



## Dedicated to the Memory of *Dinesh Mohan* (1945 - 2021)

### Messages

Press release – IIT Delhi, 21 May 2021

It is with a profound sense of loss and sadness, we would like to inform that Prof. Dinesh Mohan, Founder of Transportation Research and Injury Prevention Programme (TRIPP) and world-renowned expert on Traffic Safety and Human Tolerance to Injury has passed away early this morning (21 May 2021) due to COVID related complications.

Prof. Mohan, currently an Honorary Professor at the Institute, started his career with the Insurance Institute for Highway Safety in Washington DC, USA. Since 1976 he was with IIT Delhi's Centre for Biomedical Engineering and did pioneering work through the establishment of TRIPP.

He was a recipient of several distinctions and awards, which includes the Distinguished Alumni award from IIT Bombay and the University of Delaware. He was on several committees nationally and internationally on Traffic Safety and Injury Prevention besides being on Editorial boards of top journals. He has authored and co-authored several books and articles in scholarly journals. Some of his outstanding contributions are in terms of policy related to the safety of individuals and safe designs of passenger vehicles (buses and three-wheelers).

He was a great humanist and fervent supporter of Individual rights. The Delhi Declaration on People's Right to Safety is one such example besides many others. He was also a leading columnist and commentator on issues related to the public interest.

It is a huge loss for all the faculty, students and staff at TRIPP, IIT Delhi and all those known to him at the Institute and the Traffic safety community in India and the rest of the World.

We all pray the almighty to give his family the strength to overcome this huge loss.

May his soul rest in peace.

Dear colleagues

We are deeply saddened to announce the loss of Professor Dinesh Mohan of the Indian Institute of Technology Delhi. Professor Mohan was involved with the WCTRS for many years, serving on both the Scientific and Steering Committees, and providing invaluable help to the then President Yoshi Hayashi to initiate Organizational membership to the Society.

Professor Mohan's work in Traffic Safety and Injury Prevention was unparalleled. He was invited to join the International Association of Traffic Safety Sciences, and was the director of the Independent Council for Road Safety International. During his distinguished career he was the recipient of many honors and awards, including the 1991 International Association for Accident & Traffic Medicine's International Award and Medal for Outstanding Achievement in the Field of Traffic Medicine. Professor Mohan also worked to develop the WCTRS's research into traffic safety, and initiated

the WCTRS Special Interest Group in Traffic Safety Analysis and Policy (SIG C4) with Professor Geetam Tiwari. He brought good humour, humanity and a beautiful style of writing to all of his work, and he will be sorely missed as a scholar, colleague and friend.

Best wishes

WaelAlhajyaseen, Dr.-Eng, MEng, PE (Jordan)  
Associate Professor, Qatar Transportation and Traffic Safety Center  
College of Engineering, Qatar University, Doha-Qatar

The Volvo Research and Educational Foundations (VREF) want to inform you about the loss of Professor Dinesh Mohan, who passed away in New Delhi last week of a cardiac arrest after having contracted covid. We want to express our deepest sympathies to all of you who had the chance to meet and interact with him.

Professor Mohan was not only a pioneer in VREF's work by being the respected leader of our first Centre of Excellence, co-founded with Professor Geetam Tiwari in 2003. He was also a knowledgeable, committed and cheerful colleague and friend to many of us. As our foundations supported Professor Mohan's and Professor Tiwari's important work, they in turn continually contributed to further strengthening and developing many of our other initiatives, including the recently-established programme on Mobility and Access in Sub-Saharan cities and the forthcoming initiative on Walking as a mode of transport. Professor Mohan was indeed a cornerstone in our international work on Urban Transport over two decades.

Professor Mohan has meant a lot to all of us. His perspectives were always mind-opening, challenging conventional knowledge. We would also like to highlight Professor Mohan's many contributions to the coming generation of scholars, where he always was ready to offer support and guidance to young researchers and students in the VREF international network. His professional expertise, his seemingly tireless energy, and his strong determination in his advocacy for pedestrians' safety and vulnerable road users will be greatly missed by many world-wide.

Many of you have already been in contact with us to express your sympathy and share your sorrow in this difficult moment. We thank you for reaching out. Besides sharing fond memories of Professor Mohan over the years, others have pointed out that we need to keep in mind that he was not the kind of person who would like to see his friends and family saddened by his passing. Rather, he would like us to celebrate his life, remember the good times we had together, and move on. Despite our sorrow, we should remember him with a smile.

We at VREF are currently considering ways in which we as a community could commemorate Professor Mohan and his work. We know that many of you who have learned from him would like to remember and celebrate him. And as a senior VREF scholar expressed it, doing this together also strengthens our feeling of belonging and our sense of a community.

The **Transportation Research and Injury Prevention Centre (TRIP Centre)** at the Indian Institute of Technology Delhi, is an interdisciplinary academic unit focussing on the reduction of adverse health effects of road transport. TRIP Centre 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.





We will come back to you with more information as our thoughts and plans develop.

Best regards,  
Fabienne Niklasson,  
Volvo Research & Educational Foundations,  
C/O Volvo Pension

Dear Professor Geetam Tiwari and members at TRIPP, IIT Delhi, and IATSS Forum Indian Committee members

We are deeply distressed to hear the sudden loss of Emeritus Professor Dinesh Mohan, who contributed to overall IATSS international activities for many years.

Prof. Mohan participated in our International Round Table on Traffic and Safety held in Europe in 1991 as the leading authority of transportation and traffic safety research in India, which was the first time we knew each other.

IATSS members and Prof. Mohan had been in touch with one another in person since then; however, IATSS as an organization and Prof. Mohan as a representative of TRIPP at IIT Delhi built the team officially through the collaborative research project.

The project started in 2012 and continued for 3 years, focusing on traffic safety & community design in five medium sized Indian cities. This was the first time IATSS was involved in collaborative research with overseas institution, and also this was the first IATSS project focused on the transportation issues in India.

Without Prof. Mohan's leadership and strong power of coordination, IATSS would never had such great research opportunities in local Indian cities. Because of the success of this initial phase of our collaboration, we could continue tackling on traffic safety & street design in three small sized Indian cities from the viewpoint of SDGs for another 4 years (2017-2020).

He also continuously supported our journal "IATSS Research" as an Editorial/Advisory Board member since 2015, and his presence as a Board member surely led to great increase of paper submission from India and other developing countries.

Most recently, he provided great support to establish IATSS Forum Indian Committee. He served as Chairperson of the Committee, and we highly appreciate his efforts in making a great contribution to the success of IATSS Forum.

He also joined the 1st "Global Interactive Forum on Traffic and Safety (GIFTS)", which is a series of international symposium & workshop hosted by IATSS.

Through these opportunities, we learned more about Prof. Mohan, not only his enthusiasm toward traffic safety in the developing countries including India, but also his warm personality and broader perspective when looking at society & people.

Though it is still too hard to face the loss of Prof. Mohan, we understand that we have a responsibility to carry on his legacy and spirit as we move forward into the future.

IATSS would like to extend our heartfelt condolences to you all, his family and friends. May his soul rest in peace, and we wish all the members of TRIPP, IIT Delhi and IATSS Forum Indian Committee our best regards.

Yours Sincerely,  
Kazuhiko Takeuchi  
President, International Association of Traffic and Safety Sciences

WCTR – President

It is a very sad news, indeed, to hear that we lost Professor Dinesh Mohan, a very distinguished colleague and major contributor to the WCTRS as explained in some detail by Prof. Yoshi Hayashi stated in his trailing email.

Via this email, I am asking our UK Secretariat (Emma Pickering) to compose/list a paragraph to express celebration of his contributions (based on Yoshi's email text) to our Society in the next issue of the WCTRS News Brief to be emailed to all WCTRS members.

