, trucks etc., accounted for the rest.
- The BMTC added 571 new buses, increasing its total fleet strength to 5344. Correspondingly, the trips and schedules increased by 9%. The system transports approximately 40, 00,000 people every day, an increase of 2% compared with 2008.
- A few infrastructure projects were completed and opened for public. Important among them

Table 5: Bengaluru City – A Socio Demographic Profile – update in select areas and show 2008 and 2009 together

Sl. No	Parameters	2009	
1	Area	800 sq. kms	1
2	Population	7 million	1
2	Density	2980/sq.km	2
3	Contribution to Karnataka state population	11%	
4	Sex Ratio (Females/1000 males)	915	3
5	Life expectancy at birth	64.2 years	
6	Crude birth rate/1000	19.1	2
7	Crude death rate/1000	7.2	2
8	Decennial growth rate	1.3%	
9	Total number of slums	733	4
10	Total population in slums	4,30,501	5
11	Slum population%	10	2
12	Socially disadvantaged population (%)	40	
13	Literacy rate%	83.91	6
14	Total number of schools and colleges	7674	7
15	Total number of factories	6024	8
16	Total number of police stations	142	9
17	Total number of hospitals (including public, private hospitals & nursing homes)	572	10
18	Total number of Drug stores	4445	11
19	Total number of General practitioners	H" 5000	10
20	Total length of roads	1500 kms	1
21	Total number of police personnel (traffic)	3,102	
22	Total number of police personnel (law and order)	11,908	
23	Total number of registered vehicles	3.4 million	12
24	Number of alcohol selling outlets (CL-2, 4, 5, 6, 6A, 7, 9, 14 & 15) Licensees	H" 2400	13
25	Indian Made Liquor sold for the year 2007 – 2008	325.48 lakh CBs	13
26	Total revenue from IML & Beer	Rs.3478cr	13

Source:

1 http://www.bmponline.org
2 www.bangaloreit.com
3 http://www.experiencefestival.com/slum
4 http://www.hindu.com/2007/04/28/stories/2007042802250200.htm
5 www.censusindia.com
6 www.des.kar.nic.in
7 Karnataka Education Departments
8 Small, Medium and Large scale industries Corporation
9 BCP Bengaluru City Police
10 KSPCB Karnataka State Pollution Control Board
11 Karnataka state Drugs control General
12 www.rto.kar.nic.in/bng-veh-stat.htm
13 Karnataka State Beverages Corporation Limited

were the Yeshwantpur flyover, 11 pedestrian subways, 60 bus bays and 74.28 km of concrete roads.

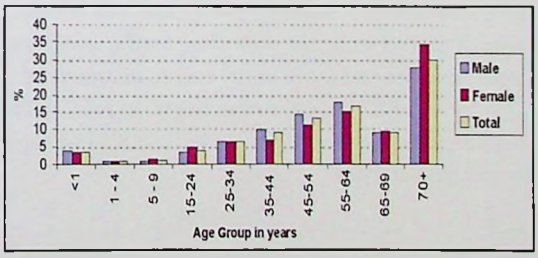
- The city also witnessed construction of several concerete-rigid medians on some of its roads. It took little time to realise that these could have been designed better.
- The metro work continued in the city and is expected to be completed in 2010 with the opening of sector 1. However, the ongoing metro work was a major impediment and bottleneck for the traffic flow. It also created a few major injuries during the year and many of them night have gone unnoticed.
- Environmentalists, NGOs and public were up in arms for the felling of hundred's of tress and loss of green belts in the city (which was considered essential for metro works).
- Probably, thousands of people would have migrated to the city, taking the total population of the city to 7 million in an area of 800 sq kms with a population density of 2980 / sq. km.
- New alcohol outlets were also opened in the city, taking the total number of alcohol selling outlets to approximately 2400. There was a change in the timings of alcohol selling outlets with an extension from 10.30 pm to 11.30 pm.
- The economic recessions that became prominent since middle of 2008 had an effect on Bengalureans and many business sectors were affected considerably. During the year, employment, travel, hotel, entertainment and others were affected most and were in a depressed phase, even though the last 3 months have seen a slow recovery. Due to this, the travel exposure might have come down (the total km travelled data is not available) considerably.
- ***Year 2009 turned out to be a very tragic year for at least 4489 families with the sudden and unexpected loss of their family members due to an injury. These 4500 families will take many years to recover or may not recover at all. The effect of these deaths alone will be felt for many years to come by their families and is just the beginning of turbulent life for them. The deaths and injuries of these young ones will be an immense loss for their families, employers, friends and society at large.***

B1. Injury deaths

Data on all deaths, including injury deaths, was collected from the vital statistics division of BBMP. In 2008, there were 31,811 deaths, which increased to 43,648 deaths in 2009. There was an addition of 11837 deaths in the intervening 365 days period. Since computerisation and analysis of 2009 data is still in progress, 2008 data has been used for discussion in this report.

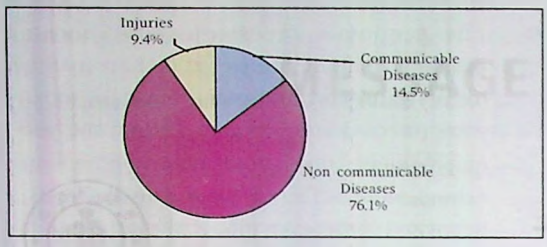
In summary, it is estimated that nearly 4000 persons would have died due to an injury in 2008. The total number of injury deaths from police sources for the same period was 4497. Among total deaths of 2008, 20,117 were males and 11,694 were females, respectively. The age – sex distribution is shown in Figure 8, and it can be seen that highest deaths for all cause mortality was in the age group of 70+ years.

Figure 8: Age Sex distribution of deaths, 2008 (BBMP data)



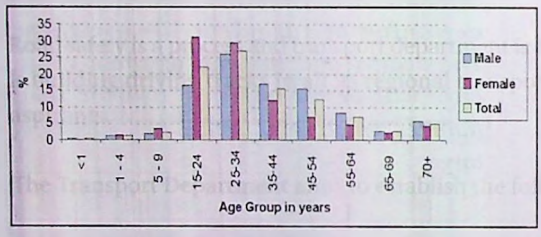
Communicable diseases accounted for 15 % (4601) of deaths, while NCDs and injuries contributed for 74 % (24,237) and 11 % (2973) of total deaths. The proportions of injuries might probably be an underestimate due to well known reasons like misclassification, nonreporting of injuries as underlying causes of death, undefined categories, non-availability of information in late post hospital deaths and other causes.

Figure 9: Major causes of death, 2008



Specific analysis of injury deaths revealed that more than two thirds of injury deaths (64.4 %) occurred in 15 – 44 years, with variation as per causes. Proportionately, more injury deaths occurred among women in the 15 – 34 yrs age group, with preponderance of males in later age groups.

Figure 10: Age sex distribution of injury deaths, 2008



The top 10 conditions that lead to death in 2008 are given in Table 6. Examination of contribution of injury causes for deaths revealed that injuries occupied the 3rd leading condition for deaths. Disaggregated data showed that traffic accident, burns, suicides and other injury causes occupied 10th, 12th, 15th and 17th rank, respectively. In total, RTIs and suicides accounted for 2.9% and 2 % of total deaths, respectively.

Table 6: Top 10 causes of death in Bengaluru

Sr. No	Cause of Death	Number of Deaths
1	Ischemic Heart Disease	5015
2	Neoplasm	3270
3	Injury	2973
4	Diabetes mellitus	2483
5	Respiratory Diseases	2320
6	Hypertensive disease	1972
7	Liver Diseases	1608
8	Cerebrovascular diseases	1603
9	Tuberculosis	1329
10	Pulmonary heart Disease	1238
11	Other causes	8000

Detailed analysis was performed to identify top 15 leading causes of death in different age groups and both sexes. Tables 7,8,9 indicate that

- Injuries are leading cause of death in younger age groups of 15-44 years.
- Traffic crashes are the leading cause of death in 25-34 yrs age groups.
- Burns are the foremost cause among women in 15 – 34 yrs age groups.
- Intentional self harm accounted for 9.35% deaths in 25-34yrs.

Comparison of injury causes between police and vital statistics division data showed major differences, reflecting information gathering practices. Transport accidents were higher in BBMP data (based on death certificates), while suicides were more in police data. Our previous research in suicides has shown that suicidal deaths are not properly documented in hospital deaths for medico legal reasons. Similarly, some unspecified and unclassified deaths are included in police sources as suicides. If RTIs are the underlying cause of death, they are not documented in death certificates. This shows that there is considerable scope for improving vital statistics data based on death registration systems.

B2. Urban injuries

After intense data gathering activities in 2008, 2009 was devoted primarily for review, streamlining and consolidation of activities in all institutions. After the stake holder's consultation meeting on Jan 28, 2009, all partners were encouraged to discuss with their heads of institutions and colleagues to improve and strengthen mechanisms for data collection. Consequently, data collection continued at different points of time and data on nonfatal injuries is not available from all institutions uniformly for the entire 12 month period in a uniform manner. In 2010, the mechanisms have been strengthened in all partner hospitals and 8 new partner institutions have joined the programme. Hence, the data on nonfatal injuries indicates only the broad trends and patterns.

Table 7: Top 15 Leading Causes of Death in Bengaluru City : Persons

Sl No.	0-4 yrs	5 - 14 yrs	15 - 24 yrs	25 - 34 yrs	35 - 44yrs	45 - 54yrs	55 - 64 yrs	Above 65 yrs	Total
1	Perinatal deaths	Neoplasms	Burns	Burns	Liver diseases	Neoplasms	Ischaemic heart diseases	Ischaemic heart diseases	Ischaemic heart diseases
2	Congenital malformations	Viral Infections	Suicide	Transport Crashes	Neoplasms	Ischemic heart disease	Neoplasms	Diabetes Mellitus	Neoplasms
3	CNS Infections	Burns	Transport Crashes	Suicide	Ischemic Heart Disease	Liver diseases	Diabetes Mellitus	Hypertensive diseases	Diabetes Mellitus
4	Diarrhoeal diseases	Transport Crashes	Tuberculosis	Tuberculosis	Tuberculosis	Diabetes Mellitus	Hypertensive diseases	Neoplasms	Respiratory disorders
5	Viral diseases	Respiratory disorders	Neoplasm	Neoplasms	Respiratory disorders	Tuberculosis	Respiratory disorders	Respiratory disorders	Liver diseases
6	Neoplasms	Digestive Sytem disorders	Digestive Sytem disorders	Liver Diseases	Transport Crashes	Respiratory disorders	Liver Diseases	Cerebrovascular diseases	Hypertensive diseases
7	Respiratory disorders	CNS infections	Other injury causes	Respiratory disorders	Cerebrovascular diseases	Cerebrovascular diseases	Cerebrovascular diseases	Pulmonary heart diseases	Cerebrovascular diseases
8	Burns	Rheumatic heart disease	Respiratory Infections	Ischemic Heart Disease	Burns	Hypertensive diseases	Pulmonary heart diseases	Urinary System disorders	Tuberculosis
9	Transport Crashes	Congenital malformations	Pregnancy & Childbirth	Other injury causes	Diabetes Mellitus	Pulmonary heart diseases	Diseases of urinary system	Liver diseases	Pulmonary heart diseases
10	Tuberculosis	Tuberculosis	Rheumatic heart disease	CNS infections	Suicide	Transport Crashes	Tuberculosis	Tuberculosis	Urinary System disorders
11	Rheumatic heart disease	Bacterial diseases	CNS infetions	Urinary System disorders	Hypertensive diseases	Urinary System disorders	Transport crashes	Diseases of the Nervous System	Transport Crashes
12	Other injury causes	Other injury causes	Viral diseases	Cerebrovascular diseases	Pulmonary heart diseases	CNS infections	CNS disorders	Intestinal infectious diseases	Perinatal deaths
13	Malnutrition	Haemopoeitic disorders	Urinary System disorders	Viral diseases	Urinary System disorders	Suicide	Other bacterial diseases	Other bacterial diseases	Burns
14	Haemopoeitic disorders	Cardiovascular diseases	Bacterial diseases	CNS infections	Viral diseases	Viral diseases	Other diseases of the circulatory system	Transport crashes	CNS disorders
15	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
Total	1382	348	1285	2128	2829	4200	5323	12390	31811

Miscellaneous includes all other conditions with smaller numbers after the first 14 causes

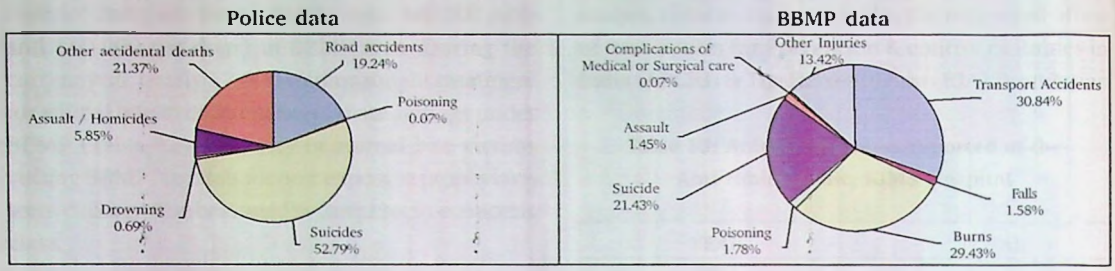
Table 8: Top 15 Leading Causes of Death in Bengaluru City : Males

Sl No.	0-4 yrs	5 - 14 yrs	15 - 24 yrs	25 - 34 yrs	35 - 44yrs	45 - 54yrs	55 - 64 yrs	Above 65 yrs	Total
1	Perinatal deaths	Neoplasms	Transport crashes	Transport crashes	Liver Diseases	Ischaemic heart diseases	Ischaemic heart diseases	Ischaemic heart diseases	Ischaemic heart diseases
2	Congenital malformations	Viral diseases	Suicide	Suicide	Ischaemic heart diseases	Liver Diseases	Neoplasms	Diabetes Mellitus	Neoplasms
3	Diarrhoeal diseases	CNS Infections	Burns	Tuberculosis	Tuberculosis	Neoplasms	Diabetes Mellitus	Neoplasms	Diabetes Mellitus
4	Neoplasms	Burns	Tuberculosis	Liver Diseases	Transport crashes	Tuberculosis	Liver Diseases	Hypertensive diseases	Liver Diseases
5	Viral diseases	Transport crashes	Neoplasms	Burns	Neoplasms	Diabetes Mellitus	Hypertensive diseases	Cerebrovascular diseases	Hypertensive diseases
6	CNS infections	Respiratory diseases	Other Injury Causes	Ischaemic heart diseases	Cerebrovascular diseases	Cerebrovascular diseases	Cerebrovascular diseases	Lower respiratory diseases	Cerebrovascular diseases
7	Respiratory Diseases	Other CNS diseases	Digestive System Disorders	Neoplasms	Diabetes Mellitus	Transport crashes	Pulmonary Heart Disease	Pulmonary Heart Disease	Tuberculosis
8	Burns	Congenital malformations	Rheumatic Heart Disease	Other Injury causes	Suicide	Hypertensive diseases	Tuberculosis	Urinary System Disorders	Pulmonary Heart Disease
9	Other diseases of the nervous system	Bacterial diseases	Respiratory Diseases	Urinary System diorders	Hypertensive diseases	Pulmonary Heart Disease	Lower respiratory diseases	Liver Diseases	Transport crashes
10	Tuberculosis	Other Injury causes	Viral diseases	Cerebrovascular diseases	Other Injury Causes	Urinary System Disorders	Urinary system disorders	Pneumonia	Lower respiratory diseases
11	Transport crashes	Rheumatic Heart Disease	Diseases of urinary system	CNS Infections	Pulmonary Heart Disease	Lower respiratory diseases	Transport crashes	Tuberculosis	Urinary System Disorders
12	Rheumatic Heart Disease	Tuberculosis	CNS infections	Pneumonia	Urinary System Disorders	Suicide	Pneumonia	Other CNS diseases	Perinatal Deaths
13	Haemopoeitic Disorders	Digestive disorders	Other bacterial diseases	Viral diseases	Burns	Other Injury causes	Other diseases of the nervous system	Transport crashes	Suicide
14	Other injury causes	Haemopoeitic disorders	Other CNS diseases	Other CNS diseases	Viral diseases	Pneumonia	Other bacterial diseases	Other bacterial diseases	Other injury causes
15	Miscellaneous	Miscellaneous	Miscelaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
Total	861	182	676	1348	1995	2886	3181	7305	20117

Table 9: Top 15 Leading Causes of Death in Bengaluru City : Females

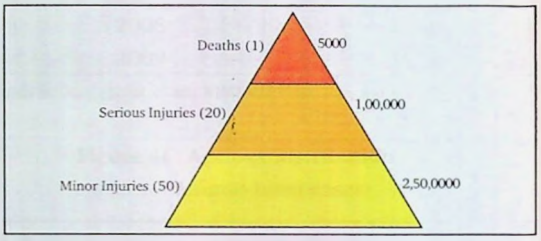
Sl No.	0-4 yrs	5 - 14 yrs	15 - 24 yrs	25 - 34 yrs	35 - 44yrs	45 - 54yrs	55 - 64 yrs	Above 65 yrs	Total
1	Perinatal deaths	Viral diseases	Burns	Burns	Neoplasms	Neoplasms	Neoplasms	Ischaemic heart diseases	Ischaemic heart diseases
2	Congenital malformations	Burns	Suicide	Suicide	Burns	Ischaemic heart diseases	Ischaemic heart diseases	Diabetes Mellitus	Neoplasms
3	Diarrhoeal Diseases	Neoplasms	Maternal Deaths	Neoplasm	Tuberculosis	Diabetes Mellitus	Diabetes Mellitus	Hypertensive diseases	Diabetes mellitus
4	CNS infections	Transport crashes	Tuberculosis	Tuberculosis	Ischemic heart diseases	Hypertensive diseases	Hypertensive diseases	Neoplasms	Hypertensive diseases
5	Viral diseases	Diarrhoeal Diseases	Respiratory Diseases	Respiratory Diseases	Liver Diseases	Liver Diseases	Cerebrovascular diseases	Cerebrovascular diseases	Burns
6	Burns	Rheumatic Heart Disease	Neoplasms	Maternal Deaths	Diabetes Mellitus	Tuberculosis	Urinary System Disorders	Lower respiratory diseases	Cerebrovascular diseases
7	Neoplasms	Tuberculosis	Liver Diseases	Ischaemic heart diseases	Viral diseases	Cerebrovascular diseases	Malignant neoplasms of genitourinary organs	Pulmonary Heart Disease	Pulmonary heart Disease
8	Other CNS diseases	Other CNS Diseases	Rheumatic Heart Disease	Rheumatic heart Disease	Pneumonia	Pulmonary Heart Disease	Pulmonary heart Disease	Urinary System Disorders	Urinary System Disorders
9	Pneumonia	Pneumonia	Transport crashes	Pneumonia	Other bacterial diseases	Urinary Sytem Disorders	Tuberculosis	Pneumonia	Tuberculosis
10	Transport crashes	Haemopoeitic Disorders	Urinary System Disorders	Diabetes Mellitus	Cerebrovascular diseases	Lower respiratory diseases	Lower respiratory diseases	Other CNS Diseases	Lower respiratory diseases
11	Other Injury causes	Congenital malformations	Haemopoeitic Disorders	Cerebrovascular diseases	Hypertensive diseases	Viral diseases	Liver Diseases	Liver Diseases	Perinatal Deaths
12	Tuberculosis	Other bacterial diseases	Viral diseases	Liver Diseases	Pulmonary Heart Disease	Burns	Pneumonia	Tuberculosis	Liver Diseases
13	Malnutrition	CNS infections	Other Injury Causes	Viral diseases	Rheumatic Heart Disease	Other bacterial diseases	Other bacterial diseases	Diarrhoeal Diseases	Suicide
14	Rheumatic Heart Disease	Malaria	Other bacterial diseases	Haemopoeitic Disorders	Urinary System disorders	Other CNS Diseases	Other Circulatory disorders	Haemopoeitic Disorders	Pneumonia
15	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous	Miscellaneous
Total	521		609	780	727	1314	1663	5085	11694

Figure 11: Comparison of injury deaths using different information sources, 2008



In 2009, there were 4489 injury deaths registered with police and 34225 persons were registered in study centres. With an underreporting of 10 % for injury deaths, it can be concluded that nearly 5000 injury deaths would have occurred in the city during 2009. Using conservative figures of 1:20:50, for deaths to serious injuries to mild injuries in 2009, there were estimated 5000 injury deaths (police data), nearly 1,00,000 serious and 2,50,000 mild injuries.

Figure 12: Bengaluru Injury Pyramid, 2009



B3. Rural Injuries

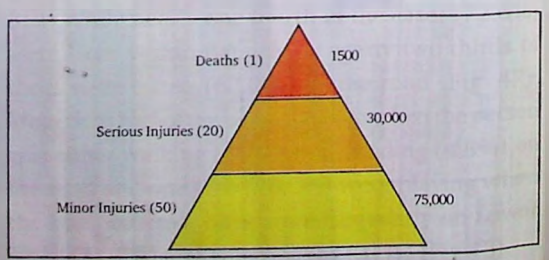
Brief profile of Tumkur

Tumkur is one of the 27 administrative districts of Karnataka state, located North-west of Bangalore at a distance of about 70 kms. The district is bounded by Mandya District in the South; Chitradurga and Hassan districts in the West; Chikkamangalore in the Northeast and Ananthapura District of Andhra Pradesh state in the Southeast direction. Tumkur town is the administrative head quarter of the district and is a centre for commercial, business and educational activities. It is home to Tumkur University, four Engineering and a Medical college and other institutions of importance. The district is famous for its iron ores. It has a population of 2.5 million.

The rural component of Road safety and Injury prevention programme is being carried out in Tumkur with the participation of District police, District hospital and Sree Siddhartha Medical College. In 2009, the district police registered a total of 1309 Injury deaths. Among them, 435 deaths were due to road crashes, 366 were suicidal deaths and 371 were due to other unnatural causes. With a 10 % underreporting as seen from earlier studies, it is estimated that there will be 1500 injury deaths in the district. Injuries are one of the top leading causes of death in this district with a population of approximately 2.6 million. Males and females accounted for 770 and 539 deaths, respectively, and once again, highest number of deaths occurred in 15- 44 yrs age group.

In the same period, the medical college hospital registered 2165 injured persons in the ER. Using conservative estimates as reported in earlier sections, it is estimated that there would be 1500 deaths (police data), 30,000 hospitalisations (26180) and 75000 minor injuries in 2009. Further details on profile and pattern of injuries in rural area are provided in different sections of the report and in the fact sheet.

Figure 13: Rural Injury pyramid, 2009



B4. RTIs and suicides are major injury causes

Among the various causes of injuries, RTIs are a leading cause of deaths and hospitalisations. RTIs accounted for 31% of deaths as per data of vital statistics division, 20% as per police records and 62.7% of hospitalisations in Bangalore. In the rural area the contribution was 34.4% and 51.5 %, respectively (Fig. 14).

