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TRANSPORTATION RESEARCH & INJURY PREVENTION PROGRAMME
INDIAN INSTITUTE OF TECHNOLOGY DELHI

Bus Rapid Transit - In Indian Cities

The increasing need for urban mass transit mobility is now being addressed by various cities in India, following the best practices in the world. The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) which aims to encourage reforms and fast track planned development in 63 cities does consider projects in the field of urban, public transport. Safe, versatile, flexible and economic, the Bus Rapid Transit System (BRTS) also known as the High Capacity Bus System (HCBS) is increasingly being adopted by cities in India.

BRTS proposals are in various stages of appraisal and implementation in Ahmedabad, Bhopal, Delhi, Indore, Jaipur, Pune and Vishakapatnam.

DELHI

Delhi with a population of 14 million (2001) is expanding and comprises an urban continuum including of a number of growing townships in Haryana and Uttar Pradesh. This has added to the flow and density of traffic in Delhi. The Delhi BRTS expects to introduce sleek, modern buses with Intelligent Telecommunication Systems (ITS) and additional facilities for non-motorized modes along a new corridor.

Phase one comprising seven corridors has been taken up for BRTS operations; this is a part of the transport plan that covers a total of 37 corridors comprising 500 km for road-based mass transit like BRTS, monorail and Light Rail Transit (LRT).

- First contract for detailing 5 corridors in Delhi was awarded to TRIPP and RITES in 2003 and tenders were called in 2005.
- A Special Purpose Vehicle, The Delhi Integrated Multi-Modal Transport System (DIMTS), was formed in 2006 to manage the BRTS and other mass transit systems in Delhi.
- Contract was awarded to BSC and C&C joint venture for constructing the first corridor in 2006.

AHMEDABAD

Ahmedabad with a population of 45 million (2001) has a total vehicle population of 1.5 million. About 6,000 buses ply on these roads and close to 60% share is of public transport in the region. A pilot corridor of 12 km for Rs. 880 million is now under construction and detailed designs of phase one for 46km is now under active preparation as approved by the Ministry of Urban Development under JNNURM.

VISAKHAPATNAM

Visakhapatnam (Vizag) is a port city in Andhra Pradesh. It has a total population of 1.3 million (2001). It is spread over an area of 11,161sq km. It was recently expanded into Greater Visakha, incorporating the Steel Plant, previous outskirts like Gajuwaka and Madhurawada into the city limits. This has increased Vizag's population by approximately 500,000 people. The total number of motorized registered vehicles was 209,000 in 2001, growing annually at a rate of 4%. Planning for BRTS has just been initiated. BRTS is to be introduced on an experimental basis along a 2 km stretch between NAD-Kotha road and Gopalapatnam.

PUNE

Pune is a city with a growing population of about 2.4 million spread over an area of about 244 sqkm. About 2.5 million trips are generated every day in Pune. About 1,000 buses ply on the roads of Pune with a modal share of public transport at 13-20% only traveling an average distance of about 7 km. A potential 600,000 passengers are there demanding an efficient public transport system.

BRTS planning started in 2003-04 and potential corridors were identified for the phase wise implementation of the BRTS. About 130 km has been identified for a total block cost estimate of about Rs. 10,164 million. The entire process is planned in concert with an integrated cycle master plan. A pilot project of 13.2 km at a cost of Rs. 623 million has already been approved and work has started on the stretch between Solapur and Satara road. 4,762 million has been approved for the construction of another 52.5 km before the start of the Youth Commonwealth Games to be held in 2008.

INDORE

Indore has an estimated population of about 1.8 million and is spread over an area of 134 sqkm. It has about 0.4 million registered motor vehicles with a per capita trip rate of 1.1 and it generated an estimated 1.8 million total trips. About 40% of the trips are made by public transport and around 0.3 million trips are bus based traveling an average distance of about 6.0 km. There are some 150 buses and about 13,000 mini buses. The Indore City Transport Services Ltd. (ICTSL) was set up to operate and manage the public transport system in Indore with private sector participation to overcome financial constraints. This has been so successful that now buses with Passenger Information Systems (PIS) and fully automated ticketing machines now operate in the city.

A network of about 120 km is planned for BRTS by 2010 at a cost of Rs. 8,682 million. Suitably barriered, central bus lanes (at grade) are planned on these corridors to increase the carrying capacity by 50%. A pilot project of 11.45km was approved for about 985 million and is expected to be implemented towards the end of 2006.

