TRAFFIC SAFETY: INTERNATIONAL STATUS AND STRATEGIES FOR THE FUTURE

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ABSTRACT

The World Health Organization released *Global Status Report On Road Safety: Time For Action* in July 2009. This report focussed on fatalities due to road traffic injuries worldwide. Here we analyse the data to understand the fatality trends by national income and modal shares of traffic in different societies. Less than 50% of the countries have reported fatality rates close to the WHO estimates. While more high income countries seem to have reported rates close to WHO estimates than low income countries, it is interesting that both low-income and high-income countries can have under reporting and realistic reporting. Therefore, it appears that is not necessary to have high income levels to develop reliable reporting systems as commonly assumed. The data indicate that even in countries that have similar incomes, fatality rates and patterns can be different. It appears that factors other than income levels, car and road design, and policing influence fatality rates per-capita for each country. Recent studies suggest that there are similar variations in fatality rates among cities within countries which cannot be explained by income levels, vehicle technology or basic road design. Much more work will have to be done in this area before the variability in crash rates can be explained satisfactorily. In the absence of more reliable data and identification of risk factors for each city or country, it is not possible to give very specific country based countermeasures for road safety. It would be adequate at present to focus on measures that have international validity and are known not to have negative side-effects.

Keywords: Safety, cities, income, fatality rates

INTRODUCTION

The World Health Organization released its *World Report On Road Traffic Injury Prevention* in 2004 (Peden, Margie et al., 2004). This report focussed on road traffic injuries (RTI) and fatalities as a worldwide health problem and included a summary of the known risk factors associated with road traffic crashes and possible countermeasures that should be put in place to control the problem. It also pointed out that “Without new or improved interventions, road traffic injuries will be the third leading cause of death by the year 2020”. The publication

of this report has spurred some national and international agencies and civil society groups to give a little more attention to the problem of road safety and a number of resolutions have been passed by the United Nations General Assembly, World Health Assembly and the Executive Board of the WHO. The WHO released a *Global Status Report On Road Safety: Time For Action* in July 2009 (WHO, 2009) This report is the first broad assessment of the status of road safety in 178 countries. The data were obtained from national governments using a standardized survey form. The status report shows that low-income and middle-income countries on an average have higher road traffic fatality rates (21.5 and 19.5 per 100 000 population respectively) than high-income countries (10.3 per 100 000) and that over half of those who die in road traffic crashes are pedestrians, bicyclists and users of motorized two-wheelers (MTW). Here we analyse the data reported which include a vast majority of the middle and low-income population of the world, to understand the injury trends by national income and modal shares of traffic in different societies. These data are used to propose road safety countermeasures and policies that may be necessary to accelerate the reduction in RTI in the future.

THE REPORT

The *Global Status Report* was developed over two years by the WHO. A standardised questionnaire was sent to all member states. A National Data Coordinator was identified in each country who was trained and then facilitated by a consensus meeting involving a multisectoral group of up to eight road safety experts. The data and policy information so collected was then sent for government clearance. Data were received from 176 WHO member states and associate member states and 2 non-member areas.

Only about the countries were able to supply data on fatalities by road user type and types of vehicles on the road in the country. Though a majority of the countries provided most details, the reliability of data can only be judged by persons who are aware of the procedures used in their country for collection of data. We give an example of the problems by examining the data submitted by India. The reported data from India for fatalities by different road user type is given in Table 1. These data indicate that the proportion of 4-wheeler occupants killed in India is greater than that of pedestrians or bicyclists and the unknown proportion is 41%.

	Percent fatalities by road user type				
	Drivers/ passengers of 4 wheeled vehicles	Drivers/ passengers of motorized 2- or 3-wheelers	Cyclists	Pedestrians	Other
(a) As reported in Global status report on road safety (Reference 3).	15.1	27.4	4.3	12.6	40.5
(b) As reported in in-depth studies from different locations in India (Reference 4)					
Mumbai	5.0	11.0	6	78	
Delhi	10.0	24.0	10	53	3
Highways*	32.0	24.0	11	32	1

* The data are for 14 selected locations around the country.

Table 1. Proportion of road traffic fatalities in India by road user type as reported in the WHO Global status report on road safety and indepth studies conducted at different locations in India.