Suicides or Deliberate self harm was the second leading cause with 1325 deaths (CCRB data) and 1509 hospital contacts. The intent is the differentiating factor between natural, suicidal and homicidal deaths and requires skills with investigative agencies and systematic documentation and review of events prior to death.

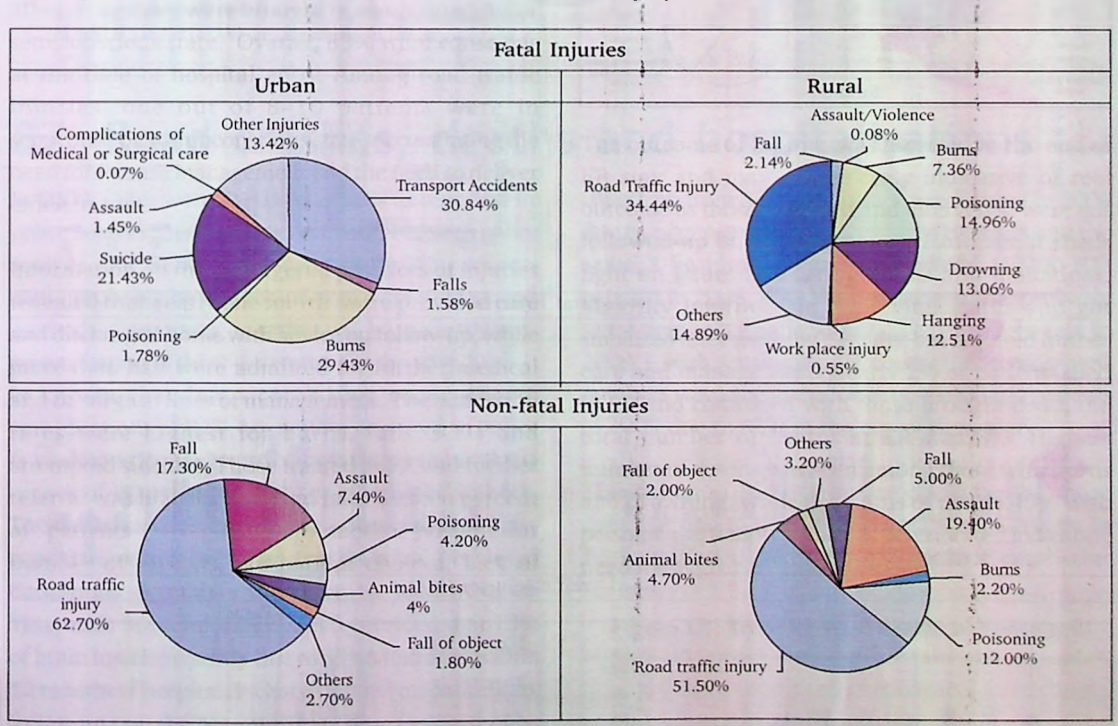
Burns can be accidental, suicidal or homicidal and once again requires a careful scrutiny of intent. As per data in table 9, burns were the leading cause of mortality among women in 15- 24yrs and 25 – 34 yrs age groups (BBMP data).

Poisoning due to a variety of substances (common ones being Organophosphorus compounds and drugs) is a common contributor for suicides. It is important to differentiate the intent here to separate suicidal and accidental (occasional homicidal ones).

Even though work related / occupational injuries are quite common, their contributions for deaths were not exactly available in the official reports.

There were no major disasters that contributed for deaths and injuries during the year 2009 in the city.

Figure 14: Comparison of the distribution of causes of injury deaths in urban and rural areas 2009

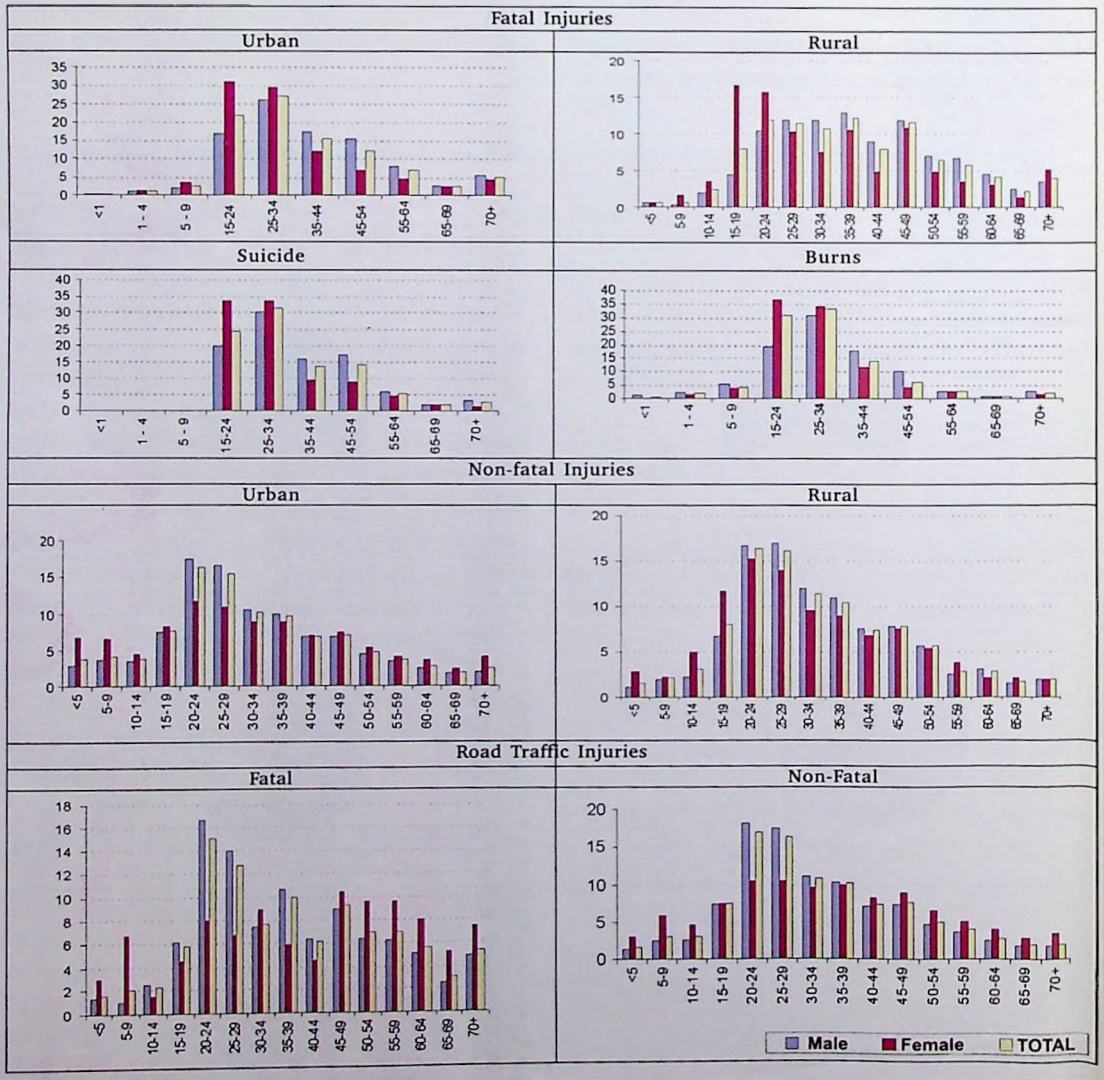


B5. Injuries affect young people

In comparison to communicable diseases which primarily affect children, and NCDs affecting late middle aged and elderly people, injuries are a problem of young people. Sixty five percent of deaths (BBMP) and 66.9 % of hospitalisations occurred in the age group of 15 – 44 years. Men accounted for 64.17% of deaths and 79.9 % of hospitalisations, while women contributed for 35.83% deaths and 20.1.% of hospitalisations, respectively. In rural areas, the distribution was almost similar with increased occurrence among men and in younger age groups. There are several reasons for preponderance of injuries among young people and in men and are linked to social, cultural, psychological, biological, environmental, product / vehicle related reasons. The risk taking nature of young people coupled with type of products and vehicles and the environment they are use add for their injury predilection.

Irrespective of data sources, nature of injuries, or injury causes, the data highlight that young people in 15 – 44 years are affected most in injuries (Fig. 15). This is a major difference in comparison with causes of deaths and hospitalisations. This is also a specific reason as to why road safety and injury prevention should be given importance as young people are most vital for any family and any society.

Figure 15: Age -sex distribution of injuries (%)



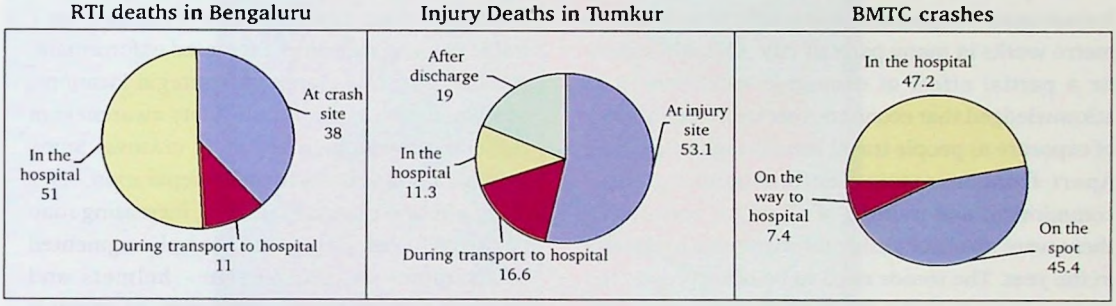
B6. Injury deaths are distributed in phases

Usually, injuries follow a trimodal distribution, with deaths occurring soon after a crash or an injury, few during transfer to hospital and others after admission to the hospital. Some deaths occur as late complications of injury after discharge from the hospital. The precise proportion of these deaths vary as per cause and are influenced by many factors like age , sex, nature and type of injury, availability of care, level of safety policies and a number of other factors.

Data from rural part of surveillance programme in Tumkur revealed that almost half of the deaths occurred at the injury/crash site.

Among RTI deaths in Bengaluru, 38 % of victims died at the crash site, 11 % during transport to hospital and 51 % in the hospital. Less than a % died soon after discharge. Among BMTC crashes, nearly half (45.4%) died at the spot, 7.4% before reaching hospital and 47.2% in the hospital. In rural areas, nearly half died at site soon after injury (Fig. 16).

Figure 16: Place of Death (%)



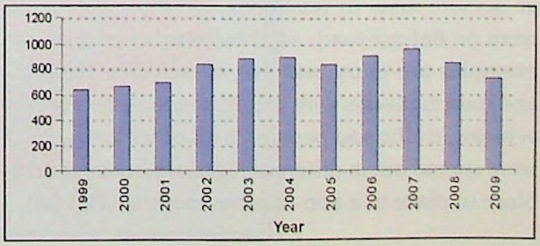
B7. Road crashes, deaths and hospitalisations

In 2009, there were 754 road deaths as reported by police sources. Discrepancies in deaths between police sources and BBMP vital statistics division sources could probably be due to different data sources and methods of reporting. Attempts will be made towards reconciliation of these differences in the year 2010. It is known that late deaths that occur due to complications of RTIs are neither reported in police or vital statistics reports as the associated or underlying causes of injury deaths are not mentioned in both. These deaths would have occurred beyond the 30 day reporting time required for RTIs as per legal definitions. A study undertaken by NIMHANS on Traumatic Brain Injuries in 2005 revealed that 13% of brain injuries (mostly due to RTIs) had died within 12 months of hospital discharge (based on domiciliary follow up visits) (29). Applying these figures for the year 2009, it is estimated that the city would have an estimated 852 deaths due to RTIs.

With regard to nonfatal injuries, data was available from 21207 hospital contact RTI patients. The data collection from 3 large hospitals was limited in 2009 due to administrative and resource contacts and the same 3 hospitals contributed nearly 18,000 RTI patients in 2008. With the assumption that probably same number of patients would have sought care in 2009 (with variations, of course), the estimated numbers would be in the range of 40,000 RTI patients in 2009 due to RTIs in the city of Bengaluru.

The situation in rural areas could be far more different due to poor documentation of events. In Tumkur district, there were 435 reported deaths due

Figure 17 : Trend of Road deaths in Bengaluru



to RTIs in 2009. Using similar methods of estimation, it is estimated that the district would have witnessed nearly 500 deaths and 10,000 hospital contacts due to road crashes in 2009.

For the 2nd consecutive year, the city recorded a decline in registered RTI deaths from 961 in 2007 to 754 in 2009. Reasons for this could be several and identifying them would be guesswork as relative contributions are difficult to establish. Some contributing factors could be increasing enforcement from city police, increasing traffic congestion due to addition of 348,707 vehicles, separation of traffic in roads with new medians (however, there were not many crashes in these areas earlier also), ongoing infrastructure expansion and traffic blocks due to metro works in many parts of city ,or could simply be a partial effect of economic recession (it is acknowledged that economic recession reduces risk of exposure as people travel less during these times. Apart from increasing enforcement (greater commitment and training of all police personnel), there were no other visible interventions in the city in the year. The trends need to be observed for the coming years to make clear conclusions.

B7.1. Crashes had a pattern as per locations

The city has 39 police station subdivisions spread over an area of 800 sq. km. Data revealed that highest number of fatal crashes occurred in 10 areas, accounting for 48% of total fatal RTIs. The distribution was similar across months and, in all 12 months, these top 10 areas remained high in the ranking (Fig. 18 and Table 10).

Further analysis revealed that within each of these areas, specific roads which are connecting to national or state highways accounted for 54% of fatal crashes. In the case of Madivala with 55 deaths, Hosur road had recorded 32 deaths. Similarly, in Byatarayanapura, of the 53 deaths, 28 deaths were on Mysore road. In Yelahanka, 23 of the 39 deaths were on Bellary road. All these roads in the above examples are entry and exit stretches of national and state highways with greater movement of goods vehicles, traffic and people. In all other areas, RTIs were spread out in different locations, moving from place to place in a non-random method (Fig. 18).

The surveillance data using epidemiological analysis has identified geographical areas with high fatal crashes. Further analysis is required to see any specific clustering of crashes on these roads as the average length of each road in city boundary limits is 20 (+/- 5) kms. Most of the people killed on these roads were pedestrians and two wheeler drivers and were hit by buses or trucks. Microanalysis of crash patterns will be taken up in these 10 areas during 2010 on a prospective basis.

While accident black spots are generally known to shift from location to location over time, area wide traffic calming measures need to be considered by authorities. In general, it needs to be seen whether a combination of engineering / traffic calming measures, increased enforcement, stationing of ambulance at strategic locations, combined with greater road safety awareness in these areas will help reducing crashes. Some possible options include traffic separation, safer footpaths and crossing facilities, increasing road and vehicle visibility, speed control, augmented programmes on drink drive - helmets and seatbelts, placement of ambulances at strategic locations and others. All these can be included and developed as "Area wise traffic and road safety programmes "with integration of activities.

B7.2. Vulnerable road users are affected most

Findings from different studies in India have indicated that pedestrians, two wheeler drivers and pillions and bicyclists are involved in large number of crashes in India (3,4,5). Data from BRSIPP once again confirm this finding for Bengaluru. In 2009, 350 pedestrians, 198 two wheeler riders, 92 two wheeler pillions and 36 bicyclists lost their lives in crashes. These 3 groups, in total, contributed for 76 % of total road deaths. Figure 19 shows the relative contributions of different road user categories in urban and rural areas for both fatal and non-fatal RTIs.

Among nonfatal injuries, the distribution remained similar with the vulnerable road users accounting for 81.3% of total hospital registrations due to RTIs. The distribution across hospitals was different depending on the total volume of trauma patients.

In the nearby rural area of Tumkur, crashes though lesser in numbers, resulted in greater number of deaths among VRUs. Nearly, 121 pedestrians, 110 two wheeler drivers, 36 pillions and 16 bicyclists were killed in crashes. The hospital data also showed similar distribution with a preponderance of deaths and injuries among VRUs.

Integrated strategies for reducing deaths and injuries among VRUs need to be considered by authorities.

Figure 18a: Fatal crashes in different traffic police station limits, 2009

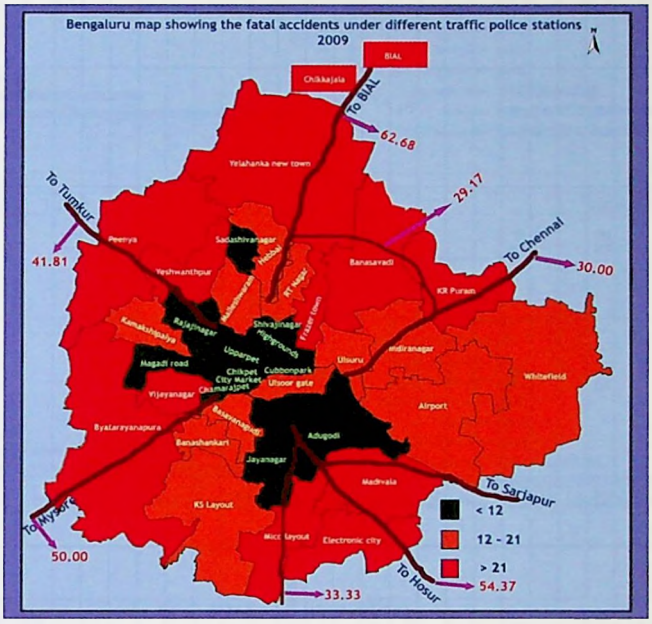


Figure 18b: Distribution of Fatal RTIs along with approximate speed limits

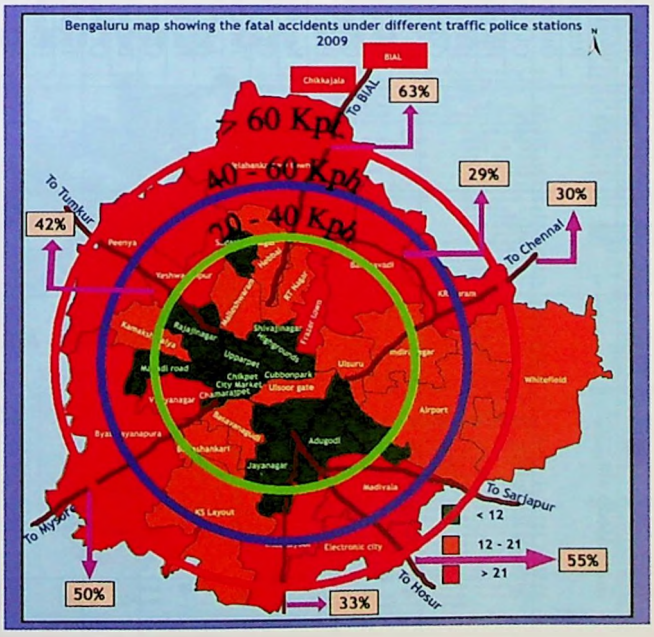
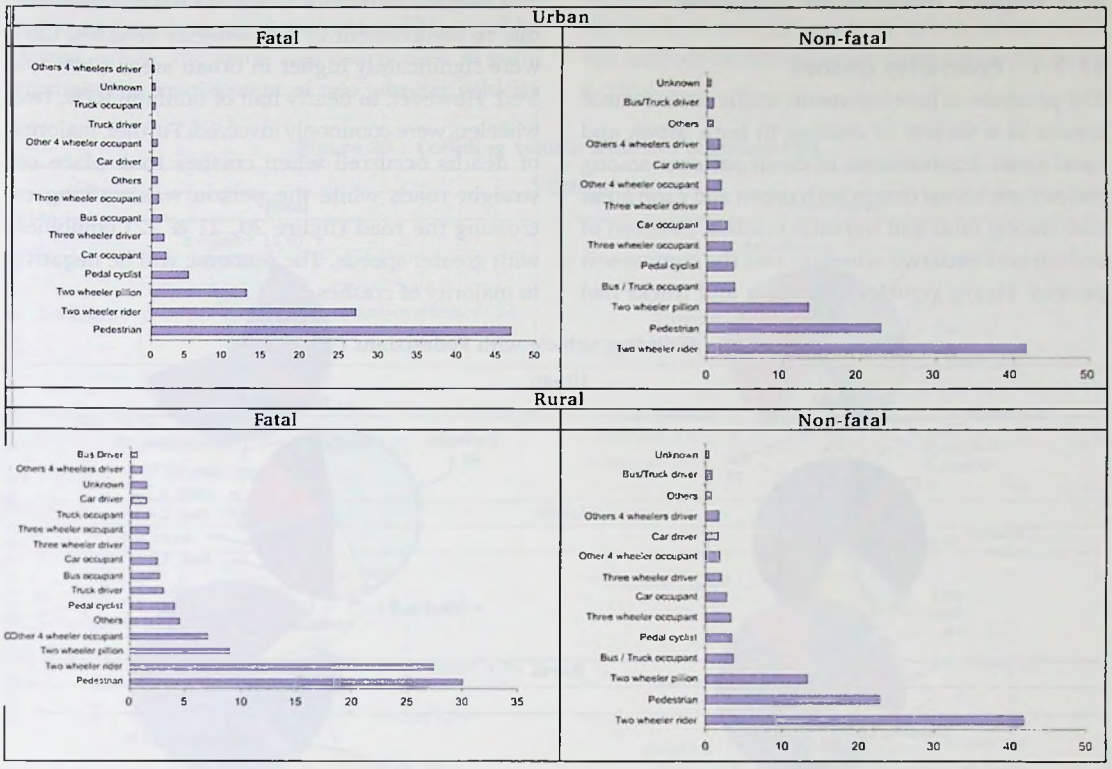


Table 10 : Location of crashes in high risk areas of Bangalore

Sl No	Area	Total Deaths 2008	Total Deaths 2009	Major Roads		Total Pedestrians	Two Wheelers	Cyclists	Car Drivers	Lorry Drivers	Others
1	Byatarayanapura	48	56	Mysore Road	28	23	24	1	0	4	4
				Kengeri Ring Road	5						
				Nice Road	6						
				80Feet Road	4						
				Others	13						
2	Madivala	56	55	Hosur Road	32	28	23	3	1	0	0
				Ring Road	13						
				Others	10						
3	K.R. Puram	98	40	Old Madras Road	12	12	24	1	2	0	1
				Ring Road	11						
				ITPL Road	3						
				Others	14						
4	Yelahanka	45	39	Bellary Road	23	20	12	2	2	0	3
				Doddaballapur Road	9						
				Others	7						
5	Electronic City		37	Hosur Road	18	19	12	2	2	0	2
				Konena Agrahara gate	6						
				Others	13						
6	Yeshwantapura	49	30	Tumkur Road	11	15	13	0	0		2
				Jalahalli	7						
				HMT Main Road	5						
				Others	7						
7	Devanahalli		28	Bellary Road	19	15	10	0	1	1	1
				Others	9						
8	Peenya	50	25	Tumkur Road	12	7	11	3	0	0	4
				Hesaraghatta Road	3						
				Others	10						
9	Banasawadi	32	24	Ring Road	7	13	8	1	0	0	2
				Old Madras Road	4						
				Others	13						
10	Mico Layout	26	24	Bannerghatta Road	8	11	9	2	1	0	1
				BTM Layout	5						
				Hosur Road	3						
				Others	8						

Figure 19: Road User categories in RTI deaths and injuries (%), 2009



DECCAN HERALD

METRO / STATE

Thursday, January 29, 2009

A study conducted by NIMHANS with the support of the Bangalore Police has come up with startling statistics to indicate the correlation between alcohol consumption and road accidents.