JAIPUR

Jaipur is a medium sized city with a population of about 2.3 million (2006) spread over an area of 411 kms (2001). It has about 0.82 million registered motor vehicles (2004), of which 70% are 2 wheelers. A total of 2.7 million vehicular trips are generated every day (2006). A meager 13-19% trips are by city buses covering an average distance of about 9 km. The city has about 185 buses and some 3500 minibuses. Most of the people are dependent on private personal vehicles for their daily commute.

The network of about 42 km for implementation of BRT has been identified in 8 interconnected corridors with about 4 km as an elevated section in phase 1. The other corridors will be identified in the new master plan. The entire project is estimated to cost about Rs. 7833 million and expected to be start in early 2007 and will be finished by the end of 2008. The BRTS will be suitably barriered (at grade) with an estimated carrying capacity of 25,000 people per hour per direction (pphpd). It is estimated to increase the modal share from ~20% to 40-50% with 500 new buses.

BHOPAL

The population of Bhopal Municipal Corporation was 1.5 million in 2001. Bhopal planning area consists of 601 sq km, out of which 285 sqkm is municipal area and the rest consists of BHEL Township, Bairagarh and 135 urban-rural villages. The total trips here were estimated to be 2.8 million including walk trips (2001). A per capita trip rate of 0.72 is observed excluding walk trips, with an average trip length of 5 km. BRTS is planned for a total length of 230 km which is expected to increase to 330 km by 2021 for a total phased out cost of Rs.10710 million.

The **Transportation Research and Injury Prevention Programme (TRIPP)** at the Indian Institute of Technology Delhi, is an interdisciplinary programme focussing on the reduction of adverse health effects of road transport. TRIPP attempts to integrate all issues concerned with transportation in order to promote safety, cleaner air, and energy conservation. Faculty members are involved in planning safer urban and inter-city transportation systems, and developing designs for vehicles, safety equipment and infrastructure for the future. Activities include applied research projects, special courses and workshops, and supervision of student projects at postgraduate and undergraduate levels. Projects are done in collaboration with associated departments and centres at IIT Delhi, government departments, industry and international agencies.

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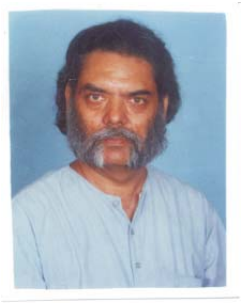
Interview with Dinesh Mohan



Dinesh Mohan is Coordinator TRIPP and Professor at the Centre for Biomedical Engineering, Indian Institute of Technology Delhi.

What was the genesis of TRIPP?

At the Indian Institute of Technology Delhi (IITD) we have experts in a large number of fields and they generally work in their areas of expertise in their individual capacities. I was one of them when I started my career in this Institute trying to establish a base for work on road safety. In the process I came across colleagues who were good at numerical methods, operations research, mechanical testing, statistics and material analysis. Their presence formed the basis for establishing a database and provided the means for an analytical understanding of the road safety situation in India. As we were doing this we realised that traffic behaviour, patterns of road use and traffic injuries in our cities and highways were significantly different from those obtaining in the highly motorised countries. This was very exciting.

Publication of our findings received international attention and established a role for research work in this area for countries like India. This formed the base for most of our work in the 1980s. In the 1990s professionals around the world focussed on pollution, safety and sustainable transportation as major issues. At this time we were lucky that new faculty members joined IITD who had expertise in some of these areas. Experts in dynamics, modelling, transportation planning, numerical analysis, computer sciences, biomechanics and material sciences at IITD, and experts in the medical and social sciences from outside the institute started talking to each other. This gave us the confidence to undertake sponsored projects of an interdisciplinary nature and in the process of working through these projects we realised that we had a team at IITD that could do innovative and original work in the area of transportation research and injury prevention.

What kind of work do you do here in TRIPP?

When we were trying to establish TRIPP we circulated a concept note to a large number of professionals inside and outside IITD to elicit ideas on what our team could focus on. After a process of detailed discussions with professionals in industry, government and IITD, which took about one year, we zeroed in on a goal for TRIPP - research and training for reducing the adverse health effects of road transport. This is what gives focus to our work and we limit ourselves to topics which directly or indirectly involves the health of all road users. When we started we thought that this was a narrowly defined focus. Our last ten years' experience has shown that even this limited focus includes a large number of issues we can deal with. For example, designing efficient public transport systems, traffic flow modelling to optimise traffic movement with an emphasis on non-motorised road users, urban transportation planning, road safety research, vehicle crash modelling, understanding policies that influence atmospheric pollution, social and economic issues, understanding the human body in terms of injury biomechanics and pre-hospital care. However, as a policy our group has not focused on issues concerning engine design and fuel properties.