Other in-depth studies conducted in India show a much higher proportion of vulnerable road users killed in cities and highways (Table 1) (Mohan, D., Tsimhoni, O., Sivak, M., & Flannagan, M. J., 2009). This difference is explained by the fact that the data submitted for India is partly based on official national statistics reported for "fatalities by vehicle type" (NCRB, 2008). In this table the "vehicle type" is recorded as one which was thought to be at "fault" and not the one in which the victim was travelling. This is the reason that bicyclists and pedestrians are reported to have low proportions in India the WHO report. The total number of vehicles reported for India is 72.7 million. The official statistics overestimate the number of vehicles operating in India because private vehicle owners do not have to register their vehicles every year. They have to pay a onetime tax when they purchase a vehicle. Therefore, out-of-use vehicles remain on the record. Recent studies have estimated that the actual number of private vehicles on the road in Delhi is about 60% of the official statistic (Expert committee on auto fuel policy, 2002). The total number of vehicles on the road in India is more likely to be around 50 million and not 72.7 million as reported. This analysis for India illustrates the problems in collecting reliable traffic injury data from around the world.

PRESENT STATUS

Figure 1 shows the country reported and WHO estimates for RTI fatality rates per 100,000 persons plotted against national per-capita income for 177 countries. Only 85 (48%) of the countries have reported fatality rates within 5% of the WHO estimates, 80 countries (45%) reported much lower numbers, with 55 reporting numbers less than half that estimated by the WHO. For seven countries the WHO estimates were lower than those reported. The WHO status report also gives 90% confidence intervals for fatality estimates. For some countries the lower end of the estimate may be more realistic than the point estimate. For example, the WHO estimate for India is 87% greater than the reported fatality rate, however, studies from India suggest the reported rate may underestimate the actual number by around 10% (Mohan, D., Tsimhoni, O., Sivak, M., & Flannagan, M. J., 2009) and not 87%.

More high income countries seem to have reported rates close to WHO estimates than low income countries. However, it is interesting that both low-income and high-income countries can have under reporting and realistic reporting. For example, both a high-income region like United Arab Emirates (UAE), and a low-income Kenya seem to have significant underreporting, and both low and middle income countries (e.g. Vietnam, Iran, South Africa and Argentina) and high income countries (e.g. Netherlands, Qatar, USA, UK) report fatality rates close to the WHO estimate. Therefore, it appears that is not necessary to have high income levels to develop reliable RTI reporting systems as commonly assumed.

Figure 1 also shows that national RTI fatality rates per 100,000 persons (reported or WHO estimates) do have a high correlation with national incomes. The WHO estimates seem to have a lower correlation than the rates reported by individual countries. Some high-income countries like United Arab Emirates (UAE), Qatar and USA have higher rates than middle and low-income countries like Argentina and Vietnam. At all income levels countries with the highest fatality have values 3-5 time higher than the ones with low rates. For example, among high income coutries, USA has a fatality rate that is 3 times greater than those with the lowest rates (e.g. Netherlands).