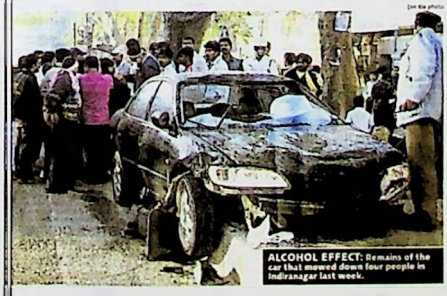
KEY FINDINGS

6% Fatal and 13% non-fatal pedestrian injuries in children below 15 years

51% Killed and 58% injured among men between 15 and 45 years

17% Pedestrian deaths and 10% non-fatal injuries among elderly

Drunken driving on the rise



ALCOHOL EFFECT: Remains of the car that mowed down four people in Indiranagar last week.

DH NEWS SERVICE

BANGALORE: Injury Surveillance Data released by Nimhans points to the fact that about one third of crashes at night are linked to alcohol consumption.

The Bangalore Injury Surveillance Programme (BISP) conducted by Nimhans indicated that alcohol was identified in about 11% of police checks and 38% of road traffic injury registrations at hospitals.

A third of accidents in Bangalore city are due to drunken driving

The study stated that about 15% to 30% of injured patients admitted to hospitals at night were under the influence of alcohol.

Information made available by the Bangalore City Police has shown a dramatic increase in the number of cases booked for drunken driving. From about 15,000 cases in 2003, the number had doubled by 2007. And, the number is likely to increase for the year 2008 with the first half of the year alone resulting in over 15,000 bookings. Although, this might be an indicator of better law enforcement, Police say that imposing a fine is not sufficient.

Other significant outcomes of the report were the identification of Road Traffic Injuries as the third leading cause of death and the occurrence of a majority of accidents between 3 am and 6 am. "Road traffic injuries are becoming rampant with the city's growth and now need to be addressed as a public health concern," said Dr G Gururaj, Head, Department of Epidemiology, speaking at the launch of a Road Traffic Injury Surveillance Programme feasibility report.

Data also indicates that nearly 40% of crashes were due to excessive speed. While the study identified road rage as a contributor to speeding, poor roads and overtaking from both sides resulted in accidents. The data was collected from 25 major hospitals around the city and the Police.

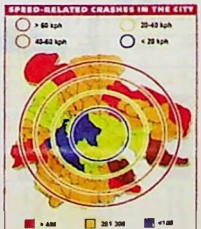
Pedestrians are not safe

Bangalore ranks as the worst among metros in pedestrian fatality. According to the Bangalore Injury Surveillance programme (BISP), the pedestrian walkability index in Bangalore is 0.51, less than any other metro in the country.

The data collected for a period of one year shows that pedestrians contribute to half the deaths and one-fourth of hospital registrations. In one year 601 deaths and 4,313 hospitalisations were reported by the police and hospitals. Given that the data was collected from 21 hospitals, the actual number could be much higher. Estimates from BISP also indicates that nearly 550 pedestrians are killed on an average every year with more than 10,000 injured. According to a study conducted in 2007, Karnataka as a whole also figures among the top ten states with the highest number of pedestrian deaths with 901.

The Bangalore Injury Surveillance programme (BISP) has identified that about 60 - 70% of fatalities among two-wheeler riders were due to head injury. It stated that motorcyclists who do not wear helmets are at a much higher risk of sustaining head injuries. Quoting previous studies, the report states that helmet usage reduces the severity of injuries by about 72% and reduces the chances of death by about 30%.

SPEED-RELATED CRASHES IN THE CITY



Killer two-wheelers

There has been a phenomenal increase in the number of two-wheelers in city over the last few years. Nearly three-fourths of registered vehicles in the city are two-wheelers. According to the fact sheet provided by NIMHANS Bangalore Injury Surveillance Programme, deaths and injuries in accidents involving two wheelers are on the rise. The number of deaths rose from 200 in 2000 to 345 in 2007. As many as 2,700 sustained injuries in accidents involving two-wheelers in 2007.

Statistics also reveal that nearly three fourths of fatal and 82 per cent of non-fatal two-wheeler injuries were in the age group of 16-45 years. The report also states that among those who suffered fatal injuries, more than half the two wheelers were moving at high speed at the time of the crash. More than half of the injured and killed motorcyclists had not worn helmets, indicating the need for stealing enforcement.

Only 2 per cent of the fatal injuries occurred under the influence of alcohol. However, the number could be much higher as this information was not documented in all the crashes.

Disturbing facts

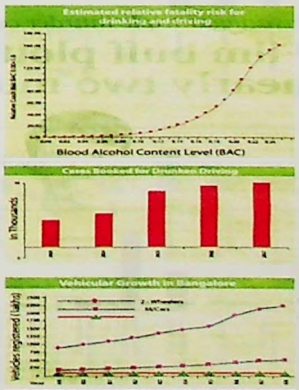
Increase in number of vehicles has led to an increase in number of road accidents. Nearly 3.1 million vehicles ply on the roads of Bangalore today as against 0.7 million about 10 years ago. The number of road fatalities has gone up by nearly 40 per cent compared to 2000.

The National Institute of Mental Health and Neurosciences (NIMHANS) has, in its study, observed that the increase in vehicular movement over the past 10 years has been directly proportional to the road fatalities. The study states, "For every death, an estimated 40 persons are likely to be hospitalised with 70 other sustaining minor injuries."

The study, on using geographical mapping of road accidents, deaths, injuries occurrence has revealed that the number of accidents on the peripheries and outskirts of the City is more than that in the heart of the City which has a heavy traffic congestion.

- 84 per cent of deaths were reported amongst men
- 29 per cent of fatal and 38 per cent of road injuries occurred in the age-group of 21 to 30 years
- While children contribute for 5 per cent of the deaths, elderly account for 11 per cent of fatal injuries.

There were 943 deaths reported in 2007 for Bangalore. With an estimated under-reporting of 10 per cent, the total deaths can be calculated to over 1,000 deaths in total for that year.



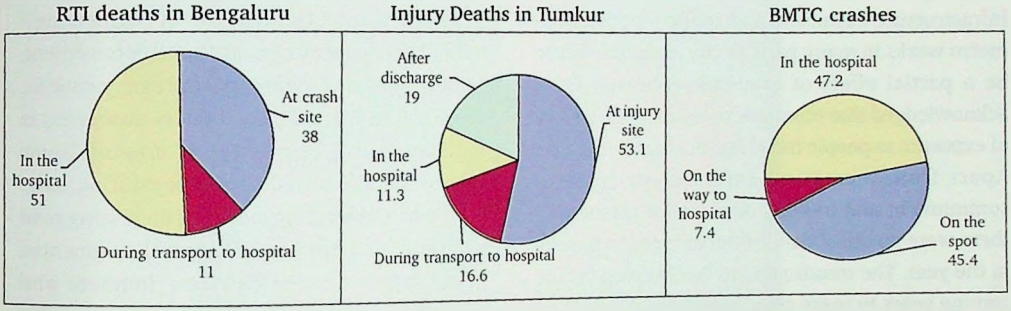
B6. Injury deaths are distributed in phases

Usually, injuries follow a trimodal distribution, with deaths occurring soon after a crash or an injury, few during transfer to hospital and others after admission to the hospital. Some deaths occur as late complications of injury after discharge from the hospital. The precise proportion of these deaths vary as per cause and are influenced by many factors like age , sex, nature and type of injury, availability of care, level of safety policies and a number of other factors.

Data from rural part of surveillance programme in Tumkur revealed that almost half of the deaths occurred at the injury/crash site.

Among RTI deaths in Bengaluru, 38 % of victims died at the crash site, 11 % during transport to hospital and 51 % in the hospital. Less than a % died soon after discharge. Among BMTC crashes, nearly half (45.4%) died at the spot, 7.4% before reaching hospital and 47.2% in the hospital. In rural areas, nearly half died at site soon after injury (Fig. 16).

Figure 16: Place of Death (%)



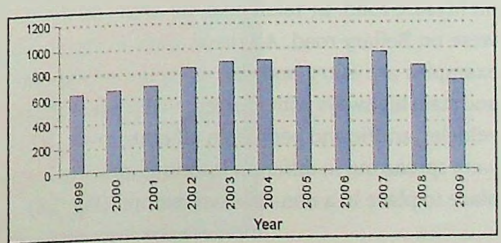
B7. Road crashes, deaths and hospitalisations

In 2009, there were 754 road deaths as reported by police sources. Discrepancies in deaths between police sources and BBMP vital statistics division sources could probably be due to different data sources and methods of reporting. Attempts will be made towards reconciliation of these differences in the year 2010. It is known that late deaths that occur due to complications of RTIs are neither reported in police or vital statistics reports as the associated or underlying causes of injury deaths are not mentioned in both. These deaths would have occurred beyond the 30 day reporting time required for RTIs as per legal definitions. A study undertaken by NIMHANS on Traumatic Brain Injuries in 2005 revealed that 13% of brain injuries (mostly due to RTIs) had died within 12 months of hospital discharge (based on domiciliary follow up visits) (29). Applying these figures for the year 2009, it is estimated that the city would have an estimated 852 deaths due to RTIs.

With regard to nonfatal injuries, data was available from 21207 hospital contact RTI patients. The data collection from 3 large hospitals was limited in 2009 due to administrative and resource contacts and the same 3 hospitals contributed nearly 18,000 RTI patients in 2008. With the assumption that probably same number of patients would have sought care in 2009 (with variations, of course), the estimated numbers would be in the range of 40,000 RTI patients in 2009 due to RTIs in the city of Bengaluru.

The situation in rural areas could be far more different due to poor documentation of events. In Tumkur district, there were 435 reported deaths due

Figure 17 : Trend of Road deaths in Bengaluru



These observations clearly indicate that safety of VRUs should be given importance on Indian roads. Even as the proportion of car users continues to increase, two wheelers are still going to occupy the top slot in MV registrations for many more years to come with the current rate of economic growth. Walking and cycling will remain important and essential modes of travel and safety and health of these groups needs to be ensured. The safety of these groups should be seen as vital in urban roads, on highways and in rural parts of India. Road / vehicle safety aspects and enforcement of road safety regulations need to be given high importance apart from targeted education of these groups.

B7.4. Safety of Public Transport systems

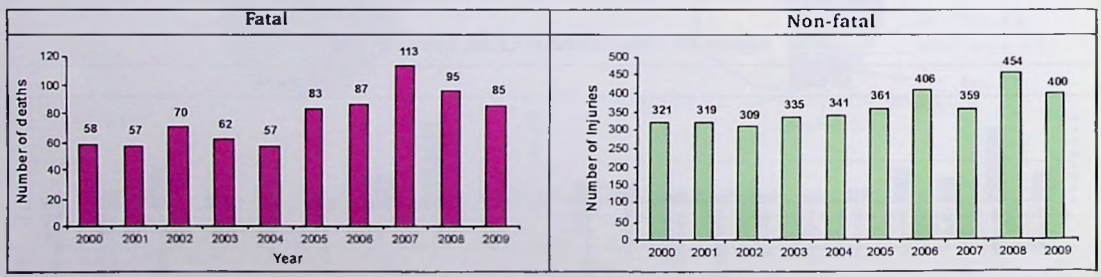
Amidst a large number of vehicles on the streets of Bengaluru, Public and private buses play a crucial role in transport of people and goods both within and outside the city. The Bangalore Metropolitan Transport Corporation plays a central role and transports millions of people every day.

In 2008, the available data was collected from BMTC records and a preliminary survey was completed. Based on the findings of the study, a preliminary report was submitted along with recommendations for improving safety scenario.

In 2009, data collection mechanisms were strengthened and improved. The data collection was undertaken comprehensively for the period 2007 – 09 and a total of 293 records were analysed. Data collection was done by a trained research officer from the CC as staff was not available within BMTC for this activity. A redesigned and validated proforma was finalised in consultation with BMTC staff. Data was collected from available records and each record was totally reviewed in a systematic way and specific information was transferred to the forms. The collected data was analysed using EPI – INFO. The trend of BMTC fatal bus crashes is shown in Figure 26.

A comprehensive report highlighting the crash patterns of BMTC buses has been completed and is pending acceptance and approval by the authorities (available on request). The report has several recommendations aimed at improving safety performance of buses.

Figure 26: Fatal and non-fatal crashes (resulting in serious injuries) invloving BMTC buses, 2000-2009

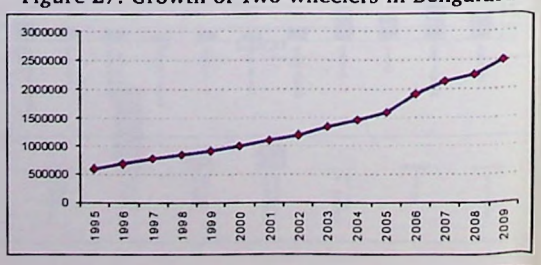


B8. Risk factor information

B8.1 Helmets

Two wheelers have increased significantly on the roads of Bengaluru in the last decade (Fig. 27). Increase in two wheeler vehicles are primarily due to its ease of driving, easy availability, greater income levels of people, media promotion and inability to afford cars. Among two wheeler riders, injury to head and face was seen in 79% and 28% of deaths respectively, while 80% and 26 % of pillions had similar injuries. Injuries to brain and facial organs are a common cause of deaths within this group.

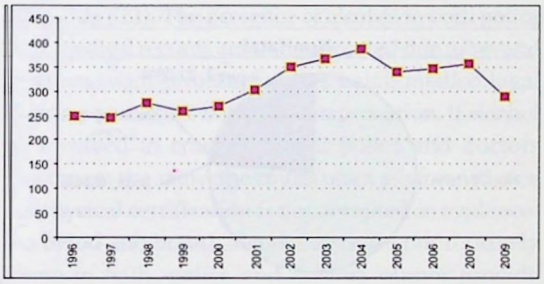
Figure 27: Growth of Two-wheelers in Bengaluru



Use of helmets is an established method for reducing brain injury related deaths and injuries. A helmet primarily reduces the impact of the collision and thereby consequent injury to the brain by (30)

- 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.

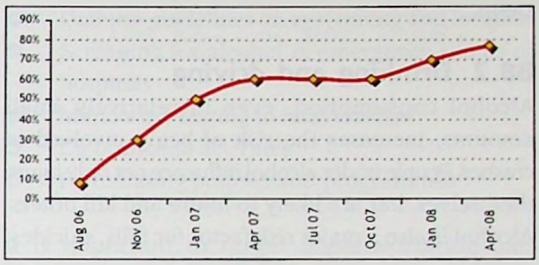
Figure 28 : Two-wheeler deaths in Bangalore (1996-2009)



Karnataka introduced partial helmet legislation (in select cities and only for riders) on November 6, 2006. The Karnataka Motor Vehicles rules, 1989 Rule: 230 stipulates that 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. In addition, it also highlights that helmets should confirm to standards and should also carry reflective tapes of 2 x 13cms to increase visibility.

Our data show that the current use of helmets within the city has gone up from less than 10 % prelegislation to between 60 – 70 % post legislation. The usage rates vary in different parts of the city and also according to day and time and are subject to levels of enforcement. The usage rates in peripheral parts of city (on ring roads, residential areas, on highways), during weekends, at night times are low compared to central – business areas due to varying levels of enforcement (Fig. 29).

Figure 29: Helmet usage among fatal and non-fatal RTIs



Examining helmet use rates among dead and injured people, though not a good measure, still indicates and helps in establishing the efficacy and effectiveness of helmets among those with different levels of injury severity. Data showed that among the killed and hospitalised, only 44% and 51% had worn helmets at the time of crash. Among the fatal RTIs in Tumkur district, only 8 % of the two wheeler riders had used helmets. More data is required on type, nature and wearing pattern to clearly understand people's practices and helps in education programmes. Recently, an independent study on "prevalence of non-standard helmet use "has been completed and data analysis is in progress.

Enforcement by police for violator's not using helmets has been stepped up in the last 2 years as indicated by the number of people booked for violations (Fig. 30). The number of people booked for not wearing helmets has remained around 2,00,000 cases per year along with an increase in fine amount in recent days from Rs.100 to Rs.500 in the same period.

Figure 30: Cases Booked by the Bangalore city police for not using helmets

There is need to strengthen helmet legislation and enforcement for all riders in the city and state to derive good protection from helmets. Targeted education of road users with increased enforcement will strengthen the helmet usage practice. Research is underway to make helmets more convenient and easy to use at Indian Institute of Technology in New Delhi.

B8.2 Drinking and driving

Alcohol consumption, even in relatively small amounts, increases the risk of being involved in crashes. People under alcohol influence not only injure themselves, but are likely to injure and kill others. Alcohol is also a major risk factor for falls, suicides, violence, child abuse, and others. Consumption of alcohol leads to poor judgment, slow reaction, delayed reflexes, poor visual attention, improper coordination, difficulties in identifying dangers on roads, and thus affects driving performance. Alcohol brings in a pseudo euphoric effect making the person less inhibitive, consequently resulting in higher speeds and non-adherence to safe behaviour on roads. Studies have shown that the severity and impact of injuries are higher, deaths are more, and disabilities are greater when alcohol is involved in crashes (31)

As per the Central Motor Vehicles Act, 1988 Sec 185: Whoever, while driving, or attempting to drive, a motor vehicle, has in his blood, alcohol exceeding 30 mg. per 100 ml. of blood detected in a test by a breathalyser, or is under this influence of a drug to such an extent as to be incapable of exercising proper control over the vehicle, shall be punishable for the first offence with imprisonment for a term which may extend to six months, or with fine which may extend to Rs.2000, or with both; and for a second or

Figure 31: Alcohol use among Fatal and Non-fatal RTIs, 2009

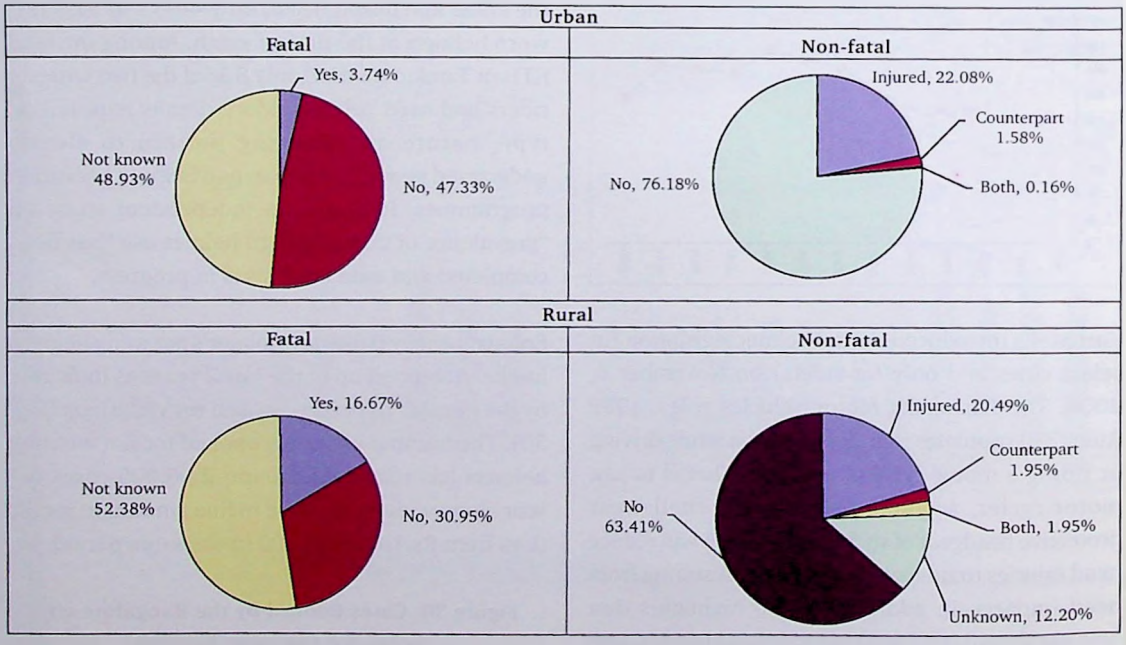


Figure 32: Alcohol from previous studies

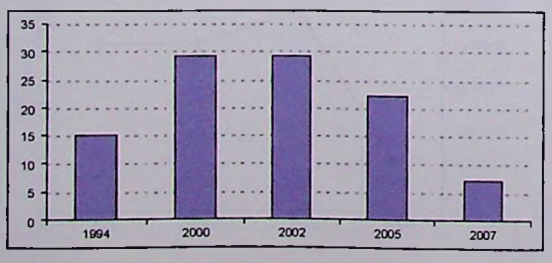
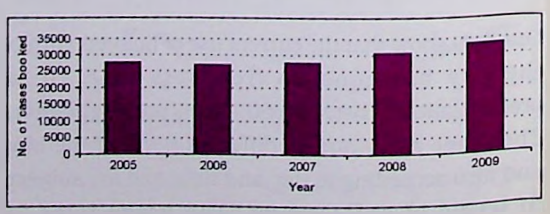


Figure 33: Trend of Drunken Driving cases booked by the Bangalore City Police



subsequent offence, if committed within three years of the commission of the previous similar offence, with imprisonment for a term which may extend to two years, or with fine which may extend to Rs.3000, or with both.

Data from BRSIPP show that, among road deaths that occurred in 2009, 4% of road crashes were linked to alcohol use among the dead person. In 5 % of cases alcohol involvement was found in the driver of the colliding vehicle (Fig. 31). There could be a gross underreporting of alcohol involvement in road deaths as alcohol levels are not measured in each and every case. Similarly, among hospitalised individuals, alcohol was seen in 22 % of injured persons. This is an improvement from nil recording in 2008 to selective documentation (probably due to training of people in police and hospitals). However, this data is still inaccurate as previous studies have shown that nearly a third of crashes occur during 8 pm – 6 am, and a third of these are linked to alcohol (Fig. 32) (32). The presence of alcohol in both police and medical records are underreported due to several reasons, with prominent ones being medico legal barriers and issues linked to compensation. If alcohol is involved in crashes, and if police and doctors document the same, the courts often ask for evidence as physical certification is not accepted as evidence. As blood and breath alcohol tests are not routinely done in both, police and doctors cannot provide evidence and hence, do not document the same. Further, families do not receive any compensation if there is alcohol involvement. Thus, in order to help families of injured and killed, alcohol is not routinely entered into records. This calls for changes in legal system to allow documentation and to delink the same from legal issues and to encourage mandatory documentation in records. In the rural area the alcohol use among those fatally injured was nearly 2% but the alcohol use in the driver of the colliding vehicle was 17%.

The implementation of drink driving laws has been stepped up since 2007 as seen by increasing number of convictions in this period (Fig. 33). The number of convictions has gone up from 27644 in 2007 to 33241 in 2009. Despite the increase in enforcement, it is well acknowledged that drinking and driving still remains a major problem.