How do you to decide to take up a project?

It's up to each faculty member and her or his motivation. However, one thing which guides all of us is our focus on issues facing citizens in India and similar countries. This of necessity makes us concentrate on problems of road users outside the car - pedestrians, bicyclists, rickshaw users, two-wheeler riders and commuters using public transport. This is because 70% - 80% of road users and the victims of road traffic injuries comprise these categories. There is really no reason why we should concentrate on the interests of car occupants which is any case taken care of by dozens of research groups around the world. On the other hand our focus on these groups gives us a comparative advantage internationally in pursuing world class research because we have a fantastic natural research laboratory around us!

Why do you do what you do?

This is, at one level, a personal question and I can only speak for myself. Having worked in the US for over 10 years with some pioneers in the field I realized that their success and contribution was the result of understanding the reality around them, looking for anomalies and then coming up with counter intuitive explanations. All this was based on a strong theoretical scientific foundation. The road space in India gives you a great deal to think about. Why do people do what they do? It couldn't be just stupidity and cussedness! This makes you work like a detective and it is great fun working on issues that other people have not worked on. At times one can come up with ideas and solutions which in fact benefit people around one. If you can pursue science and end up doing public good it is terribly satisfying. But at a more personal level, it is hugely satisfying to be able to find explanations that are new. I guess this is the reason why most of us do what we do.

Would the influence of your work be area-specific?

It is not difficult to answer by saying: India. But, I guess for any researcher that is not enough. One likes to contribute to knowledge and theory that has international applicability. That is why we like to publish internationally. It is very difficult to determine what and who you have influenced but sometimes you have clues. We have got some clues by participating in international conferences and by holding international courses annually on transportation planning and injury prevention over the last 15 years at IITD. Participants from Asia , Africa and South America have participated in these courses; faculty from Europe and USA have joined us and shared their experiences. This gives us proof that a number of professionals value our work, especially those who are not from highly motorised countries. At another level our work seems to have international ramifications as reflected by the fact that almost all the members of our group are invited internationally to present their work and they publish in some of the best international journals. We are also proud that the Volvo Research and Educational Foundations selected us as their first International Centre of Excellence for research on future urban transport. The WHO has designated TRIPP as a Collaborating Centre for research and training in safety technology; and, TRIPP has also received The Stockholm Partnerships for Sustainable Cities 2002 award.

How do social sciences like psychology, sociology and economics impinge on your work?

We are told and most of us do believe that scientific research is an objective pursuit of the truth. And this pursuit results in solutions to societal problems and development of technologies. However, this in itself is a half-truth. It is true that scientists try to apply tools of analysis that have an objective basis to them but how they select problems and what they observe is conditioned by the world around them. However, science or basic research does not always precede technology. Very often technologies are developed first and then science comes later to explain how and why they work. This is particularly true of the transportation planning and safety field. The issues we have to deal with are thrown up by the problems people face on the road: lack of access, congestion, pollution, accidents, noise and general irritation. The extent of these problems is determined by the kind of roads we design, how much money we have to execute the projects, how we manage and enforce traffic rules, how the powerful sections of society use their influence in the selection of the solutions and ultimately how the road users react to all this and behave on the road.

This obviously becomes a heady cocktail of technology, economics, politics, sociology and psychological factors; it is very difficult to unravel by linear Cartesian thinking. This is why we haven't been so successful in the past century in dealing with these issues anywhere in the world. We are still unable to reduce CO^2 emissions, bring down road traffic injuries to negligible levels, make our environment quieter, reduce congestion, and make destinations accessible for everyone in our cities and villages. Transportation researchers have to be very sensitive to these complexities. Any professional in a research

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institute responds to the demands from the local environment, the questions posed and the rewards offered. If these signals emerge democratically from the society around the researcher, then s/he can isolate, identify and pursue a lead profitabily to its end. Good science can only be done when you are able to detect patterns in nature and deduce a theory which is context sensitive. Bad science emerges from copycat work independent of our context.

If one is to discover any law of nature one must be aware of how nature affects people and how people affect nature. This is particularly true in road safety and transportation work. Any technical intervention changes people's behaviour, so, the way technology is used can be quite different from what the inventor intended; for example, when you introduce better braking systems in vehicles, drivers may start driving faster thus diminishing the beneficial effects of the new technology. This is why transportation and safety remains a weak science because professions in these fields depend too much on technical fixes without understanding the behavioral issues.