Thank you very much for letting us know.

Very best,

Tae  
(Prof.) Tae Hoon Oum, Professor Emeritus, Sauder School of Business, University of British Columbia, Vancouver, B.C., V6T 1Z2 Canada

Email: Tae.Oum@ubc.ca  
President, the World Conference on Transport Research (WCTR) Society, www.wctrs-society.com

WCTR – Past President

From: Yoshitsugu Hayashi <y-hayashi@isc.chubu.ac.jp>  
Sent: May 21, 2021 7:03 AM

I hear this news with my deep grief.

When I was appointed as WCTRS President, I requested Dinesh to become a member of WCTRS Steering Committee. He did a great job there.

Particularly he took leadership to help me a lot in initiating Organisational membership which I proposed as one of my first important initiatives as president.

The definition and privileges were drafted by him. The sentences were glittering. During discussions with him, I touched his personality with full of humanity, wit and humor.

He also has contributed a lot to developing traffic safety research in WCTRS to initiate the Special Interest Group on Traffic Safety Analysis and policy together with Getam. He looked as if brother and sister or father and daughter.

He has been invited by IATSS (International Association of Traffic Safety Sciences), a research foundation initiated by Soichiro Honda (founder of Honda) in 1974 in Tokyo. I knew his substantial contribution because I have been a board member.

I found his way of safety research very unique and quite different from ordinary civil and traffic engineers. It was a great contribution to that field.

We lost a great person. May his soul rest in peace.

Best wishes,

Yoshi

Dear colleagues

We are deeply saddened to announce the loss of Professor Dinesh Mohan of the Indian Institute of Technology Delhi. Professor Mohan was involved with the WCTRS for many years, serving on both the Scientific and Steering Committees, and providing invaluable help to the then President Yoshi Hayashi to initiate Organisational membership to the Society. Professor Hayashi remembers that his exception writing skills and warmth of spirit made drafting the relevant documents and launching the initiative to be a smooth and easy process.

Professor Mohan's work in Traffic Safety and Injury Prevention was unparalleled. He was invited to join the International Association of Traffic Safety Sciences, and was the director of the Independent Council for Road Safety International. During his distinguished career he was the recipient of many honours and awards, including the 1991 International Association for Accident & Traffic Medicine's International Award and Medal for Outstanding Achievement in the Field of Traffic Medicine. Professor Mohan also worked to develop the WCTRS's research into traffic safety, and initiated the WCTRS Special Interest Group in Traffic Safety Analysis and Policy (SIG C4) with Professor Geetam Tiwari. He brought good humour, humanity and a beautiful style of writing to all of his work, and he will be sorely missed as a scholar, colleague and friend.

Professor Tae Oum, President of the WCTRS

Professor Yoshi Hayashi, Immediate Past-President of the WCTRS

Professor Greg Marsden, Secretary General of the WCTRS, and Ms. Emma Pickering, Secretary of the WCTRS

This is very sad news indeed and please accept my condolences for all of his close colleagues.

As well as a short statement for Professor Mohan we would very much like to provide links to any statements or obituaries which have been prepared at IIT or by the Indian TRG etc.

Best regards

Greg



## Memorials

Source: "Dinesh Mohan: a visionary committed to real change" - Geetam Tiwari. *The Indian Express, Wednesday, June 30, 2021.*  
Link: <https://indianexpress.com/article/opinion/columns/iit-delhi-professor-dinesh-mohan-road-safety-expert-7328799/>

He leaves behind a team of inspired researchers both in India and abroad to carry forward the sustainable transport and liveable cities movement.

Professor Dinesh Mohan was often fondly addressed as DM by his colleagues and students at IIT Delhi. "DM, do you have a few minutes for a discussion on this project?" His prompt response was "sure". A few minutes often would stretch into hours. The discussions were not just about data and theories, but anecdotes of Bill Haddon at the Insurance Institute of Highway Safety (IIHS) in Washington DC in the 1970s, to national politics and geopolitical discussions. The president of IIHS was shocked when DM resigned from the institute, declined a green card and returned to India to pursue his career.

My first interaction with DM was in January 1990 after I joined IIT, Delhi. He was completing a research project on agricultural injury and was busy making presentations at various national and international conferences. (A few years later, this work received the Haddon Memorial Award for best paper in safety research at the World Injury Conference in Australia.) He had already been on the national committee on road safety and had been working with the Delhi traffic police and Delhi Transport Corporation addressing safety concerns.

His insistence on spending time to understand the primary data and detailed observations at site visits continued with every fresh batch of students and researchers joining our team. DM often said that while scientific theories are universal, technology always has a social imprint, and, therefore, we must spend time understanding our own problems. Since "buses impacting pedestrians is our problem, we have to find our own solutions". Scientific methods to promote an alternate bus front design, which is safer for pedestrians, safe roads for pedestrians and bicyclists, safe three-wheelers, must become our research priority. He inspired original research in testing helmets at IIT Delhi. Mechanical engineering colleagues worked on burn injuries and constructed an indigenous metal dummy to test the burn properties of different textiles.

In 1995, colleagues from mechanical engineering, applied mechanics, and civil engineering came together and worked on different chapters of the report "Delhi on the move 2005" — a road map for the Delhi transport system to acquire clean and safe transport for all in a decade. DM was the lead author and the inspiration for chapters on alternate fuel and technologies, pedestrian-friendly cities, platooning of buses, optimised taxi systems (a precursor of Uber), planning for non-motorised transport and applicability of metro systems in less motorised countries. The report was submitted to the Central Pollution Control Board and the transport department of Delhi government.

DM was a firm believer in working with the politicians to achieve real change. As researchers and academicians, we could get a job anywhere in the world, but a politician must always work for national interest because he/she cannot fight an election in any other country, he would say. We cannot accept "corruption" and "political interference" as an excuse for poor designs and poor infrastructure planning. We, as responsible academicians, must bring important road safety, transport issues into the public domain, and develop a consensus for implementing the right policies. This democratic process may be slow but is likely to be more permanent. Road safety and sustainable transport research requires stepping out of the classrooms and laboratories and interacting with the media, the bureaucracy and the politicians. The Bus Rapid Transit (BRT) system experiment in Delhi was an outcome of this vision. After the negative press coverage in 2008 and dismantling of the system in 2016, his conviction and strong support for a bus-based transport system did not change. We all agreed that the vision of sustainable transport and giving democratic rights to people in buses, people on bicycles and pedestrians was 20 years ahead of its time.

We must build a critical mass of young and researchers who can challenge the established norms, that is the only way to move the sustainable transport agenda forward. DM often started his technical presentations with a quote by M K Gandhi: "Action without knowledge is useless and knowledge without action is futile".

Researchers at TRIPP (Transportation Research and Injury Prevention Program) fondly remember his love for street food and dance music. No international conference banquet was complete without his animated discussions with international colleagues. He leaves behind a team of inspired researchers both here and abroad to carry forward the sustainable transport and liveable cities movement forward.

Source: "Dinesh Mohan was brilliant, contrarian and committed to social justice" - Rita Manchanda. *The Indian Express, Wednesday, June 30, 2021*  
link: <https://indianexpress.com/article/opinion/columns/dinesh-mohan-was-brilliant-contrarian-and-committed-to-social-justice-7331711/>

One of India's preeminent road safety experts, he was an institution builder and dedicated teacher who stuck to his convictions, despite significant professional costs.