Recommendations of 2008 National Consultation on reducing drinking & driving in India

- Capacity strengthening of policy makers
- Strengthening data collection systems
- Up scaling enforcement activities
- Revision of existing laws
- Guidelines for drivers and service industry
- Uniform guidelines on age, timing and location
- Screening for alcohol in emergency rooms of hospitals
- Mandatory testing in fatal crashes
- Co-ordinated activities
- Formulating policies and programmes

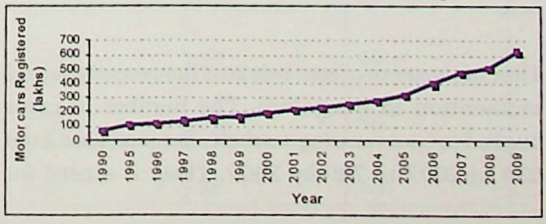
It is important to target implementation and enforcement of drink drive laws at

- males in 18 - 45 years,
- teenage drivers,
- two wheeler - car - heavy vehicle drivers and
- those driving during 8 p.m. - 12 midnight
- peripheral, outer city areas and on highways.

B8.3 Seat belt use

Car drivers and passengers can get injured in crashes as the driver may collide with vehicle in front, may hit a stationary object, may be hit by vehicles from back or may suddenly apply brakes in traffic. In all these crashes, the driver and passengers are thrown forwards or in other directions and can sustain injuries to head, chest and abdominal organs. A seat belt is a safety harness designed to keep the occupant of a vehicle inside the vehicle and in place by reducing / minimizing rapid movements that occur soon after a crash. Seat belts reduce injuries by stopping the driver from hitting interior objects and passengers in the cars and by preventing the driver / passenger from being thrown out of the vehicle. Seat belts also distribute the forces of rapid deceleration over larger and stronger parts of the body, such as the chest, hips, and shoulders. The seat belt slow down the body movement by stretching slightly and holds the occupant in the same position by keeping

Figure 34: Growth of Motorcars in Bengaluru



him / her in their seat and hence, will not be thrown around during a crash (33).

Figure 35: Seat Belt Use among Fatal and Non-fatal RTIS in Bengaluru

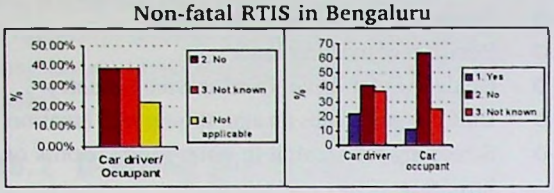
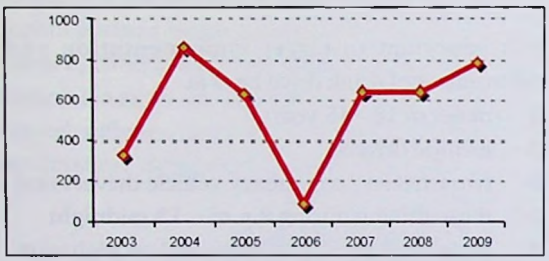


Figure 36: Trend of Seat belt cases booked by the Bangalore city police



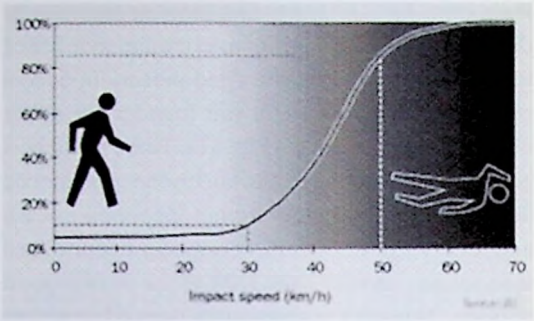
The Central Motor Vehicles rules, 1989 as amended by The Central Motor Vehicles (first amendment) rules 2003 stipulates that all cars manufactured after 1998 shall be fitted with seatbelt and should be in conformity with AIS:005-2000 and AIS:015_2000 specifications. However, as in other areas, enforcement is left with states and enforcement has been far from satisfactory. The status of implementation of seat belt law reveals that only few have been penalized for not wearing seat belts and the fine is just Rs.100.

Despite the availability of seat belts in India for some time, the usage has been abysmally low. There are no population based surveys done till date to see the use, but is estimated to be less than 10 %. No efforts have been made for education of car drivers, even when seat belts are available. Data from BRSIPP reveal that among the fatal RTIs, none of the car drivers were wearing seat belts at the time of crash. Among those hospitalised, 21.9% of car drivers and 11.7% of the car occupants were wearing the seat belt.

The enforcement of seat belt laws has recently gained momentum in Bangalore. The number of cases booked for not wearing seatbelts has increased from 636 In 2007 to 780 by 2009. There is a need for stricter enforcements and systematic education programmes to increase seat belt use.

B8.4 Speed

Figure 37: Effect of Speed



Excessive speed and associated behaviours like overtaking (from wrong direction) are key risk factors in road crashes. Generally crashes occurring at higher speeds, result in greater generation and transfer of mechanical energy to the affected person; when this exceeds the physiological tolerance of the individual, it results in damage to body organs. The level of damage to the body is influenced by the shape and rigidity of the colliding object along with velocity of the impact. Every increase in mean speed levels by 5% leads to approximately a 10% increase in all injury crashes and a 20% increase in fatal crashes (Fig. 37) (34).

Some common reasons for increasing speeds are - covering the required distance in shorter period of time, increasing productivity and greater returns, fun and pleasure seeking, good condition of roads, availability of fast moving vehicles, false perceptions on safety, traffic conditions, enforcement practices on speed limits and knowledge and practice of road users. Young drivers are more likely to speed and end up in crashes, resulting in more deaths and hospitalisations.

The BRSIPP data has not included measurement of speeds and linkage to crashes, as it is only a surveillance programme and not a crash analysis study. Our efforts to identify this in police records have had limited success. However, a few data pointers indicate the presence and association of speed as a major factor.

- Anecdotal reports and media news items covered soon after a crash indicate that majority of crashes occurred when moving vehicles were in high speed.
- Most of the deaths occurred in peripheral parts of city, ring roads and on highways, where roads are in good condition and high speeds are common.
- 91% of crashes occurred on straight roads and majority of these were separated roads.
- 89% of deaths occurred when visibility was good.
- 8% were head on collisions and 19% were rear end collisions.
- The condition of vehicles was not known as this data comes from motor vehicle inspections after crash.

The IMV act has stipulations on speed management and implementation of these has been poor due to lack of resources and technology with enforcement agencies.

Experience of many countries indicate that mobility and safety needs to go together to save lives of people. Classifying roads based on purpose and fixing appropriate speed limits, appropriate and visible signage's, staggering traffic flow, speed warning

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.

Sl. No. (1)	Class of Motor Vehicle (2)	Maximum speed per hour in km. (3)			
		Near Educational Institutions	Ghat Roads	In the city limits of Bangalore, Mysore, Mangalore, Hubli-Dharwad, Belgaum and Gulbarga	All other places
1.	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

signs, speed controlled 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 are some examples in managing speeds. Several intelligent transport systems incorporating elements of speed control and adaptation in different settings have been seen in many parts of world. Combined with enforcement strategies like formulating road rules and speed limitations, use of speed cameras, automated enforcement systems, appropriate penalties for violations and others are highly effective. Increasing public awareness and improving compliance towards speed restrictions is an important activity, requiring education to public through campaigns and public education programmes on speed reduction.

Despite limitations of resources, the city police have stepped up enforcement as seen by an increase in booking violators in different places. With the help of interceptors and speed surveillance cameras in certain locations, 2009 saw an increase in catching violators to the tune of 55189 Offences. Many engineering technologies in both vehicles and roads can pay greater dividend bringing automatic compliance from the road users (Figs. 38 and 39).

Figure 38: Trend of Overspeeding cases booked by the Bangalore City police

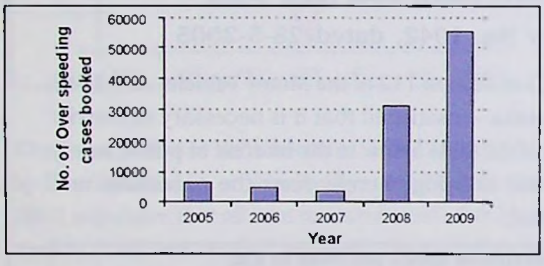
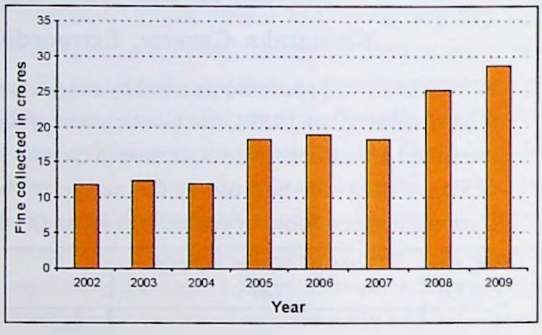


Figure 39: Fine collected Under the Indian Motor Vehicle Act by the Bangalore City Police



B9. Solutions and strategies for road safety

For a long time, it was believed that road crashes and injuries are accidents and hence, cannot be reduced. Years of research and implementation of safety programmes demonstrated that it is possible to reduce road crashes. With improvements in understanding human behaviour and the way people behave on roads and in vehicles, a safe systems approach has evolved in recent years. Several countermeasures in road engineering, safe design of roads and highways, vehicle safety, increased enforcement of helmet - drink drive - seat belts- child restraints laws , effective speed management strategies, adequate trauma care and others have played a key role in road crashes. These have been put in place through engineering, legislation and enforcement, education and timely trauma care strategies in different ways. The past few years have also shown what works and what does not work in road safety.

Need for revision of IMV Act.

Under the Indian Motor Vehicles Act of 1988, several road safety laws have been formulated and are implemented at the local levels by police and transport authorities. These were formulated several years back, when transport scenario was different. With increase in road crashes and addition of huge number of vehicles, there is need for revision. Recognising this need, recently the Ministry of Road transport and highways is in the process of revising these laws and the process has been set in motion.

There is need to modify / amend regulations in the areas of driver licensing systems, age of driving, speeding, use of helmets, dangerous driving, racing on roads, drinking and driving, Use of drugs and driving, use of seat belts, use of cell phones while driving, child restraints, visibility, obeying traffic rules, carrying excess people on vehicles, disabilities

and driving, health status of drivers, fatigue and sleeplessness, emergency care, safety rights of pedestrians and crash (accident) reporting and investigation systems.

Specifically with regard to road safety, there is an urgent need to revise laws in conformity with national requirements and based on international experiences. These revisions need to keep in mind the possible changes likely to occur in the coming years with inbuilt provisions for periodical amendments.

With the data available from BRSIPP and other national studies, inputs have been provided for the expert committee to facilitate required changes. The set of recommendations and the proposal submitted is given in annexures 2.

Most importantly, since the laws and revisions are intended to make people safe and reduce road deaths and injuries, it is essential to monitor and evaluate the impact of these laws in the coming days.

B10. Falls

Estimated deaths: 500; serious injuries: 10,000

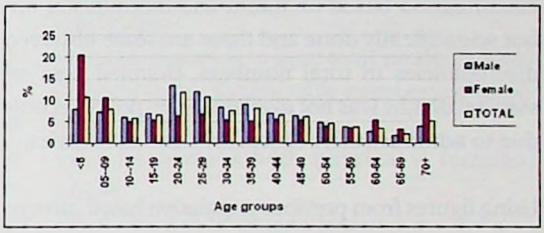
Falls commonly occur in homes, schools, construction sites, roads, public places, and are an important cause of deaths and disabilities. A "fall at a construction site" can result in instantaneous death for the worker, while a "simple fall from a chair" can turn out to be a life long disabling condition for the injured person.

- In 2008, there were 147 fall deaths as per mortality data from the vital statistics division of BBMP. Many of these deaths occurred in 15-34 yrs age group and males predominated females. Actual numbers could be higher as only smaller number of institutions could have reported precise cause of deaths.
- The number of fall deaths as per CCRB reports for the year 2009 was 93. Once again, these numbers could be much higher as only unnatural and medico legal cases are reported to CCRB. In the same year, there were 5837 patients brought to hospitals due to fall injury.

In both fatal and non-fatal injuries, males accounted for 80% of falls (ratio of 4:1 between men and women). In the non-fatal injuries, women in younger (<15 yrs) and elderly age groups were represented in higher numbers compared to men. Nearly 24.3% and 10.5%of the hospitalisations were in children and elderly respectively (Fig 40).

The data from hospitals indicate that home (44%) was the commonest place of occurrence of falls followed by roads (23%). Almost half (51%) of the patients who sustained falls had a moderate to severe type of injury. Majority of these patients (87%) were either admitted for medical and surgical care or referred to another centre for treatment.

Figure 40 : Age Sex distribution of Falls -Non-fatal



Dr. Pallavi Sarji, in her M.D., thesis at the M.S. Ramaiah Medical college, observed that falls were the highest among the very young (<4 yrs and very old (>75 yrs). 25% of the child hood injuries were falls, with the common place of occurrence being home followed by schools. (35)

In another study on domestic injuries by Dr. Ashok for his M.D., in community Medicine, observed that falls (39.5%) were the most common cause of domestic injuries followed by burns. The age group of 15 – 44 yrs was involved in maximum number of domestic injuries. Slippery floors were found more in households reporting these accidents. (36)

Prevention of falls requires in-depth analytical research to clearly delineate individual – environmental and responsible product role in understanding risk factors. Improving awareness levels among household members, eliminating slippery floors and improving health of elderly can reduce falls among elderly, while better supervision of children by parents can help children.

B11. Suicides

Estimated deaths: 2,500; attempted suicides: 25,000

Information on Intentional self harm or suicides data was collected from BBMP vital statistics division, office of the city crime records bureau and from participating hospitals.

In 2007, there were 2429 completed suicides as registered by police and 5328 attempted suicides registered in 21 hospitals. After excluding undefined categories the ratio of completed to attempted suicides was found to be 1: 6.

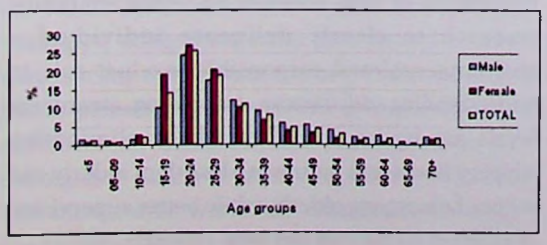
In 2009, there were 2374 completed suicides as per CCRB data and included hanging and poisoning. Even though data is received from CCRB, the classification based on intent and mechanisms are not scientifically done and there are some observed discrepancies in total numbers. Detailed data on suicidal deaths was not available from police records due to administrative and procedural difficulties.

Using figures from previous population based surveys, it is estimated that the city has on an average 2500 completed suicides and 25,000 attempted suicides. Number of persons harbouring suicidal ideations is likely to be much larger and can only be guestimates.

The available data provided from 1703 attempted suicides is a reflection of profile and patterns and caution has to be exercised in extrapolating these figures to the larger population.

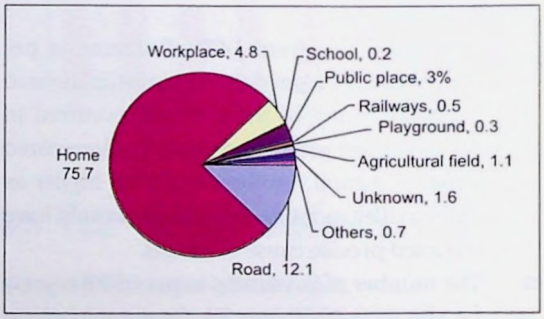
- Nearly 78% of attempted suicides occured in younger age groups of 15-39 years. Women outnumbered men in early age groups of 15-29 years (Fig 41).

Figure 41 : Age Sex distribution of attempted suicides



- Nearly 85 % of attempted suicides were first recognised by family members and were brought to hospitals.
- More than 90 % of suicides were among residents of the city.
- Using education and occupation as proxy indicators, it was observed that 2 / 3rd of suicides occurred in poor and middle income households.
- One out of 2 suicidal attempts occurred during 6 pm – 6 am in the city.
- Students, housewives, manual labourers, business employees and professional groups were seen in 15.9%, 4.9%, 30 %, 10 % and 12 % of the categories.
- Every alternate attempt occurred among married households and one in three were in unmarried groups.

Figure 42 : Place of attempted suicides (%)



- Home was the commonest place of suicides and ¾ of the suicides were attempted at home. The next common place was roads (Fig. 42).
- The intent, though difficult to establish in a busy casualty setting revealed that 80 % of attempts were clearly intentional in nature.
- Commonest method of suicidal attempt was consumption of organophosphorus compounds and over the counter drugs, as they were within easy reach of individual. Our previous studies have indicated that they were purchased by the individual earlier.
- A history of alcohol consumption in the individual or among spouses / parents was present in 9% of the attempted suicides (definitely much higher).

- Information on precipitating factors, causes or mechanisms was not available clearly and has not been included in this analysis.
- In all, 2/3rd reached hospital directly and 1/3rd were referred from 1st contact hospitals. Nearby government or private hospitals were the first point of contact among 1/3rd of attempts and the treating doctor was the first person to provide care. The mode of transportation was predominantly auto rickshaws (25 %) and private vehicles (40 %), with ambulance transfer seen in 27 % of attempted suicides.
- Nearly a third (32%) of the patients were unconscious or semiconscious at the time of hospital entry. One third were admitted straight to medical wards and more than half were treated in casualty departments for more than 6 hours, while 10 % were treated and sent home. Three % had died by the time they reached hospitals.

Suicides are complex phenomena and occur due to combined, cumulative, progressive and interactive factors operating in social, cultural, psychological and health domains of an individual or his family. Larger societal factors and policies and programmes play an important role by acting as precipitating or triggering factors. Prevention of suicides requires a careful understanding and interplay of factors and identification of larger modifiable risk factors. This requires regular good quality information supplemented by focussed and well designed research. To build this process, it requires total cooperation and participation of health professionals, police officials, law makers and policy makers along with several other sectors contribution. Surveillance of suicides and strengthening of research are crucial to formulate programmes and policies. Some established and known strategies likely to reduce suicides are

- Recognition of individuals with warning signs and symptoms
- Crisis help for distressed individuals and families
- Mechanisms for crisis intervention
- Life skills for coping with stress
- Expansion/ strengthening of mental health care.
- After care service for suicide attempters
- Limiting availability of hazardous chemicals and drugs
- Parental education to keep toxic products away from the reach of vulnerable members of family
- Family support systems
- Care for persons with physical / terminal illness.
- Legal changes in suicide laws.
- Policy changes and reforms at macro levels, and
- Stigma reduction

B12. Burns and Fire Injuries

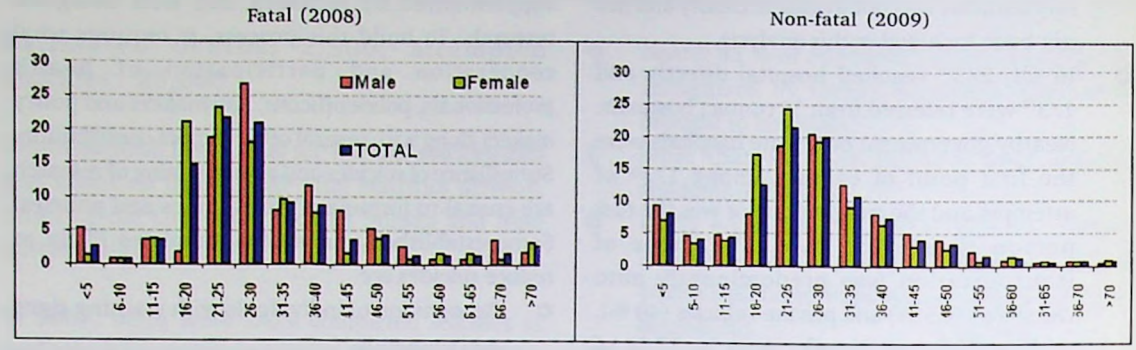
Estimated deaths: 500; serious injuries: 5,000

Burn injuries are one of the commonest causes of deaths, hospitalisations and disabilities and are regularly reported in the media. A variety of products ranging from electrical, thermal, mechanical and radiant in nature contribute for burns. Burns can be suicidal (which is very common in India among women in 15–29 years), homicidal or accidental.

- Nearly 360 persons (11%) lost their lives due to burns injury in the city of Bengaluru in 2007 as per police reports. At the same time, 2,517 persons were hospitalized with a ratio of 1:7. It is likely that numbers could be higher as many of those receiving care in other institutions and those with minor injuries are not included.
- As per data from Vital statistics division of BBMP, there were 875 deaths due to fires and burns in 2008. In 2009, as per police reports, there were 788 burn deaths in the city.
- In 2009, hospital data was not totally available as data was not collected from one of the earlier participating institutions due to procedural difficulties and resource constraints.

Nevertheless, using data available from earlier sources, the actual numbers of deaths, hospitalisations and minor burns could be in the

Figure 43: Age-sex distribution of Burn injuries (%)



Officials inspect the site of a fire at a children's hostel in Palin, Arunachal Pradesh, on Thursday. PTI

14 die in Arunachal hostel fire

ITANAGAR, PTI: At least 14 students were burnt to death and seven injured on Thursday in a fire at a private hostel in Arunachal Pradesh's Kurung Kumey district, bordering China, official sources said.

The students of Holy Angel Don Bosco School, both boys and girls, were killed after a fire swept through a hostel made of bamboo at Palin area in the district, Officer on Special Duty to the chief minister Nob Tshering said. Prima facie, it appears that a short circuit could have led to the blaze, he said.

"The fire broke out at 2:30 am. There were about 56-60 students in the hostel when the mishap took place," Deputy Inspector General of Police (Crime) Tashi Lama said.

Tshering said two platoons of reinforcements were rushed from the district headquarters of Koloriang to Palin. A platoon of Central Reserve Police Force was rushed as tension prevailed in the area following a clash between locals and school authorities after the incident.

Dated 12th Feb 2010 - DH

ratio of 1: 10: 30 with about 500 deaths, 5,000 hospitalisations and 15 – 20, 000 minor burns. Victoria hospital, an exclusive burns management centre with Bangalore Medical research Institute registered 815 Deaths, 1566 hospitalisations and 1911 minor injuries during Jan 1 – Dec 31, 2009 (personal communication) . Among the total, 1/3rd were suicidal, 6% homicidal and 60% reported it to be accidental in nature. Two thirds of injured and killed persons were brought or reported by family members.

Data from the previous report (28) indicated that burn related deaths were

- High in the younger age groups of 16-40 years, with one fifth each occurring in 21-25 and 26-30 years (Figure 36). Interestingly, ¼ of burn deaths occurred in less than 20 years age group. Women were overrepresented in 15–25 years in both fatal and non-fatal burn injuries. The male to female distribution was 2:1 in the total series, while it was 1:2 among those in younger age groups. This phenomenon has been reported by many Indian studies and causes are primarily attributed to cultural issues.
- Three fourths of burn deaths and injuries occurred at home and remaining were seen in industrial areas and other places.
- Majority of the burns were reported as stove bursts, and accidental burns and had occurred inside the house. Kerosene stoves, gas cylinders, oil lamps, cooking materials and hot liquids were the primary agents responsible for burn injuries. The causes of burns were not clearly known in majority of the instances.