One of the issues which has been bothering me over the last decade or so is the fact that very few countries in the world have been able to reduce the death toll of road traffic injuries in spite of the knowledge available to them over the last twenty five years. This obviously shows that it is not only the car and road designs which decide how, when, where and why people travel. For example, among the rich countries the US has a road traffic injury fatality rate per capita of the population which is about three times worse than Sweden, UK or the Netherlands. This obviously throws up a serious question: if these countries have similar knowledge about road and vehicle design and similar amounts of funds available, then, why are their fatality rates so different?

I guess urban structures and settlement patterns have a significant impact on how much people drive and their behavior while doing so. And this in turn, influences whether people have high or low exposure to risk in their daily lives. Over the last two hundred years, industrialisation has influenced urban form and rural living patterns creating a demand for greater travel. Those societies like the U.S. which have created structures demanding greater travel obviously put their road users to a higher risk.

Therefore, understanding Indian cities becomes very exiting. Our cities have a higher proportion of informal trade and activity and so have grown somewhat organically. This gives us an opportunity to observe and study efficiencies in human mobility; for example, some of our data show that poor people choose to live, even if illegally, close to their workplace which allows to walk or bicycle to their destination. Our traffic flow analysis at intersections show that people seem to be optimising space use rather than standing in queues. This allows faster throughput than that which a simple lane-driving model would predict. We are also surprised to find that overloaded three-wheelers seem to have very low crash rates. Such findings force us to look at the whole problem from a different perspective.

What are the issues that cause the most confusion and difficulties in the implementation of your work?

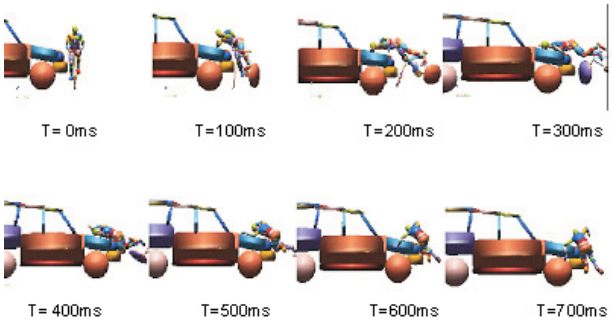
One of the biggest problems in promoting road safety is that victim blaming is still very strong in our society. Victim blaming is not scientific but the normal response of a society when it does not have the knowledge for solving the problem. In the past patients of tuberculosis or leprosy were blamed for their immorality. And in modern times the same is true for HIV victims. In the area of road safety we have known for a long time, that driver training and road user education does not reduce injury rates significantly. This has been substantiated by theory and empirical observation. However, it is difficult to find a policy maker or NGO willing to internalize this knowledge. This is the main impediment in promoting road safety. Our group has done some important work in the design of road space which gives the rightful place to vulnerable road users like pedestrians, bicyclists and bus commuters which ensure their mobility and safety. However, the implementation of these designs is very slow because they impact the public space. Design changes in the public space requires a concensus among all the stakeholders. This happens with perservence. There is however, visible progress in that the new Urban Transport Policy of India which incorporates several desirable features mentioned here.

You seem to have a view on class and society. In that contest how do you view the future of sustainable transport options?

This is the most difficult question. The road space is reasonably undemocratic in all countries, especially in India. The more powerful people (in cars) provide for themselves greater space with more safety than the less powerful (pedestrians). As engineers we prefer to dodge it rather than work on it. We seem to think that the answer will come mainly from improving cars and fuel systems. But the change wil I have to come by providing accessibility with less mobility. But in a globalised world how do you tell anyone that (s)he should not own one or more cars? Something has to happen world wide which will change this situation dramatically. At present, we don't have a clue what that might be. In the meanwhile we have to work for more democracy on the roads. Every road user has a fundamental human right to access her (his) daily needs comfortably, without getting hurt. No road user has the right to pollute the atmosphere. Ultimately, we need to ask only one question. Would you allow your grandmother or seven year old daughter to go out on the road alone? If the answer is yes, you are on the right track, if the answer is no, something is terribly wrong.