My indomitable friend, Dinesh Mohan, I cannot imagine that you went "gentle into that good night" but that you raged against the dying light and fought as you have done all your life against ignorance, mediocrity and above all, injustice. To know Dinesh — whether as a student or colleague — or to be counted among his vast array of friends, meant engaging with him intellectually, and so exasperatedly. For, Dinesh would argue counter-intuitively, veering on blasphemy at times, but in that unsettling process, pathways to clarity were opened. Take the Covid-19 debate. Dinesh questioned the value of prioritising testing, pushing many public health professionals to re-examine their position, and in that jousting both recognised that testing must not be falsely positioned as treatment or healing.

Dinesh was not your comfortable go-along-with colleague, friend and mentor, even though his energy, zest for life, passionate political convictions and deep compassion drew young and old to him. Vague and loosely-held positions had to be challenged. On Covid-19, a mobilising group's retreat from the social obligation of cutting through medical obfuscation around the pandemic — falling back instead on the "leave it to the medical experts" option — prompted a retort. It led to a transformation in the Delhi Solidarity Group's civic intervention — one based on the appreciation of shared responsibility for civic health and a recognition that an informed interrogation of "experts" is necessary for humanitarian response. This was an offshoot of Mohan's passionate conviction about the nature, purpose and relevance of science in society.

As a fresh returnee to India, this distinguished alumni from IIT Bombay was the youngest signatory to the 1981 statement on "scientific temper" — it derived from a world view that linked the role of science to civil and human rights. Baptised in the democratic protests against the Vietnam war in the US, he brought his street-fighting passion to his frontline involvement in the pursuit of justice and accountability in India, especially on issues such as the 1984 anti-Sikh violence, the Babri Masjid demolition and human rights violations in Kashmir. As a founder member of the Pak-India Forum for Peace and Democracy, he ran the risk of being branded anti-national. But whether it was at Jantar Mantar or the farmers' protest in Delhi a few months ago, Dinesh responded to the call without hesitation.

Such defiance was not without significant professional cost and a calling to account by intelligence sleuths — notwithstanding that his professional brilliance and expertise in his chosen field of road transport and safety made him a natural member of multiple national and international public policy committees. There too, he never hesitated to be true to his convictions, willing to be a contrarian on the Delhi Metro, criticising it as expensive. He was critical of Delhi's switch to CNG and braved public controversy over the introduction of the BRT (Bus Rapid Transport) and its eventual surrender to the dominant car lobby. For Mohan, his academic and policy research on road transport and safety was integral to his commitment to social justice. It privileged the most vulnerable of road users, the pedestrian and the cyclist, and valued affordable mass public transport, buses.

Dinesh pioneered research in the field of road safety and co-authored the International Public Charter on Right to Safety. He was an institution builder, founding IIT's Transport Research and Injury Prevention Programme (TRIPP). Recently he co-founded and became the director of the Independent Council for



## Memorials (contd.)

### Road Safety.

Above all, Dinesh was a caring and generous friend to many and very diverse people he forged an intimate connection with. He was never too busy if a friend called, nor did he hesitate to help someone. His laughter comes to mind and so, too, his generosity as a host at myriad gatherings at their home with his wife Peggy, a distinguished author, linguist, painter and cook. You have left a terrible void, Dinesh. You would have never given up the struggle against injustice. Now, it is on us to carry it forward.

Source: "A padayatri who was not pedestrian: Remembering Dinesh Mohan" - Sanjiva Prasad. *Careers 360*

Link: <https://news.careers360.com/obituary-covid-19-dinesh-mohan-iit-delhi-sanjiva-prasad>

COVID-19 has claimed the lives of hundreds of educators across the country. In a new series, *Careers360* tells the stories of some of them and the communities they left behind.

"Every university needs a crazy professor," my uncle Prof Mohan Ram used to say, referring to his colleagues Prof. JPS Uberoi and Prof. CR Babu. In my first year at Indian Institute of Technology (IIT) Delhi, when I was biking on campus, helmet on head and child-seat behind me, I was flagged down by a khadi-clad gentleman with a Mahishasura-style moustache, who proceeded to examine the childseat and my helmet carefully before voicing his approval and letting me go on my way.

The next several encounters with Dinesh Mohan were of a very mixed nature, where I'd either be intrigued or totally put off by a contrarian view he would voice, or a peculiarly aggressive challenge to what I regarded as a completely rational opinion. He could almost always be counted on to throw in something "from left field". His pronouncements could exasperate and shock ("I am a scientist, therefore, what I do is science"). Over those next few years, I heard more views about this person, from friends and others, some very positive, many very negative. Here was a man about whom it was impossible not to have an opinion.

The BRT\* project amplified those opinions. Every driver in Delhi had an opinion on the project and on those who were the brains behind it. The experiment was eventually wound up and branded a failure, but is a reminder that urban planning, transport, safety and environmental policy need far more expertise and inclusive processes in their conception and execution than they are in this country. I personally was unconvinced by some of the traffic models that Dinesh and his colleagues had studied because of limitations in the lane-driving model underlying the simulation software package they had used. Or the idea of placing the bus lane in the middle of the road (I called it "a very dangerous place"). It took several discussions over cups of tea for me to understand that we had important lessons to learn from Bogota and elsewhere. I don't know if Dinesh came to terms with the reality that while it helped the residents of Ambedkar Nagar and Khanpur (and at a cost far lower than the metro could), the BRT system was not aspirational; it would not transform Delhi's real estate equations.

It was over the years that I got to know him better through my senior colleague Sachin Maheshwari and others. I had my father's wariness of people around whom "like-minded intellectuals" congregated. It's only when I found that Dinesh's circle included very independent-minded people from diverse walks of life, and for whom I had a lot of respect, that I could see he was not the usual guru figure with acolytes. I saw beyond his gruff exterior. He guffawed loudly when I told him of a four-year-old's reaction on seeing the effigies at the Dussehra maidan: "They look like Dinesh Uncle". A couple of years ago, Dinesh and Peggy invited me for dinner with a few common friends. The invitation was typical: "Thought we'd have a few anti-nationals get together."

I found that there was a set of offices with very tasteful decor (very unusual!) atop IIT's main building where one could always drop in for an enlightening and entertaining chat over a cup of chai. On many occasions, he would recall what he learnt from my uncle when serving on many committees: to encourage young scientists and fund their research, not the well-connected senior professors. His understanding of academia and public education systems was well beyond that of

most of our colleagues. He would cite practices at not only MIT, Stanford, Harvard or Oxford, but also those of large successful state schools (his alma mater Michigan), European public universities, those in Japan and Singapore, and most importantly those of China and Latin America.

He loved an argument, to provoke you out of your comfortable cocoon, and hopefully provoke you into thinking about important questions on technology and society from perspectives you had not considered.

Some years ago, Dinesh made an observation about the real cost that the country (and Delhi as a city) would pay for the direction it was taking. He quite correctly foresaw the devaluation of science while outwardly embracing new shiny technologies. "Expertise has no value for these people". We have lost the ability to understand things from viewpoints that one cannot immediately appreciate, but which are ultimately in the supreme interest of the common people. Perhaps Dinesh's forceful personality distracted people, and perhaps his perceptions might perhaps have been more palatable had they been packaged differently. But that would have meant a pallid character quite alien to his nature.

Every university needs its crazy professor, my uncle had said. It also needs a maverick, who is able to speak truth to power, who questions authority, and shakes the institution out of its complacency in settling for self-congratulatory mediocrity. Do we have someone to fill Dinesh's shoes. Or should I say sandals?

Source: "The good listener who took science to people". Dunu Roy (<https://www.civilsocietyonline.com/tribute/the-good-listener-who-took-science-to-people/>)

ON May 21, an early Friday morning with the rain clouds skittering away across blue skies, Prof. Dinesh Mohan died in hospital, deeply mourned by family, friends, colleagues, and students. Much has been written about his expertise in injury prevention and safety, and his international stature as a much sought after (and provocative) speaker. There is, however, a lesser known area of his work that has not been much discussed.