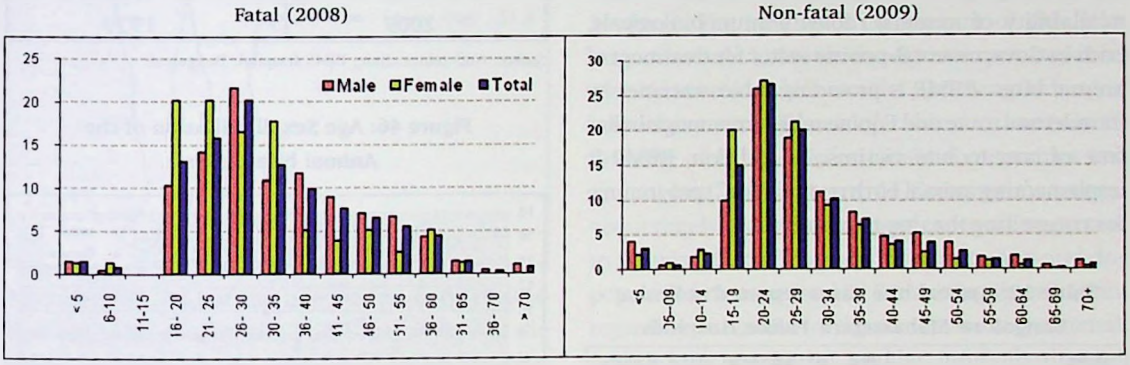
Once again, understanding the epidemiological characteristics of burns injuries is crucial to identify what needs to be addressed for prevention. In 2010, it is proposed to set up a Burns Registry in one of the leading centres. Improving socioeconomic conditions of households, making available safer stoves, safe electricity connections and electrical products, family education programmes are likely to help burns injuries.

B13. Poisoning

Estimated deaths: 500; serious injuries: 10,000

Poisoning is one of the commonest injury causes for deaths and hospitalisations. Many cases of accidental poisoning due to food, alcohol and others are frequently reported in the media. As a variety of organophosphorus compounds, Over The Counter (OTC) medicines, household products and other dangerous chemicals are easily available, a vulnerable person can easily commit acts of poisoning; important to note that poisoning can be suicidal, accidental and homicidal in nature. Causes of poisoning are unclear even at national level as there are no large scale studies.

Figure 44: Age-sex distribution of Fatal & Non-fatal poisoning



- In Bengaluru, nearly 300 people (9% of total deaths) lost their lives due to a poisoning act during 2007, while 10% of those hospitalized due to an injury were due to poisoning. Among them, 75% were men and 25% were women. Highest number of poisoning deaths was seen in 21-30 years (36%), while poisoning among teenagers in 16-20 years was 13%. Among the non-fatal poisoning cases 60% were in the age group of 16–34 years. In similarity to burns, in both fatal and non-fatal poisoning injuries, there were more women in the younger age groups (16–34 years) as seen in Figure 44.
- Summary data available from CCRB sources in the city, indicate that there were 349 poisoning deaths and most of these were suicidal (80%) with homicidal and accidental poisoning being about 1-2% and 18-19% respectively.
- Hospital data was available in 1406 (4.2%) instances of poisoning and indicates that among 82% of these cases, these were consumed with suicidal intent. Only 11.4% of them were unintentional and most of these were among children (<14 yrs).

B14. Animal Bites

(contributed by Dr.Ashwath Narayana from one of the partner institutions, KIMS)

Animal bites are a common problem and all hospitals provide care for injured persons. Among them, Rabies is 100 % fatal but is preventable by timely post exposure rabies prophylaxis (local treatment of wounds, administration of anti rabies vaccines and vaccines and local infiltration of rabies immunoglobulin in WHO category III exposures). An estimated 20,000 human rabies deaths and 17.4 million animal bite cases occur in India every year. Dogs continue to be a major source (96 %) of

infection in India. The dog census in Bangalore city revealed that there were 320,000 dogs (180,000 stray and 140,000 pet dogs) in BBMP area. During the current year, nearly 17,000 victims sought treatment for animal bite in different health care settings under BBMP (Table 12). Majority of animal bite victims visiting BBMP hospitals for post exposure prophylaxis were children and belonged to lower socio-economic class.

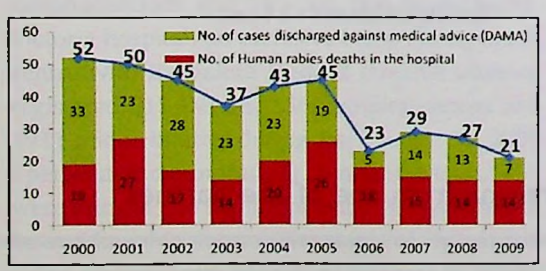
There is apparent reduction in number of human rabies deaths reported at Epidemic diseases hospital (EDH) in Bangalore (Fig. 45). This may be due to availability of modern rabies immunobiologicals, both in Government & private sector for treatment of animal bites. BBMP is providing rabies vaccines by intradermal route and Equine rabies Immunoglobulins free of cost to bite victims. In addition, BBMP is implementing animal birth control (ABC) programme for controlling the dog population.

Table 12: Animal bite cases reported at Bruhat Bangalore Mahanagara Palike Hospitals

Year	No. of animal bite cases reported at BBMP hospitals
2003-04	22,912
2004-05	32,967
2005-06	28,006
2006-07	17,798
2007-08	21,121
2008-09	13,833
2009-10 (up to Dec. 09	16,584

Source: Pilot project office, BBMP, Bangalore.

Figure 45: Trend of Rabies cases in Bangalore



The anti rabies clinic, run by Department of Community Medicine, Kempegowda Institute of Medical Sciences (KIMS) is a referral centre for management of animal bite cases in the city of Bangalore. Nearly 2000 cases are seen annually (Table 13). The centre undertakes epidemiological studies, clinical trials and is also the registered office of Association for Prevention & control of Rabies in India (APCRI) & The Rabies in Asia (RIA) Foundation

Table 13: Animal bite cases reported at the Anti-rabies clinic, KIMS Hospital

YEAR	TOTAL
2005	1585
2006	1912
2007	1996
2008	1976
2009	1979

Source: Anti rabies clinic, KIMS hospital, Bangalore.

Figure 46: Age Sex distribution of the Animal bites cases

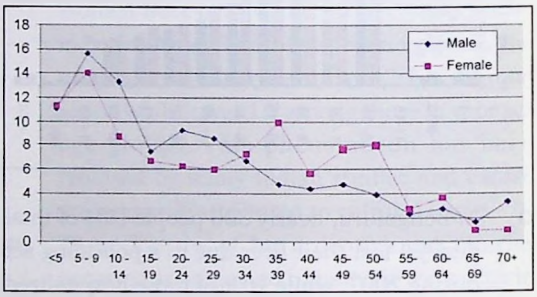
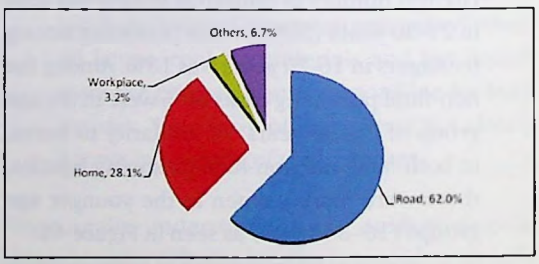
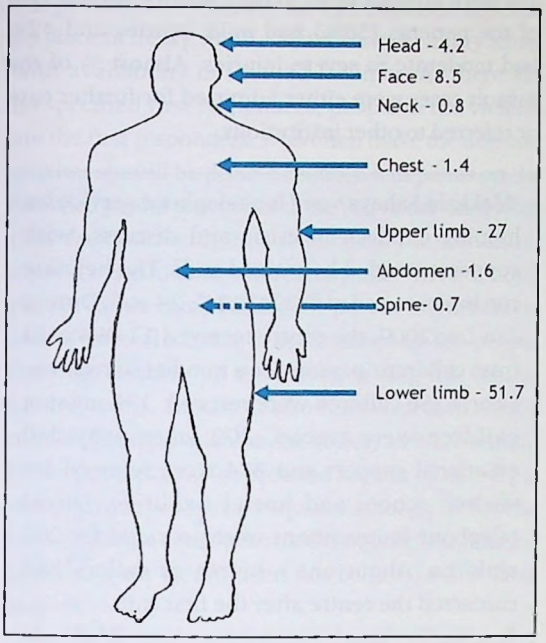


Figure 47: Place of Occurrence of Animal bite cases



Children < 15 years (37.4 %) , and within them in 5 - 9 year years (15.2 %) were bitten by dogs to a greater extent. The overall male to female ratio was 3: 1. While nearly one fourth of the cases (72.6%) were from within Bangalore, nearly two thirds of them were bitten (62.0%) on the road (Fig. 47). More than half of the bites occurred when the person was either walking (47.9%) or standing (4.8%) on the road and one fifth (20.0%) were playing when the bite occurred. Bites were frequently on Lower limbs (51.7%) and Upper limbs (27%) (Fig 48).

Figure 48: Animal bites and body parts involved



Majority (84.7%) of the bite victims had received first aid, with one fourth (24.6%) receiving it at the place of injury; of the remaining, 45.5% received first aid in a government hospital and 25.8% in a private hospital / nursing home or medical college. Only 16.6% of the bite victims did wound toileting by themselves. Three fourths of the patients (74.8%) had already visited one other hospital before coming to KIMS hospital and were commonly referred from a government hospital (49.7%) or private hospital / nursing home (21.1%). More than two thirds (64.9%) had used a private vehicle to transport the patient and less than 15% had severe type of injury.

The Government of India / National Centre for Disease Control (previously National institute of Communicable Diseases, NICD) has initiated a 2 year pilot project on "Prevention of human rabies" from 2009 to be implemented in 5 cities of India viz. Delhi, Ahmedabad, Pune, Bangalore and Madurai. The important component of this pilot project include 1) Provision of post-exposure rabies prophylaxis to all bite victims 2) Strengthening of laboratory surveillance of rabies in animals 3) Training of health professionals about rabies and animal bite management 4) Creating awareness about timely and adequate post exposure treatment to all animal bite victims in the community and dog population management 5) Sensitizing veterinarians regarding vaccination of the owned and stray animals with potent vaccine at regular intervals through active community participation, controlling their habitat, movement and population 6) Involvement of NGOs and Community. The BBMP is the nodal project implementing agency in city of Bangalore.

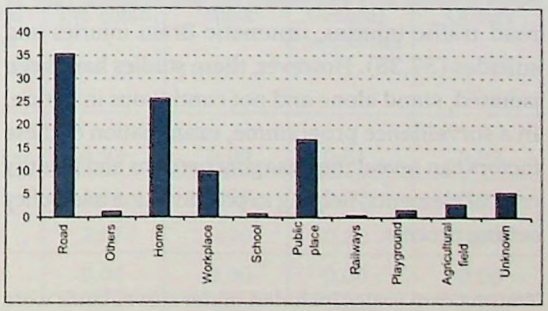
B15. Assault / violence

Estimated deaths: 200; serious injuries: 25,000

Violence is a commonly used term and includes homicides, assault, rape, injuries due to riots and wars, abuse of elderly – women – children, custodial related injuries, etc. The precise magnitude of the problem and its causes are difficult to establish in a surveillance programme and requires focused investigation.

- In 2009, there were nearly 207 deaths due to assault / homicide/violence in the city and nearly 3000 were provided care in 10 select institutions.
- The ratio of fatal to non-fatal injuries was 1: 300 based on data of 2008 under BRSIPP. Non-fatal injuries registered were primarily due to interpersonal violence and domestic violence but also included other types of violence. Majority were brought to hospitals in a state of acute injury by family members or friends / acquaintance.

Figure 49: Place of assault / violence



Assault /Violence was most commonly observed in the 20 – 34 yrs age group. Beyond the age of 30, violence was committed more against women as the injury cases were more among women as compared to men. Majority of the assault cases brought to the partner institutions were conscious (89%). Less than 5% of the cases were unconscious and only less than 1% were brought dead to the casualty. Almost half of the patients (58%) had mild injuries and 42% had moderate to severe injuries. Almost ¾ of the assault cases were either admitted for further care or referred to other institutions.

Vanitha Sahaya vani is an exclusive helpline run by Bangalore City Police to help women in distress. The agency can be contacted at "22943225" from any telephone and people also have direct access. The centre is run by professional staff offering services to needy women in crisis situations. During April 2008 - March 2009, the centre received 1135 calls and more than half (770) were provided support on telephone helplines. Based on the nature of calls, the callers are also referred to Family Counselling centre (1066), police help, legal counseling and short stay homes. Majority of the calls are related to Marital disharmony, dowry harassment, alcoholic problem in spouses, financial issues and other issues.
Source: Personal communication : "Vanitha Sahaya Vani"

"Makkala Sahaya vani" is a telephone service for helping children in crisis and distress, with support provided by trained staff. The helpline can be contacted at "22943224", 24 × 7. During Jan-Dec 2009, the centre received 11,094 calls from children/ parents for a number of reasons. Nearly 156 children were rescued, 131 missing children were traced, 200 were provided emotional support and 374 were referred for shelter, school and hostel facilities. Direct telephone interventions were provided for 207 children. About one - fourth of callers had contacted the centre after the first call.
Source: Personal communication, "Makkala Sahaya vani"

"Hiriyara Sahaya vani" is a telephone service for helping the elderly population in distress. The Service is provided by trained counselors. In the year 2009, the helpline had received 9823 calls from Elders in Distress. About 372 complaints were registered, 238 complaints resolved. Many of the calls were from elderly people to seek information (5881) which was provided to them satisfactorily.
Source: Personal communication, "Hiriyara Sahaya vani"

B16. Prehospital Care

Good surveillance programmes can often reflect the status of trauma care services and identify areas of strengthening. Previous studies in Bengaluru have been limited and examined the pre hospital care in road traffic injuries, traumatic Brain injuries and suicides (37,38). However, these studies have been isolated, stand alone and not continuous in nature. In a surveillance programme, examination of these factors can reveal the changing patterns and identify critical elements, helping in prioritization and policy setting process.

Trauma care issues included under surveillance were - availability of first aid, mode of transportation, time interval between injury occurrence to reaching one of the study hospitals, referral patterns and number of hospital contacts before reaching a definitive hospital. While these formed a set of vital factors contributing for availability, accessibility and affordability of emergency and pre-hospital care, the quality of care neither received nor provided were included. It is also essential to highlight that this is an examination of pooled data and variations might occur with data of individual hospitals depending on the nature (public – private; apex – primary, etc.,) of institutions.

B16.1. First aid services

The provision of first aid to an injured person depends on place of injury, nature and severity of injury along with availability of first aid facilities. As there are no specified first responders, people in the vicinity are the first responders, who often make the decision of what should be done. Secondly, it depends on the knowledge and practice of these responders and what they do. Commonly, in a road crash, the scenario is more of confusion, altercation and fights among people rather than shifting the person to the nearest site of care (In India, it is common to see people fighting, beating up the driver, setting the vehicle on fire, etc.,). Thirdly, it also rests with the existing medico legal practices in the society as it is common to see people lying unattended for fear of later legal complications or police enquiries among public (The hon. Supreme court has ruled that people attending to road crash victim need not be involved at later stages).

The definition of first aid varies in the local context and in the present study even care in a first contact hospital was considered as first aid as this was the first available care. In totality, nearly one fifth (20%) of fatal and non-fatally injured persons received some type of first aid. However, the number of persons receiving first aid soon after a fatal injury varied from 10–50% depending on the type of injury. In non-fatal injuries, the numbers were slightly higher ranging from 24% to 65%.

The place of delivery of first aid is crucial as it depends on the practice of "save and stabilize" or "scoop and run". People generally do not wait for an ambulance even if it is a severe or fatal injury. Less than 2% of non-fatal injuries received first aid at injury site. This was quite high in case of burns going upto 25% patients receiving some first aid at the injury site. This indicates the presence of a "scoop and run" practice as injured were taken to nearby hospitals by those present at the site of injury. Nearby Government / public hospitals was the most common place of providing first aid in nearly 50% of injuries (Table 15). This was closely followed by Private health care institutions like private hospitals and nursing homes. The involvement of general practitioners and common responders like police was less than 1% in the series.

Who delivers first aid is an important aspect as what is delivered depends on the knowledge and skills of the person and the extent he/she goes in translating that knowledge to action. In the present study, as many people received their first aid in public or private hospitals, it was commonly the doctor or nurse involved in delivery of first aid care. More than 90% of first aid deliverers were doctors, followed closely by nurses.

B16.2. Mode of transportation

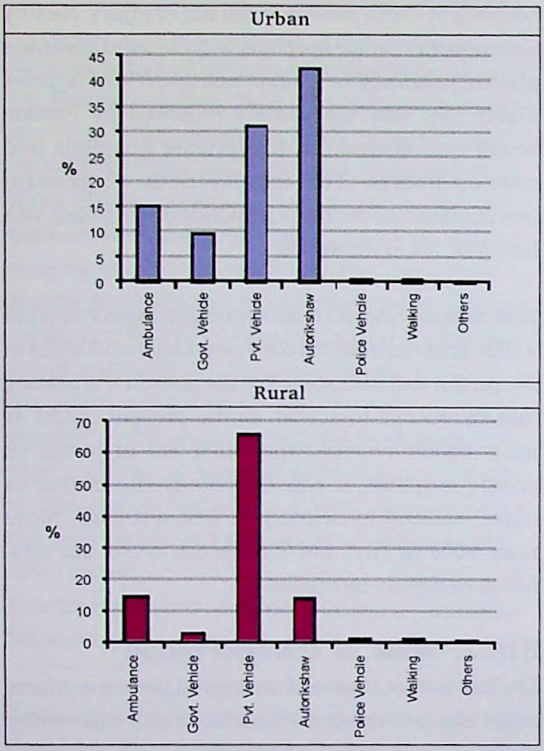
Mode of transportation of an injured person is critical as the aim is to reach the nearest health care centre in the safest possible way within a short period of time. In the rural areas, data from non-fatal injuries revealed that the commonest transportation vehicle was private means of transport through private vehicles (cars or taxis) or a 3 wheeled auto rickshaw in 66% and 14% of cases, respectively. Government and Police vehicles extended support by transporting about 4% of injured persons in urban areas. Transfer was predominantly through Auto rickshaw and

Table 15: Place of first aid for injured persons (%)

Injury Cause	At injured site	Nearby Govt. hospital	Nearby Pvt. hospital / Nursing home	Medical college	Pvt. clinic	Police	General Practitioner	Others
Road traffic injury	0.93	56.25	39.09	2.73	0.93	0.02	0.01	0.03
Fall	0.60	47.39	47.50	3.01	1.41	0.05	0.00	0.05
Poisoning	1.11	26.00	66.44	3.56	2.67	0.00	0.22	0.00
Burns	25.00	0.00	75.00	0.00	0.00	0.00	0.00	0.00
Hanging	0.00	38.46	61.54	0.00	0.00	0.00	0.00	0.00

private vehicles for nearly three fourth of injured patients. Ambulances were mainly seen in interhospital referrals.

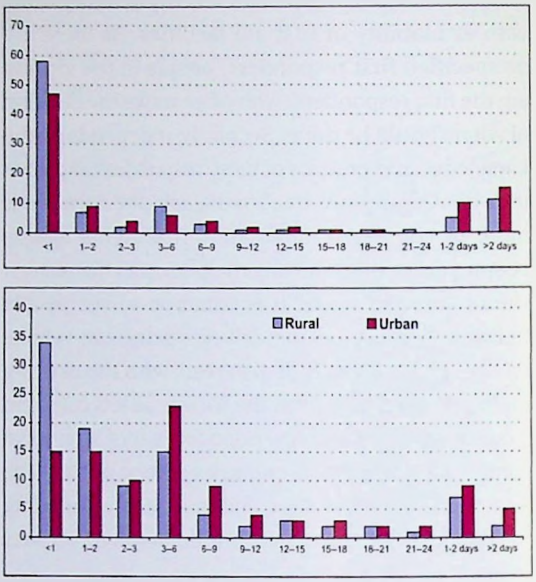
Figure 50: Mode of Transportation (2009)



B16.3. Time interval

The time of death among fatal injuries depends on severity of impact and availability of care. In both urban and rural areas, nearly 50% of fatal injuries were brought to hospitals is less than I hour; however, this also included those who had died on the spot/at injury site and those dying on the way to hospital. Among the rest, 13% of urban and 10% of rural patients reached in less than 3 hours. The remaining 40% of those who died in urban areas and 35% of rural cases died in the hospital and were brought beyond 3 hours. Interesting to note that ¼th of those who died in urban and 16% in rural had reached a hospital beyond 24 hours after injury. Many of these deaths occurred after the patient had contacted other hospitals, prior to reaching a definitive study hospital. Data was to be interpreted cautiously as quality of care has not been included in the present analysis.

Figure 51: Time interval between time of injury and registration, (all injuries)



B16.4. Source of referal

The source of referral indicates the place of first contact highlighting the possibility of strengthening services across different institutions. Among fatal injuries, the referral to the final hospital was mainly from Government (54%) and private hospitals (22%). In contrast, overall 53% of injured persons reached a hospital on their own and this was the most common practice in assault / violence (72%), attempted suicides (60%), and accidental poisoning (62%); nearly half (47%) of injured persons in a RTI also reached directly on their own. Government hospitals and private hospitals referred 22% and 18% of injured persons, respectively. The referral from private teaching hospitals was less as the available facilities are comparatively better in these hospitals.

It is a common practice in Bengaluru to see patients being referred from one hospital to another for a number of reasons. Some of the common reasons are type – nature – severity of injuries (polytrauma patients and those seriously injured are referred depending on availability of specialties), nature of hospital (public or private), availability of facilities in health care institutions and affordability of care (expenses depend on nature of hospital, injury management practices and ability of patients and their families to pay along with availability of

insurance with people). In the present programme, it was observed that among fatal injuries, 70% of patients visited more than 1 hospital. Among those visiting more than 1 hospital it varied from 50% for fall related injuries to 13% in burn injuries. In non-fatal injuries, more than 90% visited at least 1 other hospital. The smaller number in burn injuries is primarily because exclusive burns care and management is available in one of the larger public sector hospital. Among non-fatal injuries, since the first contact hospital was chosen the numbers were around 10%, but majority were referred from these hospitals to other hospitals.

The fact that two thirds of injury deaths occurred in hospitals and that poor services in terms of first aid, frequent referrals, delayed time intervals and transportation problems highlight the need for improving trauma care services in the city. This requires a set of combined activities and has been discussed in the accompanying series on emergency and trauma care. Some activities likely to benefit towards improving trauma care services.

1. At the city level, a working group should be established by the Ministry of Health and Directorate of Health services to coordinate – guide – supervise – and monitor all trauma related activities. The group should include policy makers, public health specialists, trauma professionals and clinical specialists.

2. All hospital Directors and administrators in the city should be sensitized on the need for building effective trauma care systems and improving quality of care at reasonable costs with a focus on essential components.

3. In rural areas, all medical and supportive personnel working in district and Taluka level hospitals should be trained in basic aspects of trauma care along with managing less complicated injuries.