Understanding complexity in mixed traffic

Experiments with universal design for Bus Rapid Transit Systems



Modelling bicycle – SUV crashes

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News

Driving Control and Stability Systems

A recent UMTRI study found that electronic stability control (ESC) systems dramatically reduce the likelihood of single-vehicle crashes. Paul E. Green, assistant research scientist, and John Woodrooffe, head of UMTRI's Transportation Safety Analysis Division, analyzed eight years of government vehicle crash statistics for approximately1,500 fatal car crashes and 500 fatal SUV crashes. They found that ESC systems can reduce the odds of a fatal rollover crash by nearly 73 percent in sport utility vehicles (SUVs) and by nearly 40 percent in passenger cars. Nonfatal loss of;'control crash odds are reduced by 70 percent for SUVs and55 percent for cars, with even more dramatic benefits in poor weather con-ditions. Fatal single-vehicle crashes were 50 percent less likely in SUVs with ESC and 31 percent less likely in cars with ESC.
"Electronic stability control is prob-ably the most significant automotive safety technology since the seat belt,"says Woodrooffe. "The evidence is overwhelming," Green adds. "Vehicles that have electronic stability control just don't go off the road in comparison to those without ESC." *UMTRI Research Review, University of Michigan Transportation Research Institute, April-June 2006: Vol. 37, No. 2.*

Sleepy at the Wheel

Driver sleepiness has been shown to be one of the most important risk factors in road crashes. The aim of the present study was to increase the understanding of drivers' actions when feeling sleepy. A national Internet panel survey was conducted among private drivers in the autumn of 2003. Reported symptoms of sleepiness differed between drivers who had fallen asleep and those who had not, but had been afraid to do so. The results indicate that drivers in general have a good knowledge of the various factors influencing the risk of falling asleep while driving. Furthermore, most of them are well aware of the most effective measures to prevent falling asleep at the wheel, such as stopping the car and take a nap. In spite of all their knowledge, most of the drivers continue driving when recognising sleepiness while driving. A short trip, appointments, and the wish to arrive at a reasonable hour are the most frequently reported reasons for continuing driving while fatigued or sleepy. *Sleepy at the Wheel: Knowledge, Symptoms and Behaviour Among Car Drivers. S. Nordbakke, A. and F. Sagberga, Transportation Research Part F 2007: 10:1-10.*

Effectiveness of Physical Threats in Road Safety Advertising

Threatening advertisements have been widely used in the social marketing of road safety. However, despite their popularity and over five decades of research into the fear-persuasion relationship, an unequivocal answer regarding their effectiveness remains unachieved. More contemporary "fear appeal" research has explored the extent other variables moderate this relationship. In this study, the third-person effect was examined to explore its association with the extent male and female drivers reported intentions to adopt the recommendations of two road safety advertisements depicting high physical threats. Results indicated a significant gender difference with females reporting reverse third-person effects (i.e., the messages would have more influence on themselves than others) and males reporting classic third-person effects (i.e., the messages would have more influence on others than themselves). An additional limitation pertains to the outcome measure of interest, namely, behavioural intentions. Although intentions are significant predictors of behaviour, the existence of the "intention-behaviour gap" highlights the fact that intentions are not perfect predictors of behaviour. In relation to advertising practice, these findings suggest that current health advertisements incorporating strong physical threats, whilst relevant and influential for some segments of the audience, may not be relevant and influential for the entire audience. In addition, this study did not have a control group and did not measure outcome in terms of crash reduction. Therefore the effectiveness of threatening messages in reducing crash rates remains unknown. *Examining the Effectiveness of Physical Threats in Road Safety Advertising: The Role of the Third-Person Effect, Gender, and Age. Ioni Lewis, Barry Watson and Richard Tay. Transportation Research Part F, 2007. 10:48-60.*

Vehicle Weight and Fatality

The potential for a lower risk of death compatible with increased fuel economy among 67 models of 1999-2002 model year cars, vans, and sport-utility vehicles(SUVs) during the calenter years 2000 to 2004 was examined. The odds of death for drivers and all persons killed in vehicle collisions were related to vehicle weight, size, stability, and crashworthiness. Fatality rates would have been 28% lower and fuel use would have been reduced by 16% if vehicle weights had been reduced to the weight of vehicles with the lowest weight per size, where size is measured by the lateral distance needed to perform a 180-degree turn. If, in addition, all vehicles had crashworthiness and stability equal to those of the top-rated vehicles, more than half the deaths involving passenger cars, vans, and SUVs could have been prevented by vehicle modifications. *Blood and oil:vehicle characteristics in relation to fatality risk and fuel economy. Robertson LS. Am J Public health 2006; 96(11): 1906-9.*