Shortly after his return from the US he signed the Statement on Scientific Temper in 1980 that spelled out why science had to analyze and expose the barriers that stood in the way of a rational solution to societal problems. But within two years it was obvious that he had also understood that these barriers were primarily erected against the poor. So he co-founded the Sanchal Foundation in 1982 with the objective to 'promote, foster, aid and assist research for the extension of knowledge' but with the clear mention that this knowledge had to be for the advancement, better education, working and living conditions, and health of poor people.

Two years later political riots erupted in Delhi, killing hundreds of Sikhs, and he became part of the Nagarik Ekta Manch that extended whatever help they could. But to explore the social barriers that led to the riots he also became a member of the People's Union for Civil Liberties-People's Union for Democratic Rights (PUCL-PUDR) team led by Prof. Rajni Kothari and advocate Gobind Mukhoty, that went deep into the colonies of Delhi and the villages of Punjab to come out with the searing report, "Who are the Guilty?" The report contained the essence of scores of interviews with the families of those who had been murdered to document who had done the murdering.

He was invited by the eminent orthopaedic surgeon, Dr P.K. Sethi, to do an analysis of the artificial limb that Dr Sethi had developed. Dinesh visited the workshop in Jaipur and was deeply impressed by how 'ordinary people' were able to make limbs, train amputees, share their misfortune and encourage one another, and participate in the excitement of teaching others how to walk and giving them hope in coping with the world. But what seems to have struck home was Dr. Sethi's counsel, "We have stopped being good listeners and have forgotten the art of communication with our patients, an art which plays such an important role in the equation for recovery."

This act of listening prompted him to reconsider how science could actually be created by ordinary people and led to the founding of the People's Science Institute



## Memorials (contd.)

in 1988, of which Dr Ravi Chopra later became the first director. Then he and his colleagues went back to the villages of Haryana and Punjab to listen to those who drove the tractors, ploughed the fields, sprayed the pesticides, harvested the crops, threshed the fodder, and winnowed the grain. That, in turn, culminated in the two landmark reports on "Pesticides and Physical Disability" and "Safety of Agricultural Implements".

Once a scientist becomes sensitive enough to begin listening, however, the learning cannot stop at the boundaries of his or her scientific discipline. Which is why Dinesh moved further afield to contribute to the report on "India's Kashmir War", the formation of the Pakistan-India Peoples' Forum for Peace and Democracy, the setting up of the Permanent People's Tribunal on Industrial Hazards and Human Rights (which examined the Bhopal gas leak), and an analysis of the Godhra train burning—none of which had much to do with biomechanical engineering, or traffic injuries, but sharpened the balance between science and society.

In 1997, appalled by the paucity of research in his chosen field, he formally initiated the Transportation Research and Injury Prevention Programme (TRIPP) at IIT Delhi. By a strange coincidence, the interdisciplinary nature of this programme seemed to match very well with the coming together of several groups in the city representing the transported and the injured to form the Sajha Manch. There were people who were being summarily evicted from the slums; there were those whose unauthorized colonies were being targeted with displacement; there were workers whose livelihood was at stake as thousands of factories were closed down; vendors, hawkers, rickshaws, autos that were being moved off the roads; the shift from diesel to CNG: all being done for 'cleaning' the environment, but obviously for the purpose of 'cleansing' the city before the Commonwealth Games of 2010.

Dinesh was invited to meetings of the Manch and listened very carefully to what was being said by those whom he called 'vulnerable road users' and then stepped in to subtly press TRIPP into action. Sandeep Gandhi was roped in to digitally map the slums and unauthorized colonies; Geetam Tiwari and her students began studying how cycle paths would benefit this class of road users, and what was the role of hawkers and vendors in the service infrastructure; TRIPP involved the Manch in a study of the Delhi Development Authority's differential norms with respect to water, sanitation, and transport use; Dinesh himself led a study of the needs of auto-rickshaw drivers; the idea of the Bus Rapid Transport corridor began evolving; Sudipto Mukherjee was persuaded to develop a capnograph for measuring the energy expenditure of workers; and collectively they contributed to the Manch's critiques of the Delhi Master Plan, Commonwealth Games, the National Urban Renewal Mission, the Metro, and the Smart City.

As TRIPP evolves from a programme into a centre, it would be well to remember that the foundations of good science are based on listening to, and in collaboration with, the people who lie on the other side of the social barrier.

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"Dinesh Mohan, Contrarian Scholar Who Devoted a Lifetime to Affordable, Safe Urban Transport". Subhashis Banerjee. *The Wire*, 25.6.2021.  
<https://thewire.in/urban/dinesh-mohan-obituary>

Dinesh was an extraordinary faculty member and a public intellectual in the Indian academic setting.

'Contrarian' is the word that came to my mind when I first met Dinesh Mohan more than three decades back. We were introduced in the faculty lunch club soon after I joined IIT Delhi. After a hearty welcome, he unleashed a barrage of questions, with genuine curiosity, about research on computer vision which was my subject. Later would come the provocative comments – on the social relevance of such research, on the potential evil of such technology (e.g. as used in missiles during the Gulf War), and on how, beyond the elegant geometry and estimation theory of my discipline, lay deeper ethical concerns. His gruff tone did make me defensive

and even irritated, yet the friendliness and lack of aggression made me engage with it all.

He was a very well read man, and our discussions were highly enriching. For the next 30 years of our association, our discussions – and arguments – continued over coffee and weekend drinks in the pubs around IIT Delhi on all sorts of matters related to technology, science, education, policy, governments, politics and society. And, of late, COVID-19. They continued till just about a month back, when Dinesh Mohan fell prey to the wretched disease.

As may be expected, his flamboyance and out-spokenness raised hackles in the staid environment of IIT Delhi, and universal popularity was something he neither sought nor got.

Dinesh was not shy of his politics. His contrarian views and advocacy stemmed from his imagination of an egalitarian society. His research on transportation and injury prevention were original and of far reaching impact. If ever our cities manage to have open spaces, decongested footpaths with space for hawkers, street-vendors and pedestrians, if ever we have dedicated lanes for cyclists, safe traffic, affordable public transport, then due credit must go to the early conceptions by Dinesh. For it was he who articulated a pedestrian- and cyclist-first approach. Not that he was a Luddite opposing cars, but his was a rational and principled reservation on elevated highways passing through cities at the cost of the city's pedestrians, cyclists, and on private cars hogging public space.

Many of his simpler yet intriguing research questions were supported by orthodox engineering methodology. For example, when he along with his team members conclusively established that the vulnerable looking three-wheeler autorickshaws were actually amazingly stable contraptions, or that their presence on city roads slowed down traffic and thereby prevented accidents, or that helmets and seat-belts provided a huge level of protection against injury, he used rigorous engineering analysis.

On the other, hand some of his other, more extraordinary claims on complex policy questions – for example, the utility of metro rail systems in Indian cities, or on the use of compressed natural gas (CNG) in public transport, or on the Bus Rapid Transit (BRT) system – certainly left room for doubt. On all these issues, he was fiercely argumentative and provocative.

Dinesh clearly preferred 'low cost' solutions, and this made him vehemently oppose the metro rail system in Delhi. He argued that the system will be prohibitively expensive and will have to be forever subsidised; that the construction process will be extraordinarily polluting which will offset possible post-construction lessening of pollution; that the reduction in congestion was likely to be short-lived because the requirement of a strong feeder system will not permit reduction of the number of buses, and any freed up space will only be occupied by more cars in an aspirational society. He also alluded to undesirable side-effects, like unrealistically elevated property prices along metro routes.