4. A hospital inventory of all public and private hospitals needs to be undertaken to assess the existing facilities and resources in individual institutions. Areas of strengthening have to be identified for improving facilities, wherever required.

5. Basic first aid training should be provided for possible first aid responders like police, health, drivers, and teachers who can respond to emergencies any time. These personnel should be able to assess scene and patient, provide first aid, call for help and arrange safe transportation.

6. All casualty medical officers and nurses should be trained in Basic Trauma Care and should receive periodical training in management of complex injuries connected with brain, chest-abdominal organs, burns and poisoning.

7. A single system number for ambulance service should be available for the entire city which is easy to recall. Ambulances should be available at free of cost to all individuals in need of care.

8. Trauma registries should be established in all medical college hospitals.

9. CME programmes on trauma care and related aspects can be undertaken by medical college teaching hospitals or professional bodies or Indian medical Association at periodical intervals with its availability to all interested professionals.

10. Public awareness programmes for immediate and early transfer of patients to nearest hospital should be encouraged.

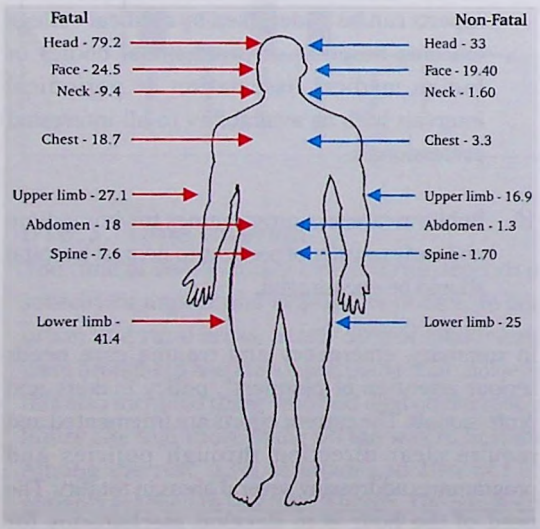
In summary, emergency and trauma care needs serious attention of planners , policy makers and professionals. The current efforts are fragmented and require clear direction through policies and programmes addressing several areas in totality. The need of the hour is to develop mechanisms for availability of care to all, irrespective of their ability to pay. Simple and effective prehospital care and trauma systems that are available to every injured person and to all sections of society will be far more effective in the long run than high tech services required for few. Minimum standards and guidelines for care of the injured needs to be developed across the country. What is required In Indian cities and villages should be driven by data and evidence and pilot demonstration programmes and not just by individual experiences alone.

B17. Nature of injuries

Organization and delivery of trauma care services depends on number of factors like nature – type – severity of injury, availability of facilities and resources and ability of people to pay for care. Head injury was the commonest cause of death in 80% of road crashes, while injury to chest and abdominal regions were documented in 1.8% of deaths. Among non-fatal injuries, injuries to head/face, upper limb and lower limb were present in 82%, 17% and 25% of crashes, respectively (Figure 52a,b & c). Neither detailed anatomical injury nor clinical diagnosis or autopsy findings was included in the programme.

The present programme adapted a very common and simple method of classification to assess injury severity. Being a surveillance programme, it was decided to include this practical method as trauma care physicians in some hospitals were not familiar with scientific methods of injury severity assessment

Figure 52 a: Body Parts injured in RTIs



like AIS, IIS, GCS, GOS, TRISS or other methods. In addition, detailed documentation and severity ascertainment of each injury was not done; for medico-legal purposes, detailed description of injuries was done separately.

The injury severity was considered mild (only ER care), moderate (requiring hospital stay up to 6 hours and needed X-rays, blood or IV transfusion, expert consultation etc.,) and severe (direct admission from

Figure 52 b: Body Parts injured in Assault/violence

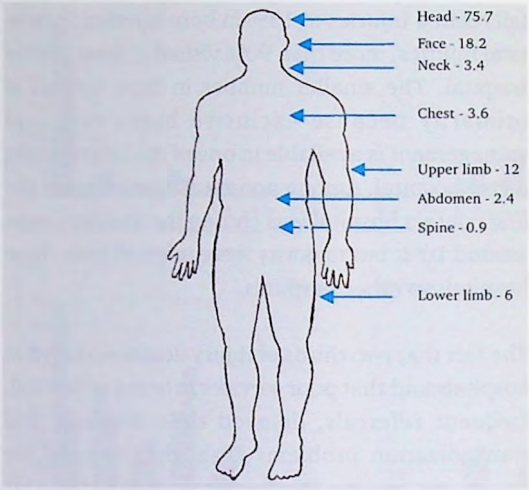
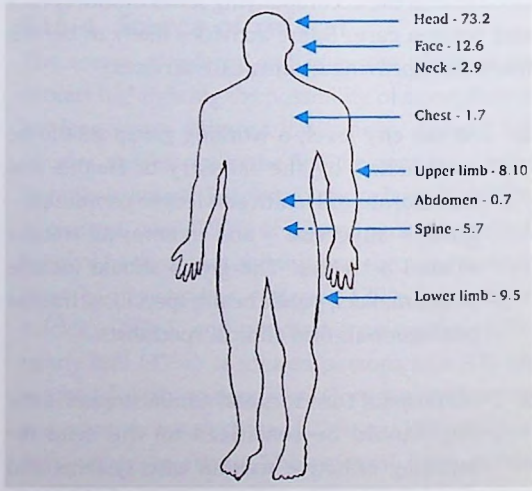


Figure 52c: Body Parts injured in Falls



casualty and intensive management) based on this operational definition. It was observed that 40 % of injuries were mild in nature. One third of RTIs and less than 10% of burns, poisoning and attempted suicides were considered mild injuries. Most of the RTIs, burn injuries, drowning, attempted suicides and falls were moderate to severe in nature (Table), indicating the need for comprehensive and integrated management approaches. The proportion of severe injuries was more in rural areas, probably due to delays in reaching hospitals. This also reflects that minor injuries can be provided care in nearby health centres or general practitioners.

Table 16: Severity of injuries in ER facilities (2009) (%)

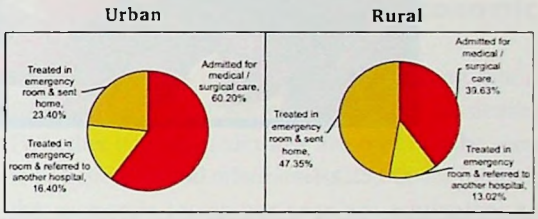
INJURYCAUSE	Mild		Moderate		Severe	
	Urban	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*
Assault	57.8	56.1	34.9	40.5	7.3	3.5
Burns	18.2	26.7	27.3	53.3	54.6	20
Fall	48.8	34.2	38.8	35.5	12.4	30.3
Poisoning	23.4	18.4	50.1	46.1	26.6	35.5
Road traffic injury	41.0	42.6	46.2	39	12.8	18.5
Suicide	23.7	16.7	49.5	46.0	26.7	37.3
Total	41.6	42.0	44.9	40.3	13.4	17.7

B18. Management and Outcome

The status of injured person at the time of reaching hospital reflects severity of injury and the need for hospital preparedness to manage such patients. The number of patients brought dead was less than 1% in the series. Every tenth patient with a poisoning – drowning – attempted suicide was in an unconscious state at hospital entry time. Although the proportion of brought dead cases was less than 0.5% , nearly 10% of the cases were brought in an unconscious or semiconscious state. Overall, 83% were conscious at the time of hospital entry. Among road traffic injuries, one out of 8–10 patients were in semiconscious or unconscious state, necessitating the need for intense management and the need to deliver efficient care.

Information on the managerial practices of injuries revealed that nearly one fourth were provided care and discharged home with advice on follow-up, while more than half were admitted for further medical and or surgical lines of management. The admission rates were highest for burns, falls, RTIs and attempted suicides. Those treated in ER and further referral was high for RTIs and falls. Sixteen percent of patients were referred to another hospital for number of reasons like patient choices, lack of facilities (bed, investigation, manpower, etc.,), affordability, and at times included medico legal reasons as well.

Figure 53: Mode of management



The outcome of injuries was assessed at the end of ER stay and may not be truly indicative of real outcome as those admitted and intervened were not followed-up in the programme. However, it sheds light on issues like care patterns and limitations. Majority improved in their vital status and got stabilized after reaching casualty, but required further care and management. Nearly 2% of patients died in ER and combined with those brought dead, the total number of deaths at ER was 3%. Highest number of deaths was seen among those with burns and drowning, while the status of nearly 40% with poisoning, attempted suicides deteriorated indicating need for aggressive management.

Section C:

Profile of activities

Feedback and action are two essential components of any surveillance programme. This section broadly highlights the process of data application and utilisation for number of activities under the programme. Surveillance may or may not exactly pinpoint the precise interventions to be implemented, but provides directions for capacity strengthening, strengthening policies and programmes , implementation of general or specific activities and continued research for developing interventions. At present, there is no defined agency or a mechanism for road safety and injury prevention and control activities in Bengaluru or India; however, opportunities exist (and needs to be developed) for strengthening existing activities and developing new programmes.

C1. Injury: Addressing the problem

C1.1 Injuries are a neglected issue and needs systematic approaches

Even though injuries are a major public health problem, efforts to address it through an intersectoral and evidence based approach are yet to begin. Some developments have begun in road safety in recent years and others are yet to be recognized. Even though suicides have been recognised, systematic integrated efforts are not in place to address the problem. Other injury problems like burns, poisoning, occupational injuries, violence and others have not received any attention. This hidden and unanswered epidemic needs to be given importance at all levels of policy making and implementation. Nearly a million people die of injuries in India every year. Data from BRSIPP has revealed that nearly 4500 persons die every year, more than 1,00,000 are hospitalized and the impact is huge in a city like Bengaluru. Today, knowledge and experience exists to address the problem.

C1.2. Injuries are a public health problem

The present programme is the first systematic effort to build a surveillance activity with existing data sources to recognise and understand the problem. The health sector bears the maximum impact in terms of providing care and services for injured persons. Apart from huge costs, the impact on young minds and bodies are phenomenal. The psychosocial and economic consequences have not been measured.

In a "do nothing" scenario or if the present scenario continues, Injuries will result in an estimated loss of 10,000 lives, 2,00,000 hospitalizations and 50,000 persons with disabilities every year by 2015 in Bengaluru(17). These numbers are conservative estimates and are likely to be influenced by many factors.Despite the enormity of the problem, there has been a glaring absence of institutional mechanisms and injury prevention policies at the ground level.

C1.3. Young people should not die due to preventable injuries

Data presented in this report as well as in 2009 clearly indicate that 70 – 80 % of injuries occur among young people, majority being men. This pattern remains similar across injuries. With changing patterns, women will be affected more as changes in life styles will increase the problem. The age of 15 – 35 years is the most crucial age of an individual with children and parents building their dreams, aspirations and ambitions. Loss of lives, broken skulls and fractured limbs at this stage can entirely pull back families and result in life long negative life styles. In few of our earlier studies (39) it is seen that people develop many negative life styles (alcohol, depression, violence, etc.,) following the loss of their near and dear ones. The loss of young lives due to an injury should be a wake-up call for all concerned and realistic programmes should be in place. This human tragedy due to a human disaster needs to be stopped.

C1.4. Injuries have huge economic impact

With guestimates in operation, considering that a Rs.1,00,000 compensation is given to all deaths (Whether it reaches all those affected is to be seen to be believed), and minimum Rs.25,000 for injured, the economic losses per year are equivalent to Rs. 2,950,000,000 in just Bengaluru alone. This apart from the huge losses, families and individuals incur for direct and indirect medical costs. Many families sell their assets, make loans, pawn their property and make emergency arrangements. At the national level, it is estimated that Rs.55,000 crores are the annual economic losses due to Road Traffic Injuries alone. If all injuries and both direct and indirect economic losses are considered, the losses will be around 3 – 5 % of GDP.

C.1.5. Information systems and existing gaps

Any prevention and control programme needs a good foundation to work through policies and programmes; such programmes obviously need good quality and reliable information. The injury information system till date in the country and in Bengaluru has been fragmented and patchy with different systems operating in their individual ways as per their administrative and legal requirements. Four common sources of injury information are police, corporation vital registration sources,

transport and health. Police data is the only source of injury information and even this is of limited value for policies and programmes. The data is not comprehensive, quality is moderate, not analysed and disseminated, and utilized by all stake holders at local levels (city or state). Even though health sector provides care for number of patients in individual hospitals, there has been no injury information system in health sector. Further, each hospital follows its own individual practices. In the absence of timely and scientific information, it has not been possible to develop – implement – monitor and evaluate any systematic policies and programmes. There is need for building proper information systems, research, and surveillance

C2. Activity Profile of 2009

The Bangalore Road traffic injury/injury surveillance programme was started in April 2007 and formal activities began in 2008. The details of the programme are provided in the present report and also in the earlier report entitled "Bangalore Road Traffic injury/injury surveillance programme: a feasibility study" published in January 2009. The data collection activities during the period Jan 2009 – December 2009 are presented in earlier sections of this report. In 2009, the major emphasis was on inputs for policies and programmes along with continuation of data gathering and pooling. The following sections provide various activities undertaken by the partners in the programme during the year 2009 using data from the programme.

1. January - Stake holders Consultation:

The year started with a stake holder's consultation meeting on 28 January 2009 under the Bangalore Road safety and injury Prevention Programme with the participation of more than 250 members from all partner agencies. During the meeting, the feasibility report, set of 10 fact sheets and 5 public health alerts were released. Various activities undertaken in 2008 were reviewed and steps to be taken for further improvement were identified. The burden and impact of road traffic injuries, suicides and other injuries, presentation on current initiatives by different sectors and need for scientific approaches to prevention and control were discussed. Following this, discussions by the CC with individual stakeholders continued at periodical intervals. Several areas have been strengthened in the intervening period.

2. Data Collection Activities

- In 2009, data collection continued with the City traffic police department to on road deaths in the city. The earlier data collection format was modified to make it more specific and focused. The form remains uniform for all the 39 police stations of the City and is completed by writers and assistant writers in all stations. The completed forms are sent to the nodal officer before 10th of every month and transferred to coordinating centres for data entry and computerization activities. Data collection was not continuous with the law and order division of city police due to procedural issues.
- The Bangalore Metropolitan Transport Corporation extended all support for data collection on involvement of public transport BMTC buses in road crashes. The format of data collection was revised and finalized in consultation with the organisation. Data collection was undertaken by the CC Staff on a regular basis once a month in the revised format and computerized.
- Data collection continued in all the partner hospitals on a regular day to day basis. The forms are printed by the Institutions with their name and logo, completed by existing staff and collected once a month by the CC staff for computerization. Based on review and feed back, the format was revised and data

collection is done by the team of causality medical officers and nurses soon after completing treatment procedures. To examine the possibility of the system running on its own, data collection by CC staff was withdrawn and hospitals were encouraged to continue on their own. However, regular monthly monitoring continued with feedback to hospital administrators and doctors.

Due to administrative procedures and other unanticipated problems, data collection could not be undertaken without supervision for in- between periods in Victoria hospital, Bowring hospital, Jayanagar General Hospital, St. John Medical College Hospital, Manipal Hospital, Malya Hospital and two other small hospitals. However, efforts were continued to develop mechanisms for data collection activities.

3. Training and Capacity building activities

Series of Capacity building activities were conducted on a regular basis throughout the year. These programmes focussed on sensitisation of participants, review of activities, problems in data collection and management, opportunities for improvement and strengthening, feed back on completed forms and monitoring mechanisms. Apart from focussing on data collection, it also included developing evidence based approaches for road safety and injury prevention by identifying new activities that could be undertaken.

- **March**: Discussions were held with Staff of BMTC personnel and data collection for the year 2008 was initiated in a systematic way in March 2008.It was also planned to undertake a survey on attitude and practices of drivers working with BMTC in the city. The role of managements and drivers in road safety was highlighted.

- **June**: An orientation cum training programme was held for medical officers, nurses and medical records officers of Kempegowda Institute of Medical Sciences on 18th June 2009. The data collected from the Institute was shared with the members and their role and contribution was highlighted. Specific activities that could be undertaken and advantages to the hospital were discussed, including improving emergency care and teaching of medical students.

- **June**: The writers and assistant writers of all 39 police stations were trained in data collection activities on 8th June 2009. The importance of timely data collection and the need for focussing on completeness, coverage and quality was highlighted.

- **June 2009**: The nodal officer meeting was held on 12 June 2009 at NIMHANS to discuss various aspects of programmes which was attended by 20 members. Data of last 6 months was reviewed and priority areas of action were identified.

- **October:** An orientation programme for the administrators of newly introduced hospitals was held on 31 October 2009 at NIMHANS.

- **November:** The training programme for the nodal officers from all the 8 new hospitals was undertaken on 26th November 2009. The programme highlighted the need for involvement of institutions in road safety and injury prevention and importance of data collection to formulate scientific programmes. The various steps and procedures involved in the programme were highlighted for participants. All new hospitals have printed their own forms and activities are in progress.

- A review meeting of the programme was held at MS Ramaiah Institute of Medical Sciences with around 40 participating members and the administration. Data collected from the hospital was provided as feedback and new areas of activities were identified.

- **June – December 2009:** The Bangalore City Police in a unique approach organized a continuous training programme for all middle and junior level officers on integrated approach to traffic management and road safety from June 2009. A total of 52 sessions were held, and each programme was over 2 days for a batch of 60 – 70 officers. The trainees included Police Sub Inspectors (240), Assistant Sub inspectors (325), Head constables and police constables (2100) of the Traffic Wing of the Bangalore City Police. The road safety sessions focused on overview of the Bengaluru Injury surveillance programme, importance and burden of RTIs as a public health problem, salient findings from the first phase of the programme based on data collected from police and hospitals, existing laws related to road safety (provisions under the Indian Motor Vehicle Act, 2002, other relevant Indian Penal Code provisions for road safety, Judicial pronouncements), importance of systematic enforcement and aspects related to pre-hospital care (principles and appropriate practices of first aid, safe transportation of the crash victim). The crucial role of the traffic police in implementation of road safety measures particularly for prevention of road deaths and injuries was highlighted. The need for a uniform, visible, random, continuous, ongoing enforcement / implementation programme was emphasized.

- **December 2009:** Similarly, a 3 day orientation cum training programme for road engineers working in BBMP was conducted during 14th to 16th December 2009 highlighting the engineering approaches on Road Safety. The objectives of the deliberations were to sensitize the staff regarding concerns, concepts and principles of road safety and identify possible mechanisms for making roads safe. The scope of BBMP engineering department was identified to be to ensure safety of people on road, at home, all public places and in work places through safe design, maintenance and operation of roads, ensuring strict implementation of regulations in all places, developing mechanisms for monitoring of ongoing activities, evaluating safety in terms of reduction in deaths and injuries, undertaking joint analysis and interpretation, and supporting interventions to be implemented by police, transport, health and others.

4. Inputs to policies and programmes:

During the year the data collected under the programme was shared with several stake holders at National, State and City levels to strengthen road safety components.

- **August 2009**: Inputs were provided for the road safety programme organized by Shell India and GRSP to strengthen fleet safety programme in Bangalore. Specific data on involvement of fleets as available from the BRSIPP was developed under this activity. http://www.grsproadsafety.org/?pageid=27#project_93

- **August 2009**: Inputs were provided to "Abide Bangalore" for consideration, recognition and inclusion of road safety in all development and infrastructure expansion activities in the city of Bangalore www.abidebengaluru.in

- **August 2009**: Inputs were provided for the technical team of the National High Way authority of India to strengthen road safety on National and State Highways. The NHAI in its attempt to strengthen road safety is in the process of constituting a road safety cell and information collection was identified as a key activity. The methodology and data from the programme was provided to identify specific factors of road safety on high ways. It was suggested to include pilot studies collecting minimal data from all fatal crashes occurring on National Highways in 2010. -www.nhai.org

- **November 2009**: Even though the National Disaster Management Authority of India has developed number of measures aimed at disaster mitigation of management, road safety was not included in the same. Efforts were made by the CC to integrate road safety with other disasters as the principles of management, through policies and programmes remain equally important. Need to ensure safety of children through comprehensive school safety programme has been highlighted. http://ndma.gov.in/

- Considering the inadequacies in road crash and suicide information, technical report was submitted to National Crime Records Bureau and State Crime Records Bureau to strengthen data collection mechanisms for fatal road crashes. Since , the FIR format and summary format are used for online data transmission, opportunities exist for data strengthening activities.

- Considering the significant hardships experienced by trauma patients in terms of their ability to pay in hospitals, the data related to trauma care and outcome was provided to the

DECCAN HERALD Sat. 31, 2009.

Trauma care needs to be upgraded

DH News Service

BANGALORE: Road traffic accidents and suicides are two major causes of 5,000 deaths and 1,00,000 hospitalisations that take place in the City annually. To survive injuries from road traffic injuries (RTI), falls, burns, poisoning, disaster related injuries, suicides, violence, occupational injuries, the individual requires trauma care services.

A study released by NIMHANS publishing data from Bengaluru Injury Surveillance programme highlighted the current state of trauma care facilities – pre-hospital and emergency care, injury patterns as well as suggested strategies for strengthening trauma care.

The data showed that the highest percentage of injury deaths (53 per cent) occur in hospitals, injury sites (36 per cent) on the way to hospital (11 per cent). In RTIs, 29 per cent died at the crash site, 22 per cent on the way to hospital and 49 per cent after entering the hospital.

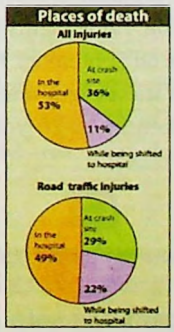
Pre-hospital care

To survey pre-hospital care, availability and pattern of first aid, transportation methods, referral patterns, time interval between occurrence of injury and reaching a partnering hospital and number of medical contacts were examined.

It was found that 28 per cent of deaths and 48 per cent of the injured received some first aid before reaching the partnering hospital. Only three per cent of all injuries and one per cent of road traffic injuries were provided care at the injury site.

The study states that doctors and nurses were the ones to provide basic first aid and common first aid responders like police, drivers and volunteers were not available at the injury site.

Private vehicles and autorickshaws were the primary mode of transport of the injured. The time interval between occurrence of the injury and reaching the definitive hospital which is crucial. Only 10 per cent and 47 per cent of injury patients and 32 and 45 per cent of RTI patients reached hospitals in less than one hour and three hours respectively. About 47 per cent of all injury patients and 53 per cent of RTI patients were referred from one hospital to another due to non-availability of facilities, investigation and inability to pay.