International Course

The Transportation Research and Injury Prevention Programme (TRIPP) at the Indian Institute of Technology, Delhi organized a seven day International Course on Transportation Planning and Safety from 04-10 December 2006 at the Indian Institute of Technology Delhi. The course was co-sponsored by the Volvo Research and Education Foundations, INRETS, France, World Health Organisation, TVS Motor Co. and the Ministry of Road Transport and Highways. The course (an annual feature for the last 16 years), was attended by 51 participants from 10 countries. The faculty members included Anoop Chawla (IIT Delhi), Dinesh Mohan (IIT Delhi), Farida Saad (INRETS, France), Fredrick M. Nafukho (University of Arkansas, USA) Geetam Tiwari (IIT Delhi), G. Gururaj (NIMHANS, India), Harald Zellmer (Autoliv, Germany), Hermann Knoflacher (Technical University of Vienna), Janusz Kajzer (Chalmers University, Sweden), Marie-Chantal Jayet (INRETS, France), Mathew Varghese (St. Stephen's Hospital, Delhi), Meleckidzedeck Khayesi (WHO, Switzerland), Nicole Muhlrad (INRETS, France), Shrikant Bangdiwala (University of North Carolina, USA), Sudipto Mukherjee (IIT Delhi), Sylvain Lassarre (INRETS, France) and Tom Godefrooij (ICE,The Netherlands) .

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The Bone and Joint Decade • 2000 - 2010

For prevention and treatment of musculoskeletal disorders
www.boneandjointdecade.org

National Action Network - India

RESOLUTION 0N COMPULSORY HELMET USE BY MOT0RISED TWO-WHEELER RIDERS IN INDIA

THE BONE AND JOINT DECADE is an independent global non-profit organization whose mission is to improve the health-related quality of life for people affected by musculoskeletal disorders worldwide. It is the umbrella organization by which National Action Networks, professional medical societies, patient advocacy groups, governments, industry and researchers partner to effect change by: (1) Raising awareness of the growing burden of musculoskeletal disorders on society; (2) Empowering patients to participate in their own care; (3) Promoting cost-effective prevention and treatment; and (4) Advancing understanding of musculoskeletal disorders through research to improve prevention and treatment.

Every 30 seconds someone dies on the world's roads. Annually over 1 million people die and over 25 million are injured or permanently disabled from road traffic injuries. Seventy-five percent of the fatalities and injuries occur in the less motorised countries. The problem is growing. The Global Burden of Disease Report, published by the World Health Organization, predicts that road traffic accidents will move from ninth place to third place on the list for worldwide death and disability. BJD-NAN-India recognises that road traffic injuries and fatalities have become a significant health problem in India also and we need to take preventive measures on an urgent basis. With regard to motorised two-wheeler injuries BJD-NAN-India recognises that:

- Two-wheeler crashes contribute a significant proportion of road traffic fatalities and injuries in India.
- Compared with cars, motorcycles are especially dangerous. Per km travelled, the number of deaths on motorcycles is about 10-15 times the number in cars. Motorcycles often have excessive performance capabilities, including especially rapid acceleration and high top speeds. They're less stable than cars in emergency braking and less visible. Motorcyclists are more prone to crash injuries than car drivers because motorcycles are unenclosed, leaving the rider vulnerable to contact hard road surfaces. This is why wearing a helmet is so important.
- Helmets are the principal countermeasure for reducing crash-related head injuries, the leading cause of death among unhelmeted riders.
- Helmets decrease the severity of injury, the likelihood of death, and the overall cost of medical care. They're designed to cushion and protect riders' heads from the impact of a crash.
- The World Health Organization's report on traffic injury prevention documents that compulsory helmet use by motorized two-wheeler riders can reduce deaths by 30%-50%.
- The scientific evidence is overwhelming that helmets are very effective in reducing severe head injuries in motorcycle crashes, and that compulsory helmet use laws are essential to ensure that all riders use helmets.
- Scientific studies show that helmets reduce head injuries without an increased occurrence of spinal injuries in motorcycle trauma.
- There is no scientific evidence available that use of helmets makes motorcyclists more vulnerable because of reduction in sight or hearing.
- When compulsory helmet use laws are enacted, helmet use increases and fatalities and serious injuries decrease. And, when such helmet use laws are repealed, helmet use decreases and injuries and associate costs increase.

Therefore, the BJD-NAN-India supports the enactment and enforcement of compulsory helmet use laws for motorised two-wheeler riders in all states of India

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