Dinesh believed that the high cost of engine conversions and the requirements of specially designed closed-loop catalytic converters will make CNG in public transport unviable in the long run, and pollution benefits, if any, will only be marginal. He argued that diesel engines are more mainstream and are likely to see more significant improvements in pollution reduction through research, and the real benefits in pollution control should come from quickly making public transport more convenient and popular, thereby reducing the number of private cars and congestion on the roads. He rooted for low-floor air-conditioned diesel buses and argued that additional pollution, if any, can be offset by the larger number of people they may carry.

Dinesh fiercely opposed the lockdown of March 2020 and was absolutely dismayed by the humanitarian crisis it caused. But this made him underestimate COVID-19 and he would sometimes say that the COVID-19 problem was more imagined than real, and that there was no evidence of any large scale distress due to the disease, at least in India. He appeared to be in favour of a let-the-disease-play-out model like in Sweden.

Of course, many of these contrarian arguments had tremendous merit, but as a



## Memorials (contd.)

conservative computer scientist I was trained to be sceptical of any claim not supported by a theorem, and of arguments that claimed legitimacy by plotting graphs based on data, which was not easy to verify. So I and several others contested his views. The number of cups of coffee that must have been downed by people in the IIT Delhi coffee shops listening to Dinesh passionately argue against the metro and CNG is mind boggling. And I never managed to convince him that randomised controlled trials were more often than not conceptually unsound for making causal attributions and he should use more convincing methods in support of his arguments.

Dinesh got into trouble with the BRT. He and Geetam Tiwari – a common friend and colleague of many years, and a superbly trained architect and town planner – designed the bus corridor at the centre of the road, drawing inspiration from a very successful similar design in Bogota, Colombia. The design provided for pedestrian footpaths and dedicated cycle paths on the sides, and placing the bus corridor at the centre was meant to keep pedestrians and cyclists safe from the buses. Their penchant for 'low cost' avoided provision for escalators or subways between the road-sides to the bus stations at the centre.

As a result, though the design achieved its original aim of significantly increasing the overall flow of person-kilometres per unit time by increasing the flow of buses, it created incredible congestion for cars when people crossed the roads to reach the buses. Poor implementation with unsynchronised traffic lights and poor enforcement of traffic discipline by the police compounded the problem. Though slowing down the cars did not adversely affect the person-kilometres per unit time objective, they failed to correctly assess the combined protesting power of aspirational 'middle class' car owners. The project ran into trouble and was ultimately abandoned when the AAP government came to power. Dinesh was extremely disappointed but he did privately admit – perhaps in a rare moment of weakness – that he went a little overboard with his egalitarian objectives.

What impressed many of us most about Dinesh was the way he ran the Transportation Research and Injury Prevention Programme (TRIPP) in IIT Delhi. It was run almost entirely using grant money from sponsored research projects funded by private entities, and he managed to co-opt people of all kinds – including civil, mechanical and bio-medical engineers, architects and town planners, statisticians and economists, applied mechanics folks and computer scientists – to work on transportation related problems in a multi-disciplinary approach. TRIPP is a one-of-its-kind in the country and its unique success is rightly attributed to Dinesh's rare ability to attract people and his open mindedness in sharing a project and its idea. Just a few days back, TRIPP was made a full-fledged research centre in IIT Delhi.

While writing this remembrance I contacted a common friend of ours, Sachin Maheshwari, who first introduced me to Dinesh. This is what I got back:

"Yes he was crazy.

"He was crazy to attempt and pull off creation and successful running of an interdisciplinary research programme funded entirely, year after year, by grant money; where people from disparate areas came together to do work to a common objective. He was crazy enough to spend forty five years of his life among people who actually thought he was crazy."

That pretty much sums it up. Dinesh was an extraordinary faculty member and a public intellectual in the Indian academic setting. He will be missed.

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Source: Andrew Green, *The Lancet*. Vol. 398 July 3, 2021.

Dinesh Mohan was best known for his groundbreaking research on road safety and the broader health impacts of transportation policies. Yet whether he was investigating human rights abuses or attempting to improve agricultural practices

to reduce injuries, he was driven by a need to "challenge conventional wisdom and come out with alternative solutions that would help the poor", said Mathew Varghese, an orthopaedic surgeon and the former director of St Stephen's Hospital in Delhi, India.

Mohan came from an engineering background and received a bachelor of technology in mechanical engineering at the Indian Institute of Technology (IIT) Bombay in 1967. He continued his education in the USA, receiving a master's degree in mechanical and aerospace engineering from the University of Delaware in 1970 and a PhD in bioengineering from the University of Michigan 5 years later. Mohan then joined the Insurance Institute for Highway Safety in Washington, DC, where his work included evaluating injuries to vulnerable road users. That experience was "extremely influential", teaching him to "address the structural determinants of injuries", said Kavi Bhalla, a student of Mohan's, who is now an Associate Professor in the Department of Public Health Sciences of the Biological Sciences Division at the University of Chicago, IL, USA.

When he returned to India 3 years later, Mohan established a base at IIT Delhi from which he would become a "powerful advocate for the safety of vulnerable road users", said Ian Roberts, Professor of Epidemiology and Public Health at the London School of Hygiene & Tropical Medicine, UK. While holding a series of professorships at IIT Delhi for more than three decades, Mohan did research into improved helmet designs for motorcyclists and safer auto-rickshaws, among other innovations. In 2002, he also helped set up the Transportation Research and Injury Prevention Programme (TRIPP), IIT Delhi. "He understood that transportation needs more than narrow, engineering solutions and was promoting interdisciplinarity to solve these complex problems", said Geetam Tiwari, the Ministry of Urban Development Chair Professor for Transport Planning in IIT Delhi's Civil Engineering Department and TRIPP.

"Pushing for evidence-based road safety interventions is what was really important to him", Bhalla said. Mohan "understood the power of data collection, of epidemiological study", said Varghese. Recognised as a global leader in the field, Mohan was one of the authors of the seminal WHO and World Bank 2004 World Report on Road Traffic Injury Prevention. He later helped found the not-for-profit Independent Council for Road Safety International. The zeal that guided his road safety work also led him into other fields. For example, with colleagues he researched burn injuries from fireworks during annual Diwali festivities and found that most victims had not been treated with cold water, leading the researchers to collaborate on media campaigns on this issue. "It was a huge success", said Varghese, who helped with the research. "People were coming to the hospitals with their hands dipped in buckets of water." Mohan also understood the importance of interventions that the most vulnerable could easily and affordably adopt. When he investigated injuries to agricultural workers in rural communities, Mohan learned that injuries by increasingly powerful machines and equipment were "more frequent than diseases like malaria, hepatitis and chickenpox", as he wrote in 1993, and he called for inexpensive, practical safety features. "Here is somebody talking about the poorest of the poor and how you make them safe, how to find the solution to make it work for them", Varghese said.

A dedicated human rights activist, Mohan was involved in efforts to document and hold accountable the perpetrators of anti-Sikh violence that occurred after the 1984 assassination of former Indian Prime Minister Indira Gandhi. He also contributed to efforts to improve relations between India and Pakistan, including helping found the Pakistan-India Peoples' Forum for Peace and Democracy in 1994. "Dinesh was a pioneer, a visionary who was able to think out of the box", said Etienne Krug, WHO's Director of the Department of the Social Determinants of Health. "He was provocative, but always with the noble intention of moving the needle towards justice and by keeping in mind the realities and needs of people living in low-income settings." Mohan is survived by his wife, Peggy, and daughter, Shivani.