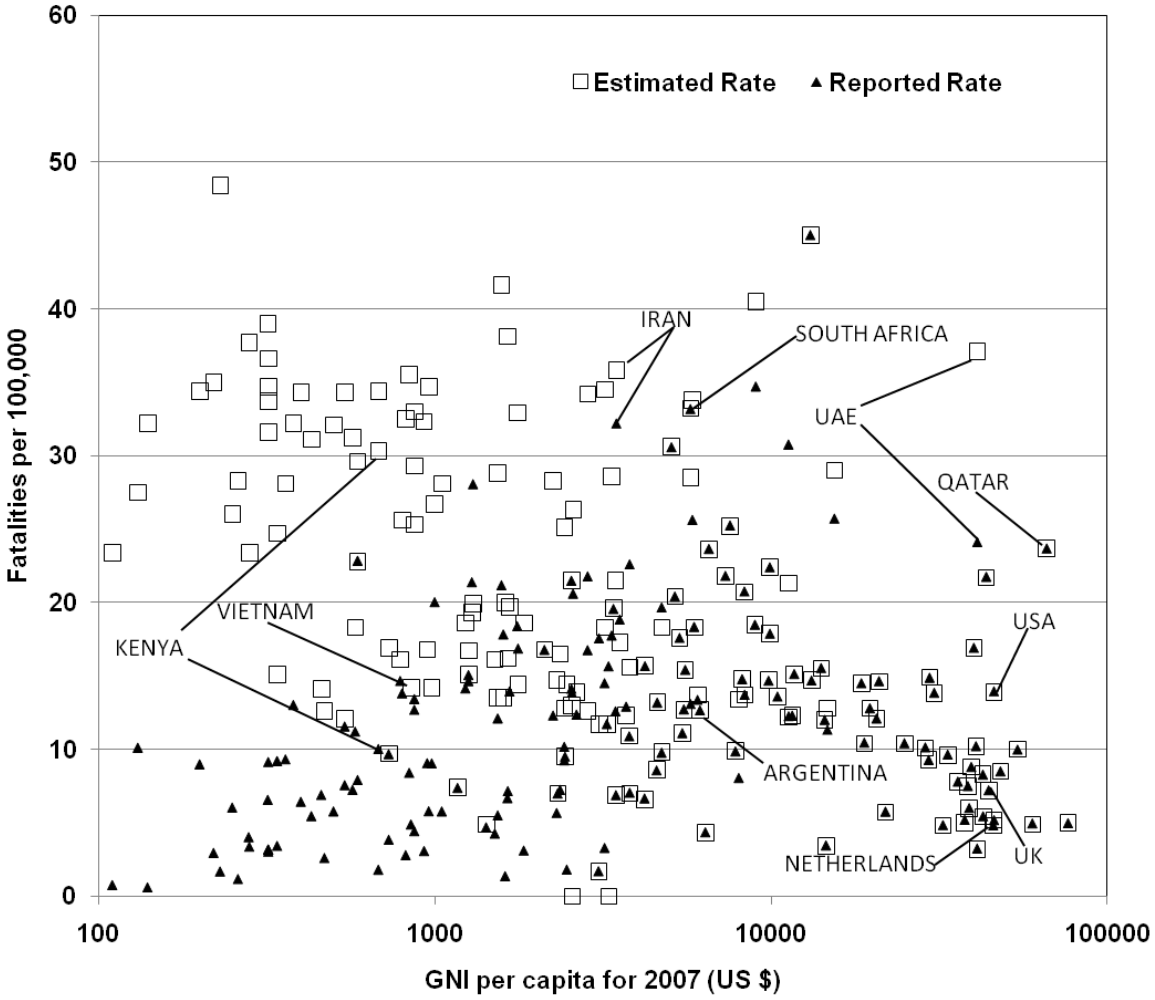
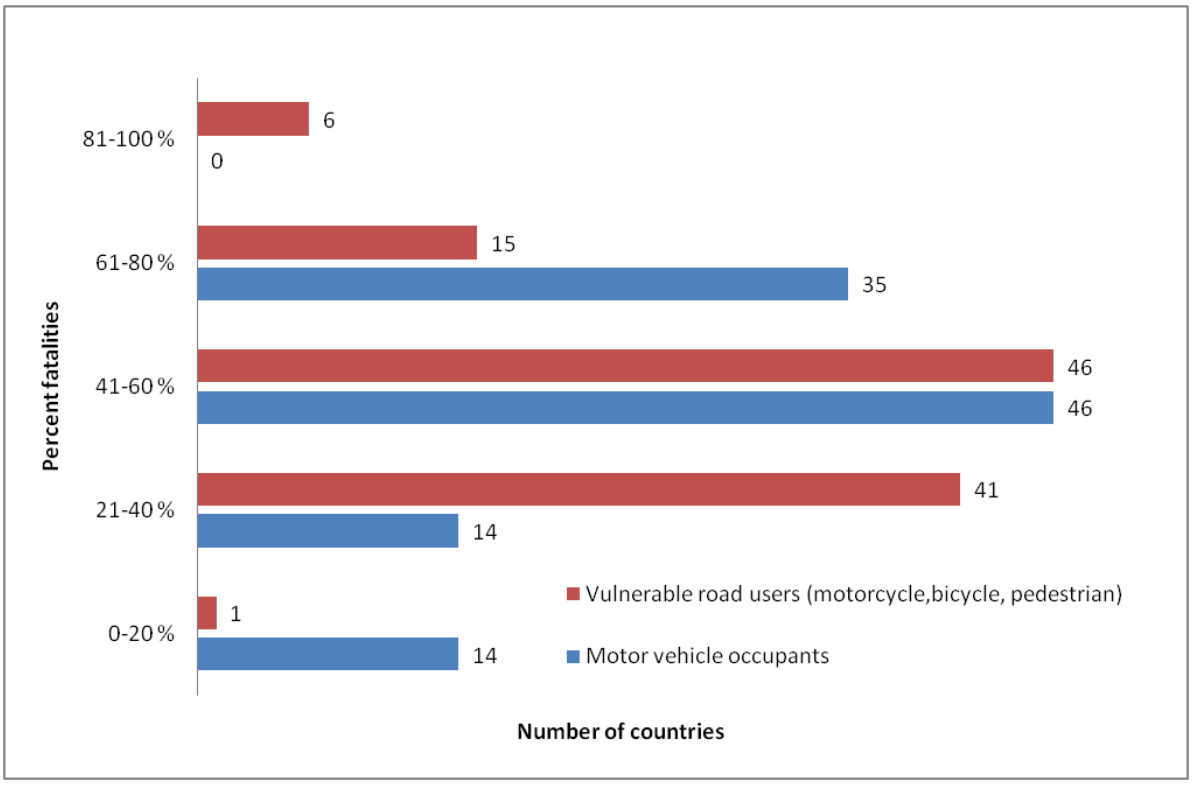