INJURY PATTERNS

- Head (77 per cent in fatal and 42 per cent in non fatal)
- Face (19 per cent in fatal and 27 per cent in non fatal)
- Upper limbs (25 per cent in fatal and 35 per cent in non fatal)
- Lower limbs (37 per cent in fatal and 46 per cent in non fatal)
- Chest and abdominal organs (23 per cent of all patients)

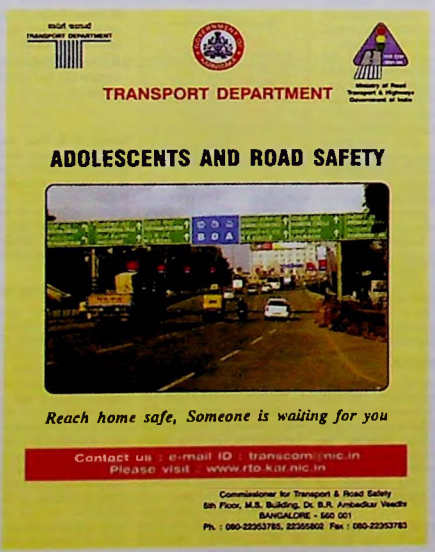
Strengthening means

Among the strategies put forward in the study include establishing of a lead organisation within the Ministry of Health to co-ordinate implement, monitor and evaluate all trauma care activities in state and city level and mechanisms for integrated emergency care programmes covering all types of emergencies. All pre-hospital and trauma care facilities to be made available in all hospitals with a bed strength of over 100 also found mention.

expert committee constituted to develop mechanisms for free treatment of injured persons.

- In a significant development, the Ministry of Road Transport and Highways, established an expert committee under the chairmanship of Ms.S. Sundar to suggest revisions for Indian Motor Vehicles Act of 1988. Even though this issue was discussed in our nodal officers meting and was identified as a critical need, this provided an opportunity for providing inputs to strengthen the legislative aspects of road safety. The data available under the programme was analysed in different ways and list of recommendations were submitted to the Chairman and members of the expert committee. (Annexure 2) details the recommendations submitted on behalf of the programme. Further, some members of the committee were met individually to highlight importance of revisions and doing it based on data and evidence. - http://morth.nic.in/index2.asp?sublinkid=460&langid=2

- **September 2009**: In a significant programme, the transport department of Government of Karnataka in collaboration with MS Ramaiah Institute of Medical Sciences, initiated the programme on "Adolescents and Road safety" in Bangalore on September 7, 2009. The data available in the programme specifically for young children in 10-20 years of age group was provided and discussed. The programme is likely to get expanded in the City and the entire state. The comprehensive school safety programme is under development in consultation with the Department of community medicine at MS Ramaiah Medical College and initial activities are under progress.



5. Campaigns and awareness programmes

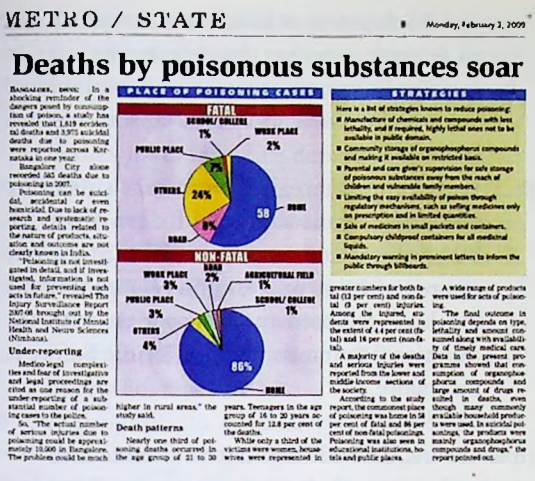
Under the programme,inputs were provided for number of ongoing initiatives that were aimed at increasing awareness and importance for road safety in the City of Bangalore by other agencies. In all these activities, detailed discussions have been held to identify need, type of data required, areas of focus, target audience and duration. It only made these campaigns more specific, targeted and focussed.

- **August 2009**: In a documentary on pedestrian safety by the Indian Institute of Journalism and Media, and Indian Institute of Management, data on pedestrian's deaths and injuries in Bangalore was provided to the production team. The necessary steps that can be taken by various stake holders and the people have been highlighted in the documentary which is in the final stages of development.

- **December 2009**: In a documentary under development by Terravista Films by Sree Amith Mithra, entitled " Lives : Lost and Saved", data on two wheelers deaths and injuries has been provided to highlight the specific issues of two wheeler drivers and measures for improving road safety aspects. The documentary is in final stages of production (done at very less cost)

- **December 2009**: In a campaign developed by www.smilingdrivers.org, specific inputs on helmet usage, seat belt use and early trauma care have been highlighted with data from the programme.

- In a series of day to day news related programmes by the print media, data inputs on number of issues have been provided on number of occasions. The print media from different news paper agencies covered road safety aspects in the City with the data available in the programme. All partners were also encouraged to write articles in the press.



METRO / STATE

Monday, February 2, 2009

Deaths by poisonous substances soar

BANGALORE, DECS: In a shocking reminder of the dangers posed by consumption of poison, a study has revealed that 1,819 accidental deaths and 3,975 suicidal deaths due to poisoning were reported across Karnataka in one year.

Bangalore City alone recorded 585 deaths due to poisoning in 2007.

Poisoning can be suicidal, accidental or even homicidal. Due to lack of research and systematic reporting, details related to the nature of products, utilisation and outcome are not clearly known in India.

"Poisoning is not investigated in detail, and if investigated, information is not used for preventing such acts in future," revealed The Injury Surveillance Report 2007-08 brought out by the National Institute of Mental Health and Neuro Sciences (Nimhans).

Under-reporting

Medico-legal complexities and fear of investigative and legal proceedings are cited as one reason for the under-reporting of a substantial number of poisoning cases to the police.

So, "The actual number of serious injuries due to poisoning could be approximately 10,000 in Bangalore. The problem could be much higher in rural areas," the study said.

Death patterns

Nearly one third of poisoning deaths occurred in the age group of 21 to 30 years. Teenagers in the age group of 16 to 20 years accounted for 12.8 per cent of the deaths.

While only a third of the victims were women, house wives were represented in greater numbers for both fatal (33 per cent) and non-fatal (9 per cent) injuries. Among the injured, students were represented in the extent of 4.4 per cent (fatal) and 16 per cent (non-fatal).

A majority of the deaths and serious injuries were reported from the lower and middle income sections of the society.

According to the study report, the commonest place of poisoning was home in 58 per cent of fatal and 86 per cent of non-fatal poisonings. Poisoning was also seen in educational institutions, hotels and public places.

A wide range of products were used for acts of poisoning.

"The final outcome in poisoning depends on type, lethality and amount consumed along with availability of timely medical care. Data in the present programme showed that consumption of organophosphorus compounds and large amount of drugs resulted in deaths, even though many commonly available household products were used. In suicidal poisonings, the products were mainly organophosphorus compounds and drugs," the report pointed out.

PLACE OF POISONING: CASES

FATAL

SCHOOL/ COLLEGE 1%
WORK PLACE 2%
PUBLIC PLACE 7%
OTHERS 24%
HOME 58
ROAD 8%

NON-FATAL

WORK PLACE 3%
AGRICULTURAL FIELD 1%
PUBLIC PLACE 3%
SCHOOL/ COLLEGE 1%
OTHERS 4%
HOME 86%

STRATEGIES

Here is a list of strategies known to reduce poisoning:

- Manufacture of chemicals and compounds with less lethality, and if required, highly lethal ones not to be available in public domain.
- Community storages of organophosphorus compounds and making it available on restricted basis.
- Parental and care giver's supervision for safe storage of poisonous substances away from the reach of children and vulnerable family members.
- Limiting the easy availability of poison through regulatory mechanisms, such as selling medicines only on prescription and in limited quantities.
- Sale of medicines in small packets and containers.
- Compulsory childproof containers for all medicinal liquids.
- Mandatory warning in prominent letters to inform the public through billboards.

6. Academic Activities

The partners in programme also used the data from their respective Institutions and from the programme (that was made available by the CC) to present papers in various conferences and scientific meetings. New activities from academic institutions also were encouraged and are in progress.

Scientific paper presentations

1) Suryanarayana S P, Gautham M S, Manjunath M, Pruthvish S: Surveillance of injuries in a tertiary care hospital; presented at the 21st Annual conference of the Karnataka Association of Community Health, 10-11th October 2009, J S S Medical College, Mysore

2) Giriyanna Gowda, Ashwath Narayana D H, Girish N Rao, Gururaj G. Road Traffic Injury Surveillance Programme at KIMS Hospital, Bangalore. Presented at the 21st Annual conference of the Karnataka Association of Community Health, 10-11th October 2009, J S S Medical College, Mysore

3) Giriyanna Gowda, Ashwath Narayana D H, Girish N Rao, Gururaj G. Road Traffic Injury surveillance programme in a Tertiary Care Hospital in Bangalore City. Presented at the Annual conference of the Indian Public Health Association, Jan 22 to 24th 2010, Andhra Medical College, Vishakapatnam

4) Venkatesh P, Ashok J, Girish N, Gururaj G. Profile of rural injuries. Presented at the Annual conference of the Indian Public Health Association, Jan 22 to 24th 2010, Andhra Medical College, Vishakapatnam

5) Anita et al. Injury surveillance programme in tertiary care centre. Poster presentation at INDUS 2009, Coimbatore, Oct 30 to Nov 01, 2009

Technical assistance provided to Dissertation and research projects

6) Dr Pallavi Sarji, Postgraduate in Community Medicine under the guidance of Dr S P Suryanaraya, Professor of Community Medicine, M S Ramaiah Medical College, Bangalore – 560 054 titled "Study of gaps between precepts and practices of preventive measures and pre-hospital care among injury cases" admitted to M S Ramaiah Teaching Hospital.

7) Dr Sreedhara, Postgraduate student of masters in Hospital Administartion, Padmashree Institute of Management initiated a study entitled "processing of medico legal cases in selected hospitals in Bangalore".

8) Dr. Shilpa R, Post graduate in Community Medicine under the guidance of Dr. Bobby Joseph, Department of Community Medicine, St. John's Medical College started her M.D., thesis on "Incidence and Profile of Occupational Injuries among residents of villages under the Sarjapur PHC area, Bangalore".

9) In July 2009, BMTC took keen interest to understand drivers knowledge and practices and initiated a survey among BMTC bus drivers. Nearly 4200 interviews have been completed and data analysis is in progress.

10) In addition, information pertaining to data from Department of Plastic Surgery and Burns ward, Victoria Hospital was utilised for display during Suvarna Arogya Seva Trust, a health insurance initiative by Government of Karnataka for Below Poverty Line, at Gulbarga on January 1st 2010.

7. **Expansion of activities**

- During the year, 8 new hospitals were enrolled into the programme and these are Rajarajeshwari Medical College, (Mysore Road), Vydehi Medical College, (ITPL Road), ESI Hospital, Rajajinagar, (for occupational injuries). Suguna Hospital (Private Hospital), ESI Hospital, Indiranagar, (for occupational injuries), Ambedkar Medical College Hospital, Rajiv Gandhi Institute for Chest Diseases, and Colombia Asia Hebbal and Yeshwanthapur Hospitals. We warmly welcome our new partners. The nodal officers meeting was held on 31 October 2009 and the Casualty Medical Officers/ Nurses training programme was held on 26th November 2009. All the hospitals have printed their own forms and activities are in progress.
- Discussions have been held with Bangalore city police and with the Centre for product design and development at Indian Institute of science to initiate a centre for crash analysis to specifically examine vehicle and road related features for prevention and control of road traffic injuries.
- Preparations are in progress to develop electronic transmission of data from all 39 police stations in the city. The computerization process and related training has been initiated in consultation with the Additional Commissioner for Traffic Safety in Bangalore.

In summary, the activities can be summed up as - strengthening of data collection, data led programmes, and beginning of new activities. Most importantly, linkages were established, partnerships strengthened and new ideas were discussed during the year.

D. Sustainability issues

Administrative support through a programmatic approach – motivated and committed staff - resource availability – necessary back up services – continuous feedback – and data utilization / application for policies and programmes are crucial for Road safety and injury prevention and surveillance programmes to be effective. Injury surveillance, especially for Road traffic injuries and suicides, should become an inbuilt component of injury prevention and control, road safety and suicide prevention programmes, respectively. Feasibility, sustainability and cost effectiveness should be addressed from the beginning. These aspects and possible mechanisms have been discussed in our previous report and some salient points are provided below.

- There is need for a dedicated agency in the city that can drive these programmes on a continuous basis. This agency has to be identified, supported and nurtured to undertake these activities with resource allocation and capacity strengthening at appropriate levels.
- As injuries are a health problem, the Directorate of Health Services should take a leadership role and inform all major hospitals for introduction of Emergency trauma care record on a regular basis. Necessary administrative notifications should be sent to all partnering health institutions. Apart from surveillance, number of other activities like advocacy, capacity building, monitoring and evaluation should be initiated.
- Capacity strengthening programmes for senior and mid level policy makers and training programmes for other staff from police and health sector should be held at periodical intervals. Injury surveillance will ensure monitoring of activities along with data inputs for other activities at different levels.
- All professionals involved in data gathering, treatment and care of injured persons in all participating institutions (police at mid and junior levels + ER staff of selected – participating hospitals-medical record divisions) should be trained (at least twice in a year) to improve data collection, trauma care and to obtain better cooperation. The required training modules and training course contents should be developed jointly for ensuring uniformity in training.

- Variety of communication channels like reports, fact sheets, websites and other channels should be utilised for sensitisation, awareness building and use of data. The local decision making bodies and respective departments at higher levels should utilize and apply data for development – implementation of interventions and for larger decision making process as well. The programme should be monitored continuously and evaluated at periodical intervals for further modifications and improvements.
- A programme of this nature will require cooperation – participation – support of stake holders, police and transport officials, hospital administrators, nodal officers and teams in casualty departments. Inputs to strengthen this component through training programmes, information sharing, continuous feedback, using data at individual and hospital levels, and joint collaborative programmes needs to be promoted.
- Resources are required in the long run for continuous running of the surveillance programme and this should be part of the larger road safety and injury prevention programme ; not an isolated activity on its own. An initial investment is very much required till the programme gets established. The local government or Directorate of health services or state health division or city police or BBMP should take ownership of the programme. Injury and RTI surveillance is a part of larger injury prevention and control and road safety activities.

The way forward

With existing police, transport and health systems reporting systems being patchy and fragmented and, research in all these sectors being extremely limited in India, the obvious questions is " how can we improve data availability to formulate – implement – monitor and evaluate road safety and other injury prevention and control programmes". One of the possible methods is to implement a surveillance programme in sentinel institutions across the country on selected injuries (RTIs and suicides) with a focus on moderate and severe injuries. The scope and ambit of surveillance can be expanded to the level of trauma registries or kept to a simple level depending on the technical expertise available in institutions and mechanisms that would evolve to address road safety and other IPC issues. The need for evidence-based programmes, which would result in a noticeable reduction in deaths and hospitalizations, has been acutely felt. It is hoped this joint partnership programme with leading institutions and organizations in the city of Bengaluru would pave the way to formulate effective injury prevention policies and programmes in the coming years. Injury surveillance should be a part of larger road safety and injury prevention activities.

If only, he had got the right care.....

Mr "V" is a 50 year old male coming from Chikkanayakanahalli in Tumkur district. He is a farmer and has completed middle school. The injury happened when he was traveling in his scooter near to his agricultural fields. The scooter toppled after slipping on the mud road leading to the tank bund area. V sustained minor injuries on face and back, but had some bleeding from his nose, and there were lacerated wounds on his scalp.. Immediately after the accident, the patient was rushed to the nearby government hospital. First aid was given by the doctor. After stitching the scalp wound, the doctor noticed continued bleeding from the nose. Suspecting traumatic brain injury, the patient was informed to go to Bangalore for further management. Till such time, V did not have vomiting and suddenly started complaining of giddiness and could not speak. Worried after his condition, the family members hired a taxi and started off to Bangalore. Half way through, as the vomiting became worse, they took him to a nearby nursing home. After giving him some injection to stop vomiting, the doctors asked them to rush to Bangalore. On reaching Bangalore, on suggestion by one of their friends, they took V to a private hospital on the outer ring road. The Duty doctor refused to see the patient and asked them to take the patient to the government hospital. It was a delay of almost 18 hours before the patient reached the right hospital. By that time, his conditioned had worsened. A CT scan revealed a big Subdural hematoma. After the emergency surgery, V was shifted to the head injury ward for observation and has still not recovered totally.

How can we survive?

Mr "S" is a 40 year old male residing at Hosakere in rural Bengaluru. He could not complete his education beyond 6th standard and is now working as a daily wage laborer. In the evening at about 6.20 pm, when walking back to home, he was hit by a two wheeler from behind at the bus stand on the Devanahalli - Hosakote main road. He was standing on the road and was about to cross the road, when the speeding two wheeler hit him and speeded without stopping. The injuries were serious: apart from abrasions over face and upper limbs, he complained of pain in the sides of the abdomen and said he could not move his legs. Seeing that he had no bleeding from his ears or nose and not suspecting head injury, the government hospital doctor referred him to the Government hospital in Bangalore as he was still not conscious. Nearly 4 to 5 hours were spent in getting an ambulance transfer organized. On arrival at the hospital in Bangalore, the CMO suspected internal injury and was shifted to the surgical unit for emergency surgery. S had no money with him, and his wife and young son who accompanied him also did not have any money, and desperately tried requesting everyone for some help. They had not had any meal since afternoon. Fortunately, investigations revealed that there was no major damage to internal organs and he was shifted to the ward within 24 hours. Meanwhile, his wife had gone back to their village and had come back with a loan, which they would need to repay over the next 1 to 2 years. Because of the surgery S would not be able to go to work for almost one month.

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Annexure - 1

The cases of Injured and Killed in India for various causes, 2008

Sl. No	Causes	Bengaluru		Karnataka		India	
		Injured	Killed	Injured	Killed	Injured	Killed
A	**Unintentional injuries**						
I	Air-Crash	0	0	0	0	1	19
II	Collapse of Structure (Total)	16	6	29	149	991	2833
1	House	0	0	3	37	261	1173
2	Building	7	3	7	14	107	249
3	Dam	0	0	0	6	2	66
4	Bridge	0	0	0	0	22	93
5	Others	9	3	18	92	599	1252
III	Drowning (Total)	7	102	15	2173	582	27206
1	Boat Capsize	0	0	0	29	58	979
2	Other Cases	7	102	15	2144	524	26227
IV	Electrocution	3	49	11	388	400	8067
V	Explosion (Total)	4	0	4	11	1719	792
1	Bomb Explosion	4	0	4	0	1588	490
2	Others (Boilers, Gas Cyld. etc.)	0	0	0	11	131	302
VI	Fall (Total)	10	85	12	462	1778	10637
1	From Height	10	80	12	439	744	8757
2	Into Pit/Manhole	0	5	0	23	1034	1880
VII	Factory	0	0	0	29	506	1229
1	Machine Accidents	0	0	0	26	461	858
2	Mines or Quarry Disaster	0	0	0	3	45	371
VIII	Fire (Total)	19	314	27	1587	2987	22454
1	Fireworks/Crackers	1	0	1	29	194	342
2	Short-Circuit	0	4	1	102	202	1098
3	Cooking Gas Cylinder/Stove Burst	18	50	18	260	316	3628
4	Other Fire Accidents	0	260	7	1196	2275	17386
IX	Fire-Arms	0	0	0	7	734	1639
X	Killed by Animals	0	0	3	62	134	827
XII	Poisoning (Total)	119	30	132	1838	4405	24261
1	Food/Accidental intake of Insect. etc.	0	8	0	107	2098	7829
2	Spurious/Poisonous liquor	0	10	0	188	181	1358
3	Leakage of gases etc.	0	1	0	32	6	247
4	Snake Bite/Animal Bite	3	1	9	658	1703	7825
5	Other	116	10	123	856	417	7002
XIII	Stampede	0	0	0	6	92	434
XIV	Traffic Accidents (Total)	6180	865	63314	10232	473562	144587
1	Road Accidents	6180	865	63281	8814	469156	118239
2	Rail-Road Accidents	0	0	33	0	124	2222
3	Other Railway Accidents	0	0	0	1418	4282	24126
XV	Other Causes	65	600	65	1117	4387	35135
XVI	Causes Not Known	0	199	0	1074	1493	13962
	Total of unintentional injuries	6430	2524	63620	20129	498124	318316
B	Intentional Injuries						
XVII	Intentional Injury Deaths						
1	Homicides*	0	253		1593		35962
2	Dowry deaths*	0	54		251		8093
3	Suicides	0	2396		12222		125017
XVIII	Other Intentional Injuries*						
1	Attempt to commit murder	264		1251		27401	
2	Rape	62		436		20737	
3	Kidnapping and abduction	119		680		27561	
4	Molestation	187		1828		38734	
5	Sexual harassment	2		28		10950	
6	Cruelty by husband and relatives	290		2507		75930	
7	Other IPC crimes	10969		60853		829206	
8	Others	15156		53023		959154	
	Total of intentional injuries	27049	2736	120606	14148	1989673	166692
	Grand Total (A+B)	33479	5260	184226	34277	2487797	485008

* Data from Crime in India Report, 2007

Source: NCRB Report 2008

Annexure - 2

Extracts of the report submitted to the expert committee set up for revisions of Indian Motor Vehicles Act

General Observations

1. With increase of road deaths and injuries in India due to combination of several factors, the decision to revise the IMV act is timely and appropriate. The proposed revision after 20 years has to keep changes that are likely to occur in the coming years and possible future developments.

2. All road safety laws need to be framed for safety and health of people and the expected outcomes and impact of the act need to be measured by reduction of deaths, hospitalizations, disabilities and socioeconomic losses.

3. The revised IMV ACT should have individual and separate sections with regard to Transport vehicles, Roads and environment, Road safety, insurance procedures and compensations. The present Act is a mix up of all issues and needs to be broken up into different sections. The recommendations provided here are with reference to road safety aspects.

4. All revisions are to be based on data and evidence available in the past few years from the Indian region and should also consider international developments and experiences.

5. The act should have specific sections that are mandatory for different groups and should be based on consensus in the early stages to avoid delays in implementation.

6. The entire system should be made simple and easy to follow, thereby giving less room for misinterpretations by different groups. The law should be strong enough to achieve the desired goal.

7. Penalties should be strong enough and realistic based on an understanding of human psychology and limitations of human behavior (In the present act, in many places it is mentioned as life imprisonment and other punishments which are never followed) to deter people from taking risky behaviors.

8. The committee can consider uniform penalty levels with regard to road safety laws as it becomes easier for people to understand and remember (Ex: the fine could be Rs.2000 for not wearing helmets, drinking and driving, over speeding , driver license etc., .) and these can be grouped together in some areas. Higher level penalties can be considered for serious offenses. Areas that are of high importance should be kept uniform with moderately high penalty levels.

9. The implementation of laws should be uniform across the country with no provision for change or manipulation by states. With the development of national databases for vehicle registration and driver licensing systems this should be easy to implement.

10. Implementation mechanisms also need to be specified and in some areas require coordination with related ministries of health, NHAI, police, law and others to develop implementation mechanisms. These should be discussed with concerned professionals and sectors in the early stages to develop comprehensive mechanisms for implementation.

11. The revised laws should be monitored seriously to see the impact of changes and overall reduction of road deaths and fatalities. It would be helpful to establish centers for monitoring of laws and to build road safety information systems in select centers across the country.

The impact of all laws needs to be measured in terms of reductions in deaths, hospitalisations and disabilities due to road crashes. This requires promoting and strengthening crash investigation and analysis as an independent area.