## Excerpts from the works of Dinesh Mohan selected by his close associates

Source: "Injury Control and Safety Promotions: Ethics, Science and Practice". *Injury Prevention and Control*. (Editors: Dinesh Mohan and Geetam Tiwari) Taylor & Francis

"We have a societal and moral responsibility to design our products, environment and laws so that people find it easy and convenient to behave in a safe manner without sacrificing their needs to earn a living and fulfill their other societal obligations"

"Safety is a pre-requisite to the maintenance and improvement of the well-being and health of the population"

"Infections, contagious diseases, and other health problems due to malnutrition, air and water contamination, parasites, mosquitoes and unsafe work conditions, dominate the attention of the public and policy makers. Under such circumstances it becomes very difficult to arrive at a consensus to consider injuries as an important public health problem"

"What needs to be understood is that the theoretical base of injury control countermeasures may have international applicability but the actual physical solutions may not. There is clearly a poverty of theory for work around the globe"

"Effective injury prevention and control work cannot be done in the confines of academia and needs the practitioner to engage professionals in other disciplines along with civil society"

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Source: "Traffic Safety, City Structure, Technology and Health". *Sustainable Approaches to Urban Transport* (Editors: Dinesh Mohan and Geetam Tiwari), Taylor & Francis.

"RTIs and deaths are here to stay, we can only attempt to reduce them. Citizens of LMICs, however, have shown a greater intolerance of deaths caused by road traffic crashes. In many Asian and African countries, hardly a day goes by when an angry crowd does not try to lynch a driver or burn a vehicle involved in a pedestrian crash. Villagers on their own have also constructed "illegal" speed bumps (speed breakers) in thousands of villages to slow down vehicles speeding through their neighbourhoods"

"A second problem is that work on road safety is still not recognised as a scientific occupation in our academic institutions and among decision makers. This results in a huge turnover in "experts" who work in this area. Very few work on road safety as their dominant area of activity."

"Most of the megacities in the world are already located in LMICs and many more cities in these countries will grow to populations of 10 million or more in the next few decades (World Health Organisation, 1998). All these cities are faced with serious problems of inadequate mobility and access, vehicular pollution, road traffic crashes and crime on their streets. The increasing use of cars and motorised two-wheelers add to these problems and this trend does not seem to be abating anywhere."

"What these cities do not have are efficient public bus systems, safe and convenient walkways and bicycle lanes, the best in fuel quality and vehicle technology, and strict and efficient vehicle maintenance systems. However, improvements in these will take time, large financial investments and may be difficult to implement for a variety of reasons"

"Quite obviously, people's fears regarding safety on the roads when using public transport are not unjustified. A large proportion of the decrease in road traffic injuries and deaths in HICs is the result of the availability of cars that provide much greater safety to the occupants in crashes, and the result of a very significant reduction of the presence of pedestrians and cyclists on HIC streets."

"Public transit systems have a strong appeal for transportation engineers because they contribute less pollution and congestion, and provide an egalitarian solution to the mobility needs of a city. However, the perception that they result in increased

safety may not always be correct. Our analysis of current road traffic injury statistics in Delhi found that buses were involved in fatal crashes in numbers that were disproportionate to their use. As a result, increasing bus use would result in increasing traffic fatalities, primarily among pedestrians, the most vulnerable road users."

"Issues for sustainable transport:

- In the next ten years purely technological solutions in the design of vehicles and their engines can lead to a small reduction in injury and
  - fatality rates and a significant reduction in emissions such as SO<sub>2</sub>, NO<sub>x</sub>, benzene, ozone and other organic compound.
  - Carbon dioxide emissions are not likely to be reduced by current technological options.
  - Currently, no significant noise reduction can be predicted by technical design solutions.
  - Policing and traffic management techniques are not likely to reduce traffic fatality rates by more than 50-75% though we see a difference of fatality rates by factors of 4-10 between cities
  - Obesity issues will not be affected by vehicle or road design.
  - Community interaction issues will not be affected by vehicle design.
- Therefore, it seems that if we are to promote walking, bicycling and public transport use, we will have to make traffic safety a priority along with city structure design that incorporates the following:
- Street design ensuring the safety of non-motorised modes.
  - Vehicle speed control by street design and ultimately intelligent traffic system (ITS) control on vehicles.
  - A denser layout of through traffic streets with narrower cross sections.
  - Smaller size of residential neighbourhoods."

Selected by: Geetam Tiwari

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Source: "PROTOCOL: Effectiveness of road safety interventions: An evidence and gap map". Dinesh Mohan, Geetam Tiwari, Mathew Varghese, Kavi Bhalla, Denny John, Ashrita Saran and Howard White. *Campbell Systematic Review*, 2020;16:e1077 <https://doi.org/10.1002/cl2.1077>

The Decade of Action for Road Safety 2011-2020, officially proclaimed by the UN General Assembly in March 2010, sought to reduce morbidity and mortality due to road traffic injuries (RTI) significantly. While there is reasonable agreement internationally on safer designs of motor vehicles (except locally produced vehicles like three-wheeled scooter taxis, tuk-tuks, jeepneys, etc.), there is a lack of evidence based interventions in road and infrastructure design, police enforcement and postcrash care. Researchers in the field of traffic safety have been aware of the existence of counterintuitive results in their area of work for more than four decades. The fact that many interventions do not result in reductions in RTI is mainly because a large number of studies only measure intermediate outcomes like change in behaviour or knowledge and not the actual results in the field. The scope of this evidence and gap map (EGM) is to cover relevant studies in the road safety sector from all countries and present the effectiveness of interventions in terms of mainly traffic crash injuries as its outcome. The interventions adopted in this EGM are classified into five broad categories: Human factors, vehicle factors and protective devices, road design, infrastructure and traffic control, post-crash pre-hospital care and legal and institutional framework. In order to come closer to accomplishing targets for road safety, it is important to allocate resources to promote interventions that are effective in achieving outcomes in the context of road safety. A mapping will provide a comprehensive overview of existing knowledge in the area of road safety and its effectiveness across the world. The map will guide programme managers to high quality evidence and inform targeted commissioning of future research.



## Excerpts from the works of Dinesh Mohan selected by his close associates

Source: "Road safety in less-motorized environments: future concerns". Dinesh Mohan. *International Journal of Epidemiology* 2002;31:527–532

Studies from less-motorized countries also report that road traffic injury patients can occupy 30–70% of orthopaedic beds in hospitals. Road traffic injuries are also a major cause of orthopaedic and mental disabilities. The experience of poor communities in coping with medical catastrophes is very different than that experienced by economically well off communities. The special problems faced by poor families can include the following: inappropriate or absence of treatment leading to complications and longer treatment time; re-allocation of labour of family members and reduced productivity of whole family; permanent loss of job for the victim even if he/she survives; loss of land, personal savings, and household goods; poor health and educational attainment of surviving members; and dissolution or reconstitution of household.

None of the above issues are factored in the standard economic calculations done for estimating the cost of road crashes in poor societies. When someone in a poor family is injured and is bedridden at home or in hospital, the whole family gets involved in the care of the patient. This results in the re-allocation of labour of all family members—those on daily wages lose their income; children may not go to school; and older family members may spend less time in the care of children and infants. The household has to cope with the time and financial demands of the situation and this can have a permanent effect on the health of children and infants in the family. This can be the result of loss of income, less attention, worsening hygiene at home, etc.

Since a very large number of poor households depend on daily wages and temporary jobs, do not have health insurance, or the assistance of social welfare schemes, a serious injury can result in permanent reduction of income. In cases of prolonged treatment or death of the victim, the family may end up selling most of their assets and land and getting trapped into long-term indebtedness. Investment in treatment of a seriously ill family member stops only when all assets get sold. A study from Thailand shows that 60% of involuntary land sales were to finance treatment of a family member. Death of a male head of household creates a household headed by a woman. Such families have to suffer serious social and economic hardships and this can have negative health effects on children.