Figure 1. Reported and estimated (WHO) road traffic injury fatality rates per hundred thousand persons for different countries.

This suggests that higher national incomes do not necessarily produce better road safety policies. This is contrary to the widely held belief that RTI rates are highly dependent on per capita incomes (Kopits, Elizabeth & Cropper, Maureen, 2005). This is probably because all earlier analyses depended on official fatality rates as reported by individual countries. The WHO estimates for low-income nations are generally higher than country reports, where as for high-income countries the two estimates are generally closer (with some exceptions).

VULNERABLE ROAD USERS

Figure 2 shows the proportion of different users killed in toad traffic crashes in different countries for which data are available. It is interesting that the vulnerable road user (sum of pedestrian, bicycle and motorised 2/3 wheelers) fatalities is greater than 20% in all counties except one, whereas 14 countries report less than 20% share for motor vehicle fatalities. As mentioned earlier, the reported number of fatalities can be smaller than the WHO estimated number by factors as great as 5:1. Therefore, road user fatality rates can also suffer from



distortions. Some countries like the Gulf states and some states with very small populations

Figure 2. Proportion of fatalities by road user type in 109 countries.

report very low percentage of vulnerable road user fatalities. For example, Papua New Guinea and Mongolia have high 4-wheeler fatality proportions at very low per-capita incomes (< US$ 1,300). It is difficult to explain this in the absence of more details regarding the reliability of data and recording procedures from these countries. Thailand and Malaysia (middle-income countries) report very low pedestrian fatality proportions and very high 2-3 wheeler proportions. It is possible that because these two countries have a high proportion of motorcycles the pedestrian fatality rate is low as motorcycles are less likely to cause fatal pedestrian crashes than cars would. Or, it is possible that the data reported by these countries are not reliable.

Figure 3 shows that in those Asian countries that have a higher proportion of 2/3-wheel vehicles in their fleet have a higher proportion of 2/3 occupant fatalities. However, there is a reasonable spread of fatality proportions around each vehicle proportion. Japan (JP) and Singapore (SG) are high income countries that have similar 2/3-wheeler fleet ratios (reporting is likely to be reliable, country and WHO fatality estimates are similar) but Singapore fatality ratio is 2.7 times greater than that of Japan though their overall fatality rates are similar. This indicates that even countries that have similar incomes, vehicle fleet ratios, motor vehicle standards and traffic regulations can have different fatality patterns. This probably due to other factors influencing fatality rate urban living patterns, street and highway infrastructure, etc. (Mohan, D., 2008). Figure 3 also indicates that data supplied by some of the countries may not be reliable. Bangladesh (BD), a low-income country with a high proportion of 2/3-wheeled vehicles reports very low proportion of fatalities. It is possible that the data reported does not reflect reality. It is also not clear why Thailand (TH), Malaysia (MY) and Indonesia (ID) have very high proportion of 2/3-wheeler fatalities.