Specific observations

A. The Indian Penal code sections that are relevant to road safety:

1. Section 279. Rash driving or riding on a public way. "Whoever drives any vehicle, or rides, on any public way in a manner so rash or negligent as to endanger human life, or to be likely to cause hurt or injury to any other person, shall be punished with imprisonment of either description for a term which may extend to six months, or with fine which may extend to one thousand rupees, or with both."

2. Section 304A. Causing death by negligence "Whoever causes the death of any person by doing any rash or negligent act not amounting to culpable homicide, shall be punished with imprisonment of either description for a term which may extend to two years, or with fine, or with both."

3. Section 336. Act endangering life or personal safety of others "Whoever does any act so rashly or negligently as to endanger human life or the personal safety of others, shall be punished with imprisonment of either description for a term which may extend to three months, or with fine which may extend to two hundred and fifty rupees, or with both."

4. Section 337. Causing hurt by act endangering life or personal safety of others. "Whoever causes hurt to any person by doing any act so rashly or negligently as to endanger human life, or the personal safety of others, shall be punished with imprisonment of either description for a term which may extend to six months, or with fine which may extend to five hundred rupees, or with both."

5. Section 338. Causing grievous hurt by act endangering life or personal safety of others "Whoever causes grievous hurt to any person by doing any act so rashly or negligently as to endanger human life, or the personal safety of others, shall be punished with imprisonment of either description for a term which may extend to two years, or with fine which may extend to one thousand rupees, or with both."

Specific recommendations for modifications of existing act in select areas of relevance to road safety

Sr. No	Domain	Existing Provision	Justification for revision	Proposed changes
1	Driver Licensing Systems	The existing act stipulates that No person shall drive a motor vehicle in any public place unless he holds an effective driving license issued to him authorizing him to drive the vehicle. **Requirements include** a. Proof of age b. Self declaration of physical fitness and medical certificate from a physician required c. In case of drivers of goods carriages carrying dangerous and hazardous goods, mention of minimum educational qualifications. The licensing authority also has powers to revoke the license in certain situations	Studies have found that nearly 30 % of drivers drive without a valid driving license. In addition, it is well known that anyone can obtain a driving license in any state or city without going through any formal procedures	1. Mandatory driving schools certification with permission to run driving schools should be established. The New act should specify criteria's and guidelines for running driving schools. 2. The Act should come out with one set of instructions for public on procedures and tests to be completed for obtaining a license. As national data bases of drivers are being set up, the system should be uniform throughout the country. This information should be available in all state languages and should be displayed in all public schools. 3. A national core curriculum should be developed for all driver tests incorporating health, safety, awareness and rules of road issues. 4. Driving tests should be made stricter. The online procedures that are being established are helpful more from an administrative point of view and do not really test driving knowledge and skills. Minimum guidelines should be established in this regard. 5. The system of suspending/canceling licenses should be introduced and list of offences for which these can be done should be notified for public information. 6. The fine of Rs.500 should be increased. 7. Renewal of driver license of individuals above 50 years should be based on health status and previous health records. 8. Graduated driver license systems should be introduced and made compulsory across the country, especially for drivers of public transport vehicles and other heavy carriers.
2	Age of driving	No person under the age of eighteen years shall drive a motor vehicle in any public place provided that a motor cycle with engine capacity not exceeding 50 cc may be driven in a	Data from BRSIP has revealed that 11 % of injured drivers were children less than 18 years. Young children less than 18 years are also found to be drivers on the roads. No	Graduated driver licensing systems should be introduced and procedures need to be systematic. The transition from Learner's license to full license should be watched and there should be specific restrictions for learners. The final license should be available after completion of 18 years and after completion of tests.

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		public place by a person after attaining the age of sixteen years.	specific details on actual number of drivers less than 16 or 18 years are available in the country. The penalty is a fine of Rs.500 with or without imprisonment. The latter is not followed in any part of the country.	The penalty levels should be increased to Rs.1000 uniformly across the country for those less than 16 years and for those below 18 years who drive a vehicle without a license.
3	Speeding and driving	Section 112 pertains to limits of speed and prohibits driving of a motor vehicle or it being allowed to be driven in any public place at a speed exceeding the maximum permissible speed. The Penalty for exceeding the prescribed speed limit is up to Rs. 1000, abetment for over speeding, Rs 300, for overtaking perilously, for failing to confer way to sanction overtaking and overtaking from wrong side the fine is Rs 100.	Limited studies in India have shown that excessive speed in urban areas and on highways is a major contributor for crashes. Data from BRSIP has shown the increasing occurrence of crashes on the outskirts of the city and in peripheral areas, where speed exceeds 80 km per hour. Studies done on highway using speed cameras indicated that the speed of heavy vehicles, public transport buses and cars were in the range of 100 - 140 kms , even in places where highways pass through villages and other traffic generators. This is also substantiated by increasing capture of violations by Bangalore city police with the help of interceptors.	The law should have clear specifications on speed in different urban - rural - highways - residential areas - near to schools / hospitals / other traffic generators. The penalty levels are not only low, and should be increased substantially and linked to crash outcomes. For example, if crash result in death, the penalty should be higher and to be modified for other crashes with different outcomes. As it is difficult to establish evidence for courts, mechanisms should also be strengthened for monitoring of speeds, coordination mechanisms along with high penalty levels. It should be made mandatory for all public transport vehicles and heavy vehicles to be fitted with speed governors or tachometers to control speeds automatically. All public transport vehicles must be fitted with closing doors (automatic or manual) and should be strictly enforced to avoid people falling from moving vehicles, especially in turns, when vehicles are in high speeds.
4	Use of protective device like helmets for two wheeler drivers and pillions.	Every person driving or riding (otherwise than in a side car, on a motor cycle of any class or description) shall, while in a public place; wear (protective head gear conforming to the standards of Bureau of Indian Standards).	At the national level, data from NCRB indicate that 19.08 % of deaths were among two wheeler riders However, all independent epidemiological studies indicate that	The Act should be more specific and comprehensive in all respects. Helmet legislation should cover all motorcycle users above 18 years and all classes of two wheeler vehicles. The legislation should cover both riders and pillions.

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		At present the penalty for not wearing a helmet is Rs. 100. At present, many of the Indian states do not have helmet legislation; and in other states, there is only partial legislation (for riders only and for select class of two wheelers) At present the law enforcement agencies only look for the presence of a helmet on the head and do not look into whether it is a standard or non-standard helmet	nearly 30 - 50 % of both fatal and nonfatal injuries are among two wheeler riders and pillions. Specifically, data from BRSIP for 2008 indicate that 26 % of deaths and 42 % of hospitalised injuries were among two wheeler riders. Pillions accounted for 11 % of road deaths and 10 % of hospitalised injuries. The data also report that only 33 % of riders and 38% of nonfatally injured had worn helmets at the time of crash. Further, reports from all over the world and from World Health Organisation in particular conclusively indicate that helmet legislation and enforcement is one of the proven and cost effective method of reducing deaths and injuries among two wheeler riders.	The law should be uniform across the country and this should be a central law with no flexibility for states to modify as per convenience. The penalty for not wearing helmet should be in the range of Rs.500 - Rs.1000. Helmets worn should meet standards as laid down by the Bureau of Indian Standards. Use of half head helmets, construction helmets, broken helmets and others should be totally banned. As there are no specified standards for child helmets in India, it should be considered separately after formulating necessary guidelines. Law should be applicable for all categories of motor vehicles, irrespective of engine power.
5	Dangerous driving	Section 184 provides for punishment for dangerous driving Penalty shall be punishable for the first offence with imprisonment for a term which may extend to six months or with fine which may extend to Rs.1000, and for any second or subsequent offence, if committed within three years of the commission of a previous similar offence, with imprisonment for a term which may extend to two years, or with fine which may extend to Rs.2000, or with both.	Dangerous driving is a commonly used lay term and is nonspecific and not focused. Since it is not defined, it will be difficult to link and relate this to crashes.	This section needs to be defined properly. What is dangerous driving should be identified and defined and correspondingly, penalty levels needs to be revised. Even though life imprisonment is commonly seen in IMV act, it has not been applied effectively due to legal barriers and other issues

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6	Racing on roads	The existing act under Section 189 stipulates that Whoever without the written consent of the state government permits or takes part in a race or trial of speed of any kind between motor vehicles in any public place. This shall be punishable with imprisonment for a term which may extend to one month, or with a fine which may extend to Rs.500 or with both.	No scientific data is available on this in India , but anecdotal media reports indicate that this is a common occurrence	This should be strictly modified and enforced as it is becoming a common practice. The penalty should be in the range of Rs.2500 - Rs.3000 and linked to speeding and driving.
7	Drinking and driving	Whoever while driving or attempting to drive a motor vehicle a. has in his/her blood alcohol exceeding 30 mg per 100 ml of blood detected in a test by a breath analyzer or b. is under the influence of a drug to such an extent as to be incapable of exercising proper control over the vehicle. A police officer in Uniform or an officer of the Motor Vehicles department can ask for breath tests to be done if they so suspect the driver of the motor vehicle to be under the influence of alcohol. Penalty for drinking and driving shall be punishable for the first offence with imprisonment for a term which may extend to six months, or with fine which may extend to two thousand rupees or with both and for a second or	There is no national data on drinking and driving as reported in NCRB reports. However, several epidemiological studies from Bangalore have reported repeatedly that one third of crashes occur during night time. Among these, the involvement of alcohol varies from 20 % to 40 %, and is found to be a major risk factor. Studies have also reported the alcohol involvement in both the injured and killed categories. Many times, people are injured and killed by other drivers under alcohol influence, and it has not been possible to trace them in investigations. Since blood and breath alcohol levels are not estimated in nonfatal crashes and in majority of fatal crashes, this is a major legal barrier in courts of law and for registering	Addressing drinking and driving requires a combination of interventions. Some of these are ◆ Checking for alcohol among drivers in a random, visible and uniform manner in all urban areas, highways and districts. ◆ Screening for alcohol at the time of appointment of drivers of public transport vehicles and heavy vehicles ◆ Ensuring that breath alcohol findings are accepted in all courts of law and to be combined with blood and visceral tests for fatal crashes ◆ All fatal crashes to be investigated for alcohol involvement. ◆ Having a uniform policy with regard to location, timings and sale of alcohol. ◆ Removing alcohol selling outlets from 200m on either side of highways. ◆ All hospitals (medical colleges and district hospitals) to introduce screening for alcohol problems. ◆ If fatal crashes are linked to alcohol involvement, it should be considered under the category of nonbailable offense. ◆ Penalty levels to be increased to not less than Rs.2500 for first offence and Rs.3000 for repeat offences, including cancellation

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		subsequent offence, if committed within three years of the commission of the previous similar offence with imprisonment for a term which may extend to two years or with fine which may extend to three thousand rupees, or with both.	details in both police and hospital records.	of license. This should be uniform across the country and to be revised once in 5 years. ✦ The penalty levels can also be based on breath alcohol levels like o Rs.2500 for those with 30 - 60 mg / 100ml o Rs.4000 for those with 60 - 120 mg / 100ml o Rs.5000 for those above 120mg / 100ml
8	Use of drugs and driving	The section is not clear and is imprecise with no definition of drugs (legal and illegal), level of offense, penalty levels.	There is no Indian data in this regard and needs to be examined based on review of medical literature from India.	The section of the act should clearly list out harmful and hazardous drugs with severe penalty levels. To be implemented effectively, mechanisms need to be established for detection of drugs along with legal acceptance. It will be helpful, if the Act can mention that manufacturers of drugs need to inform the warning signs in big bold letters for those legal drugs likely to cause drowsiness and decreased concentration levels. This should be made a responsibility of drug manufacturers. A list of such drugs can be obtained for MOH&FW.
9	Use of cell phones while driving	At present, the offence of usage of mobiles will be punishable under the category of dangerous driving vide Section 184 Motor Vehicles Act.	Even though, precise numbers are not available from India, data from other countries have clearly established that cell phone use while driving is a risk factor as it influences attention and coordination.	A new section needs to be incorporated in the act. The penalty levels should be substantially high in the range of Rs.2000 per offense and to be increased later.
10	Use of Seat belts	Rule 125 A of Central Motor Vehicle Rules, 1989 states that after the year 1993, all manufacturers should equip vehicles with a seat belt for the driver and the front seat occupant. The existing act has a section on seat belts and penalties are Rs.100 for not using seat belts.	Studies have shown that seat belts are effective in reducing deaths and injuries among car occupants. The current use of seat belts among front seat passengers in India are extremely low , less than 10 % levels	The New act should make it mandatory that seat belt to be used by all front seat car occupants in all cars. Since this facility is already available in all new cars it should become mandatory. In addition, the transport of children in front seat of cars should be banned. The penalty for not using seat belts should be in the range of Rs.1000 - Rs.2000 for car drivers not using seat belts.
11	Use of child restraints in cars	There is no mention of this in the existing act	No data is available from India. The effectiveness of this intervention has been well established	The specific provisions for implementation of this need to be included in the new act.

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12	Visibility issues	No clear directions in the existing act, except mention of glaring lights, stickers for heavy vehicles	Poor visibility is known to be a risk factor for crashes. Several studies have pointed out this finding in studies. In a qualitative study of 1500 brain injured RTI patients, it was self reported that 22 % of patients sustained a crash due to poor visibility factors.	The New MVA should specify and include ✦ Compulsory running of daytime headlights by two wheeler drivers. ✦ Uniform reflective stickers for all vehicles should be introduced and the dimensions shape and size of reflective materials for different categories of vehicles has to be decided by the committee. ✦ All vehicle manufacturers should be encouraged to make their vehicles in bright and reflective colours. The act can enprovision incentives for vehicle manufacturers. ✦ All bicycles should be manufactured in yellow or orange colour. ✦ All wheels pf bullock carts to be painted in reflective paints.
13	Obeying traffic rules	Section 119 provides for the duty to obey traffic signs. Penalty of Rs 100 for disobeying traffic signals/ signboard, disobeying traffic police officer in uniform, disobeying manual traffic signals, driving against police signal, failing to give signal and jumping signal.	Data on this can only be obtained from police challans and this is not a specific indicator.	This section is too vague and should specify list of things drivers are not supposed to do and penalties to be severe enough cautioning drivers not to take any risks.
14	Carrying excess people on vehicles	Section 128: Safety measures for drivers and pillion riders not to carry more than one person excluding the rider.		This is unspecific and act should specify this for different types of vehicles.
15	Disabilities and driving	The existing act under Section 186 stipulates that Whoever drives a vehicle in any public place when he is to his knowledge suffering from any disease or disability calculated to cause his driving of the vehicle to be a source of danger to the public, shall be punishable for the first	Even though no clear data exists on this issue in India, it is easy to understand the limitations of disabled persons in using road environment	This section even though present for a long time has been difficult to enforce due to definitions of what constitutes physically or mentally unfit. Experts from different disciplines will have wide ranging interpretations of the law. All persons with a medically diagnosed condition need to carry a card indicating their health problems and the type of medications they are receiving.

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		offence with fine which may extend to two hundred rupees and for a second or subsequent offence with fine which may extend to five hundred rupees.		
16	Health status of drivers	There is no clarity in the present act. The existing act is very vague in mentioning that	There are no clear data available from India on this issue and needs to reviewed	There is no specific mention of this in the current act and needs to include issues of relevance. All drivers of heavy and commercial vehicles can be made to carry a card that informs of their health status, type of drugs they are on, results of vision tests once in 3 years and any other important issues. This should be applicable, especially to those above 50 years. Specifically for Epilepsy, The Indian Epilepsy Association has filed cases in courts with the argument that those drivers who are seizure free for more than 1 year can be permitted to drive. They need to carry a card indicating types of drugs they have been receiving.
17	Fatigue and sleeplessness	The existing act does not address this issue in any way.	With nearly one third of crashes occurring during night times, fatigue and sleeplessness is one of the major contributing factors. There have been difficulties in measuring this risk factor. Specially with heavy vehicles and public transport buses, this has been a major issue as it endangers the life of many passengers on board	The new act should specify the need for maintaining driving hours in all public vehicles and private fleets. The need for making alternate arrangements (like 2 drivers) in long distance carriers should be incorporated.
18	Emergency Care	The existing act under Section 134 mentions the duty of a person in case of accident or injury to a person : When any person is injured or any property of a third party is damaged as a result of an accident in which a motor vehicle is involved, the driver of the vehicle or other person in charge of the vehicle shall -	The Hon. Supreme court of India has issued directives in this regard and the ministry of transport and highways has given publicity for the same. Despite these measures, the situation continues to be grim and prehospital care has not been strengthened	The major barrier for this is the presence of medico legal issues in both hospitals and police. This should be removed and the presence of Supreme Court directives should be included in the act. In addition, all hospitals have to provide mandatory free treatment till the patient is stabilized and referred, if required. Separate compensatory mechanisms have to be developed for initial care of patients. Provisions have to be made for movement of ambulances and right of way has to be provided.

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		a. unless it is not practicable to do so on account of mob fury or any other reason beyond his control, take all reasonable steps to secure medical attention for the injured persons. b. Give on demand by a police officer any information required by him or if no police officer is present, report the circumstances of occurrence, etc... Penalty: punishable with imprisonment for a term which may extend to three months or with fine which may extend to five hundred rupees or with both, or if having been previously convicted of an offence under this section, he is again convicted of an offence under this section, ,with imprisonment, for a term which may extend to six months, or with fine which may extend to one thousand rupees, or with both.	Consequently, the injured do not receive first aid, reach hospitals late, referred from hospital to hospital and there are no triaging systems.	
19	Safety rights of Pedestrians	Rule 11 deals with pedestrian rights	As per BRSIP data and from several other reports in the country, nearly 50 % of deaths and 40 % of hospital registrations due to road crashes are among pedestrians.	The act should mandatorily stipulate the provision of footpaths, walking spaces, crossing facilities and speed reduction and control in all areas , specially in traffic generators
20	Crash (accident) reporting and investigation systems	Reporting of all crashes to police by both injured people and by hospitals	With increasing occurrence of road crashes (nearly 1, 50,000 deaths and 30 time this number for hospitalisations), the reporting systems are inadequate and difficult to manage.	The new act should simplify number of things while promoting and facilitating a scientific approach for reduction of road crashes. In this regard ✦ A simple, essential, scientific reporting system has to be established in both police (in coordination with NCRB) and hospital systems with the aim of identifying essential risk factors.

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			In addition, this complexity has also been interfering in patient care and spending time in documentation and maintatinence of umpteen number of registers in hospitals. All police documentation has been ongoing from an administrative, criminal and legal perspective and has not been of help for prevention and control of road crashes.	✦ Online transmission of information on crashes to national agencies and designated centres (to be established) within the country has to be promoted. ✦ This system should support transport and police departments to take effective action at an early time. ✦ Mechanisms have to be delineated to report fatal and those required by people (for compensation purposes only) to be reported to police. ✦ Scientific research to be established for reduction of crashes based on crash analysis by setting up of a crash investigation and analysis in each state of India.

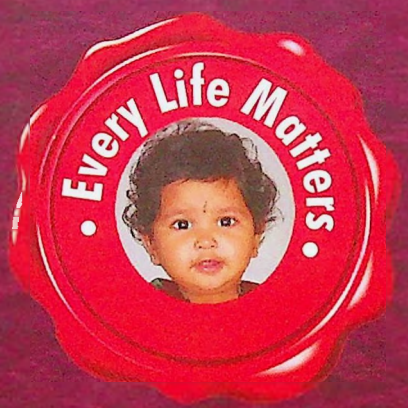
MENTOR-VIP is a global injury and violence prevention mentoring programme. It has been developed through the efforts of WHO and a network of global injury prevention experts. Mentoring allows for skills development through exchange of experience between a more skilled or experienced person and a person seeking to develop those skills. MENTOR-VIP offers an opportunity for individuals committed to the injury area to further develop key skills. MENTOR-VIP is designed to match mentees wishing to develop certain skills with mentors who have agreed to devote their time and efforts to assist mentees develop those skills. Matching of individuals is made on the basis of the profiles of mentee and mentor and the overall principles and objectives of MENTOR-VIP. Once a mentorship is awarded the mentee and mentor jointly plan the activities that will be undertaken during the mentorship. A principle of the programme is that it provides a low cost model for mentoring. Mentoring takes place primarily through electronic and telephonic forms of communication and interaction. Mentorships are for a 12 month period and begin in September of each year.For further details visit:
http://www.who.int/violence_injury_prevention/capacitybuilding/mentor_vip/en/index.html

TEACH-VIP is a comprehensive injury prevention and control curriculum which has been developed through the efforts of WHO and a network of global injury prevention experts. TEACH-VIP E-Learning has been adapted from the facilitator-based training curriculum TEACH-VIP. It provides training on a broad range of topics related to understanding and preventing injuries and violence. It includes extensive content on using data to understand injury problems; details the current knowledge around leading injury and violence problems; and covers the development of evidence-based programmes to address them. TEACH-VIP E-Learning is suitable for a wide range of audiences, including public health professionals and care providers; staff of public health ministries and those in government sectors relevant to injury prevention; officials from non-governmental organizations and others interested in increasing their knowledge base in injury and violence prevention.For further details visit:
http://www.who.int/violence_injury_prevention/capacitybuilding/teach_vip/e-learning/en/index.html

How many more will be lost, before we act!

On ..... Jan 2009, Mr. C..., aged 34 years, while travelling as a pillion, was hit by a ..... bus and died immediately. He was travelling with his son, when a supposedly speeding bus collided with him and injured two others. Following the crash, the driver and the conductor fled the scene and crowd gathered. Enquiry followed, compensation was awarded, media reported the event and road death statistics increased by another number. Every one said such things will happen.

However, for his family, it was the beginning of problems. Loss of husband for the wife, death of father for children, financial problem in family, and loss of a binding force followed in the next few days and weeks. After 1 year, the family has been torn apart. This crash left an unforgettable impact on the family and they may or may not recover from this tragedy.



As per official report, on any given day, nearly 350 persons die in India due to road crashes, often those in younger age groups. About 1500 persons die due to injury causes like road traffic injuries, falls, burns, poisoning, drowning, suicide, assault and many others. The real problem is much higher due to under reporting and misclassification. Several thousands reach our hospitals for care, and are discharged with disabilities that will affect them and their families for the rest of their life. Each day, children and young adults saved from Infectious and communicable diseases die, get hospitalized and become disabled due to injuries.

Each of these are considered as someone's negligence, error, fault, wrong behaviour and investigated from a criminal, legal and administrative angle. Some get compensation, many delayed. Does money really make a difference for the bereaved families?

In a country where road crashes and other injuries are publicly glaring, there are no systematic, scientific and sustainable programmes to address this huge public health problem. As long as we in this country continue to accept road deaths and other injuries as unavoidable and unpreventable events, and as accidents, we cannot turn this tide.

Road crashes and other injuries are predictable and preventable. There are solutions that work. Enforcement, Engineering, Vehicle/Product Safety, Education and Trauma Care can make a huge difference to people like Mr. C .... and thousands of others. We need to move from a "reactive "to a "proactive approach", and shift from "concerns" to "actions". Reduction in road and injury deaths can only happen, if we have the right policies, programmes, resources and willingness to act by giving road safety and injury prevention a higher priority.