It is clear that the outcome of a serious injury or death of a family member in poor communities has many long-term effects, socially, economically and psychologically, on all the other family members and the community. Many of these outcomes are permanent and soul destroying for individuals and possibly for the larger community. There is very little work done to understand these issues. Therefore, we must not stop at the calculation of losses in purely monetary terms. For poor communities, our methods do not even capture the economic losses in all their complexity. The effect of injury and death on the family structure, crushing of hopes and aspirations of future generations, and the psychology of the community are just not factored in. These issues will have to be taken much more seriously in the future and not neglected just because they cannot be defined in monetary terms.

The patterns of road traffic and road traffic injuries are very different in high-income countries compared to those in less-motorized countries. High-income countries have not experienced the situation obtained in less-motorized countries in the past. Vulnerable road user injuries and involvement of buses and trucks dominate the scene in many less-motorized countries. Since very little work has been done to develop vulnerable road user-friendly highway and urban street designs, all construction work sponsored by international agencies in less-motorized countries follows international designs or some scaled down version of the same. These designs produce inefficiencies and make the lives of local people more difficult by introducing fast transport without facilities for local needs.

Therefore, transportation planning, exposure control, intelligent separation of non-motorized traffic on major roads, and traffic calming are likely to play a much more important role in less-motorized countries. All vehicle and infrastructure

designs need to be much more vulnerable road user friendly. Designs and policies for such interventions which are likely to succeed are not entirely clear or available. Research programmes and demonstration projects need to be funded and started immediately. The above will not be possible unless methods are devised to educate national policy makers and executives in multilateral agencies like the World Bank about modern methods of road traffic injury control. Most of them are still operating on principles that were discredited over three decades ago.

*Selected by: Kavi Bhalla*

Source: "Automobile Manufacturers, Advertising and Traffic Safety in India" Dinesh Mohan, Abhaya Jha. *Economic & Political Weekly*, Vol. L No. 51.

The first-ever independent crash tests of five brands of small cars from India were released by Global NCAP in early 2014. The vehicle structures proved inadequate and collapsed to varying degrees, resulting in high risks of life-threatening injuries to the occupants. The structures of these vehicles are not strong enough and even if they were fitted with airbags it would not be effective in reducing the risk of serious injury. What these results mean is that in a frontal crash at over 50 km/h the occupants of these cars have a high probability of being injured critically.

The fact that vehicle manufacturers generally do not provide safety features unless forced to is proven by the responses of the car companies involved. A spokesperson from Tata Motors is reported to have said, "All our vehicles, including the Tata Nano, meet all Indian safety regulations," and that from Hyundai India, "Hyundai Motor India affirms that Hyundai vehicles are designed and built to meet all the prescribed safety standards set by the Indian regulatory authorities." What they did not say is that they know that the cars they make and sell in India are not safe enough and they make safer cars for other markets. The results of our study show that at present the Indian manufacturers are not promoting safety issues or their safety technology in any significant manner in their print advertisements or TV commercials. In addition they are not offering airbags or ABS in most of the base models costing less than \$12,000 (most of the vehicles sold in India). When safety features are offered as options they force the consumer to spend more than \$1,500 extra. Reliable industry sources inform us that these features should not cost more than \$250 or less. However, none of the Indian manufacturers give us this choice. Therefore, the responsibility lies with the Government of India for delaying the announcement of strict safety norms for cars sold in India. This delay over the years has already resulted in unnecessary deaths and disablement of thousands of Indian citizens.

Source: "Future of road safety and SDG 3.6 goals in six Indian cities" Dinesh Mohan, Abhaya Jha, Samradh S. Chauhan. *IATSS Research* 45 (2021) 12–18.

Enforcement of seatbelt and helmet use laws decreases overall death rates by more than 10% in all cities where the laws are not being enforced at present. This is a relatively inexpensive intervention and can be implemented even before 2025 in all cities in India, and should be considered an important factor for achieving SDG 3.6 goals. Indian streets are currently designed on a vehicle-centric model and ignore the needs of pedestrians, cyclists, and MTW. These road users constitute more than 70% of the victims in all cities in India. To achieve reductions by implementing speed control and traffic calming methods, short-term and long term policies will have to be made and supported by requisite funds. Since the maximum impact in fatality reduction for all the cities comes from these interventions, they should be prioritized over the next decade.

At present, the lowest death rates per 100,000 population are reported from Norway, Sweden, and Switzerland at 2.0, 2.5, and 3.0, respectively. Our





## Excerpts from the works of Dinesh Mohan selected by his close associates

estimates suggest that, except for Mumbai, all other cities in India will experience much higher rates even after a decade. It is possible that death rates in these cities may decline further with the introduction of new speed control and enforcement technologies, the adoption of more sustainable modes of travel, and the move away from use of MTW. This study suggests that while SDG 3.6 targets may be achieved by 2030 with great effort in India, the presently available safety interventions may not be adequate to bring death rates below 2.0 per hundred thousand persons. Since the situation differs significantly between cities, it will be important to evolve city-specific policies for safety intervention priorities and changes in travel behavior. The desired reductions in road traffic injuries in India will not be possible without a much greater investment in road safety research and road design for safer travel.

*Selected by: Abhaya Jha*

Source: "Fireworks cast a shadow on India's festival of lights". Dinesh Mohan & Mathew Varghese. *World Health Forum*, Vol. 11 (1990).

This article describes a campaign for the safe use of fireworks and the prompt application of cold water to skin burned by them. Some success was achieved in the latter regard as a result of frequently repeated television announcements.

Many people sustain burns when playing with fireworks during Diwali, the Hindu festival of lights.

In a survey of 300 households two weeks later, 2.6% of families reported firework-related mishaps that affected five persons in all, four suffering burns and one a different type of injury. This suggests that thousands of people suffered burns from fireworks within two days in North India.

A 20-minute documentary on the dangers of fireworks and burn treatment was made by the Mass Communication Research Centre, Delhi, in association with one of the present authors and a burns surgeon, and was broadcast on national television's educational slot before Diwali. Advertisements were placed in the newspapers by the Loss Prevention Association of India, warning people against the dangers of fireworks.

A two-minute television announcement dealing with the dangers of fireworks and the use of cold water as first aid for burns was shown repeatedly in the week preceding Diwali.

A one-minute television announcement with similar messages was directed at children. Sponsored by UNICEF and shown repeatedly in the week preceding Diwali, it used puppets, children, music and special effects.

These results support the findings of earlier studies indicating that it is not easy to change people's behaviour by education alone as far as injury control is concerned, but that effective prevention or treatment can be taught if a simple action, like the use of cold water on burns, is involved.

Education and publicity have relatively little influence on the way teenagers handle fireworks. It would probably be far more effective to ban dangerous fireworks than to try and educate the users in safe handling. Efforts by the fireworks industry to educate children about the dangers of fireworks can even be counterproductive.

Effect of Whole-Body Vibration on the Low Back: A Study of Tractor-Driving Farmers in North India. Adarsh Kumar, Mathew Varghese, Dinesh Mohan, Puneet Mahajan, Praveen Gulati and Shashank Kale. *SPINE*, Vol. 24 No.23, pp 2506-2515.

Study Design. A retrospective cohort study of tractor-driving farmers (study group) and non-tractor-driving farmers (control group) matched for age, gender, generic/ethnic group, land-holding, and work routines.

Objectives. To determine, using magnetic resonance imaging and clinical investigations, the effect of wholebody vibrations on the back in tractor-driving farmers.

Summary of Background Data. Low back pain and pathologic changes in the lower backs of tractor drivers have been reported. However, no study with a control group matched for work-related risk factors has been reported.

Methods. Fifty tractor-driving farmers were compared with 50 non-tractor-driving farmers matched for age, gender, ethnic group, land-holding, and work routine. Both groups were interviewed for details of work routine, assets held, family profile, and vibration exposure to assess the influence of these parameters on signs and symptoms of backache. Magnetic resonance imaging was done to assess the effect of exposure on whole-body vibration and degenerative changes in the back. Vibration measurements also were done on tractors to observe the actual severity of the vibrations.

Results. Regular work-related backache was more common among tractor-driving farmers (40%) than among non-tractor-driving farmers (18%,  $P = 0.015$ ). Anthropometric evaluation showed abdominal girth and weight to be significantly higher in tractor-driving farmers ( $P = 0.006$  and  $0.046$ , respectively), whereas while height and arm span were similar between the two groups. Clinical examination for evidence of disc or facet degeneration showed no difference between the two groups. Evaluation of magnetic resonance images of tractor-driving farmers and non-tractor-driving farmers by an orthopedic surgeon, radiologist, and neurosurgeon showed degenerative changes to be similar between the two groups ( $P = 0.050$ ).

Conclusions. Tractor-driving farmers report backache more often than non-tractor-driving farmers, but no significant objective differences on clinical or magnetic resonance imaging evaluation were found between the two groups. [Key words: disc degeneration, disc herniation, lumbar spine, magnetic resonance imaging, tractor drivers, whole-body vibration]

*Selected by Mathew Varghese*

Source: "Traffic safety: Rights and obligations". Dinesh Mohan. *Accident Analysis and Prevention* 128(2019) 159-163.

Therefore, we have a societal and moral responsibility to design our products, environment and laws so that people find it easy and convenient to behave in a safer manner without sacrificing their needs to earn a living and fulfil their other societal obligations. The systems must be such that they are safe not only for 'normal' people but also for those individuals who might belong to any disadvantaged group. These kinds of designs, rules and regulations would reduce the probability of people hurting each other or themselves even when they make mistakes. Such policies would help in moving toward a future where it would be recognised that individuals have a right to safety and the state and society at large has an obligation to protect those rights.

### DELHI DECLARATION ON THE SAFETY OF THE VULNERABLE ROAD USERS

Road traffic crashes have become a major cause of ill health; each year at least 500,000 people are killed and millions are injured. The majority of those people are vulnerable road users (VRUs); pedestrians, bicyclists and motorized two wheeler riders. This worldwide epidemic of VRU injuries, disabilities and deaths can be controlled only by policies which change priorities in funding, remedial actions and research in favour of the VRUs, in recognition of the real world situation.

Improving the safety of the VRUs requires a political commitment at the highest level and a recognition by the community of the needs of the VRU. The safety of the majority of the users of the transport system must not be subordinated to economic interests, nor to the requirements of only one class of road user.



## Excerpts from the works of Dinesh Mohan selected by his close associates

### MAIN PRINCIPLES

- 1) The groups that are today the vulnerable road users are an important and desirable part of the entire transport system. Walking and bicycling in particular are to be encouraged and promoted by appropriate planning of the transport environment, because of their low cost, negligible energy consumption and environmental compatibility.
- 2) Well designed and maintained public transport systems can reduce overall casualty rates, by encouraging low risk travel. Good urban planning reduces risk by diminishing unnecessary and inefficient journeys.
- 3) Inappropriate speeds by motor vehicles are a major cause of accidents, especially in urban situations. Lower speeds generally result in fewer crashes and less severe injuries, and therefore should be systematically fostered in urban areas.
- 4) Road environments can be designed to control speeds, to separate road users of different sizes, weights and velocities, to reduce the probability of road users making mistakes and to minimize injuries if a crash does occur.
- 5) Each element of a program to promote traffic safety - education and enforcement, changes in the road environment, and improvements in vehicle design - can make important contributions, but these elements are most effective when they are integrated into a comprehensive program appropriate for the physical, cultural and social environment of the particular region or country.
- 6) There is need for improved emergency communications, patient transport and trauma care systems.
- 7) Resources in less motorized countries are very limited, and therefore transport safety programs should be carefully planned and optimized. A good database is essential and the development of adequate definitions and data collection systems are vital for planning appropriate countermeasures and evaluating their effectiveness.
- 8) Vehicle exteriors can be designed to be less injurious to VRUs. Such designs should be introduced by vehicle manufacturers and enforced through national and international regulations, and by greater legal liability.

### RESEARCH

Funding of traffic safety research particularly in less motorized countries is totally inadequate. Public and private sector finance should be more directed at research to improve data bases, encourage the exchange of results and the transfer of appropriate knowledge, technologies and countermeasures. The most immediate research needs are:

- 1) New solutions to diminish conflicts in urban areas between VRUs and other motor vehicles, and to control vehicle speeds.
- 2) Improvements in helmet designs for cyclists and motorcyclists to reduce cost and weight, and improve audibility and ventilation under tropical conditions.
- 3) New compatibility designs between buses and trucks and the VRUs, to reduce

large vehicle aggressiveness in the crash phase.

- 4) Safer motorcycle designs to protect the lower limbs of riders.
- 5) The development and evaluation of cost effective emergency trauma care systems.

### CONCLUSIONS

Unless such special efforts are made the vulnerable road users will continue to be the most frequent victims in road crashes around the world. Participants in the International Conference on Traffic Safety held in Delhi in January 1991 urge all governments, international organisations, non-governmental organisations, multilateral and bilateral funding agencies, community groups, and professional organisations to institute these recommendations in their own environments.

*Selected by: Rahul Goel*

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"Speed and its Effects on Road Traffic Crashes". Dinesh Mohan Ed. Transport Planning and Traffic Safety: Making Cities, Roads and vehicles Safer.

The speed at which motor vehicles move in traffic is at the base of the road injury problem. Speed influences both the probability of the occurrence of a crash and the crash consequences in terms of the severity of injuries and the extent of property damage. In October 1973 the members of the Organization of Arab Petroleum Exporting Countries (OAPEC) announced an oil embargo. The outcome of this natural experiment gave us reliable evidence that reduction in average speeds of traffic reduces both the incidence of traffic crashes and average severity of injuries suffered by road users. The concept of traffic calming comprises the combination of road and infrastructure measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users. Speed control and traffic calming appear to be the most effective and promising ways to reduce injuries and deaths in road traffic crashes.

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"Driverless vehicles and their future in India". Dinesh Mohan, Economic & Political Weekly, Vol LI No. 32.

DLVs: One way to understand the role of DLVs in the future is to examine the role a chauffeur plays in the mobility of upper-class citizens in Indian cities. The car owner is able to issue instructions on the mobile phone and have the following functions performed by the car (driven by a chauffeur):

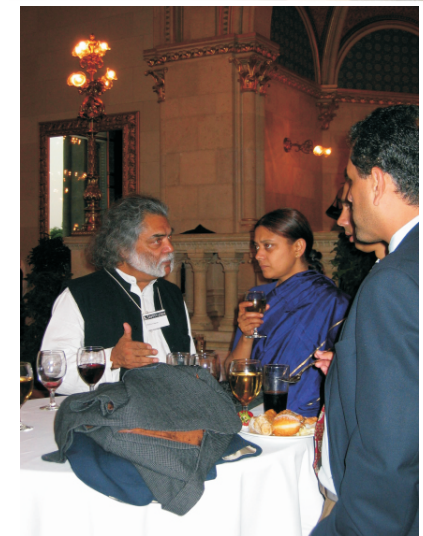
- (i) Have children and disabled members of the family taken to their destinations without other members of the family accompanying them.
- (ii) Pick up guests from airports, etc.
- (iii) Run errands (including shopping) and making deliveries.
- (iv) Transport owners to their destinations and then park and wait at a location a distance away where parking is available.
- (v) Cruise around if no parking is available while the owner does some shopping.

*Selected by: K Ramachandra Rao*

## Photos



## Photos



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