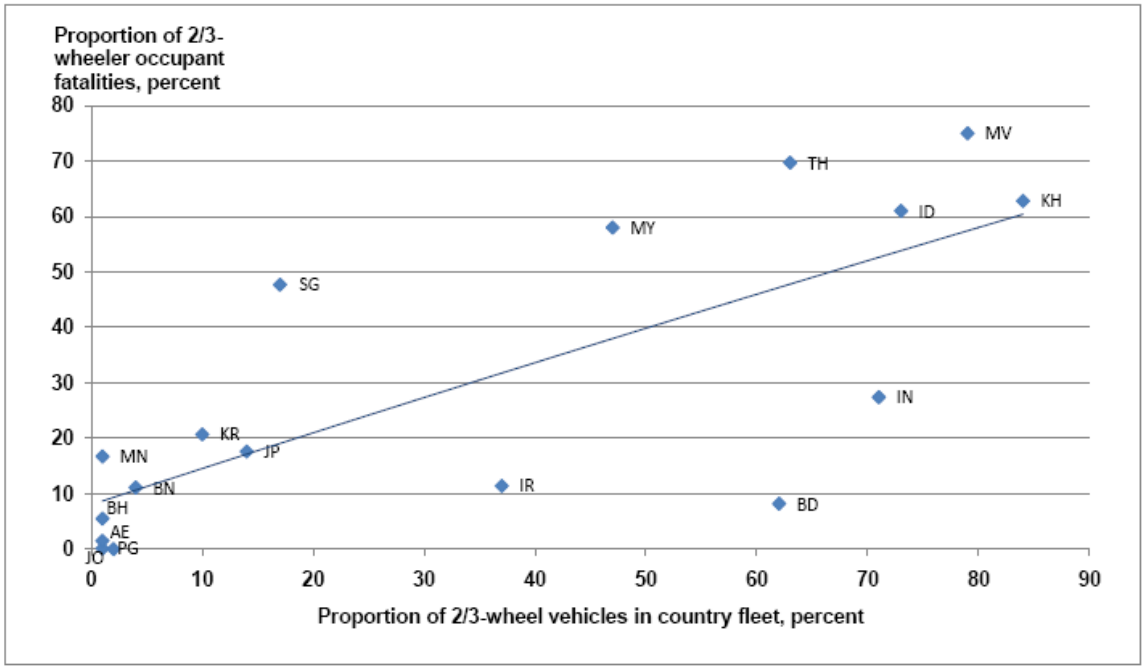


Figure 3. Proportion of 2/3-wheeler occupant fatalities vs. proportion of 2/3-wheeled vehicles in country fleet

In order to propose safety policies for the future it is necessary to have some idea about how vehicle fleet distributions change with increase in income, especially motorcycle ownership. Figure 4 shows that generally car proportions increase and 2/3-wheeler proportions decrease with increases in per-capita incomes. Here again there are large variations at similar levels of income. The correlation by income is weak for both over the whole range of incomes. Proportion of car ownership becomes greater than 2/3-wheelr ownership for all cases only when incomes exceed US$ 10,000 per-capita per year. Incomes double every 10 years at growth rates of 7% per year. Since most countries are below US% 3,000 income levels at present, it is unlikely that many country annual per-capita incomes will exceed US$ 10,000 in the next two decades. At present Japan is the only high-income country in Asia that has a large population. It is also interesting that Japan and Singapore have a relatively high motorcycle ownership level but only Japan has low fatality rates both overall and that for and 2-wheelers.

CONCLUSIONS AND RECOMMENDATIONS

Data presented above show that few countries have reliable RTI related data at present. However, some general trends are discernable:

1. While higher income countries tend to produce more reliable RTI data, this is not always true. Some high income countries have unreliable statistics and some low-income countries are able set up good data collection systems. Therefore, all countries should be able to set up reasonable data reporting systems given the right policies.
2. Vulnerable road user fatalities constitute the majority of all RTI fatalities in all large Asian countries including the high income countries. These groups need special attention in all road safety activities.

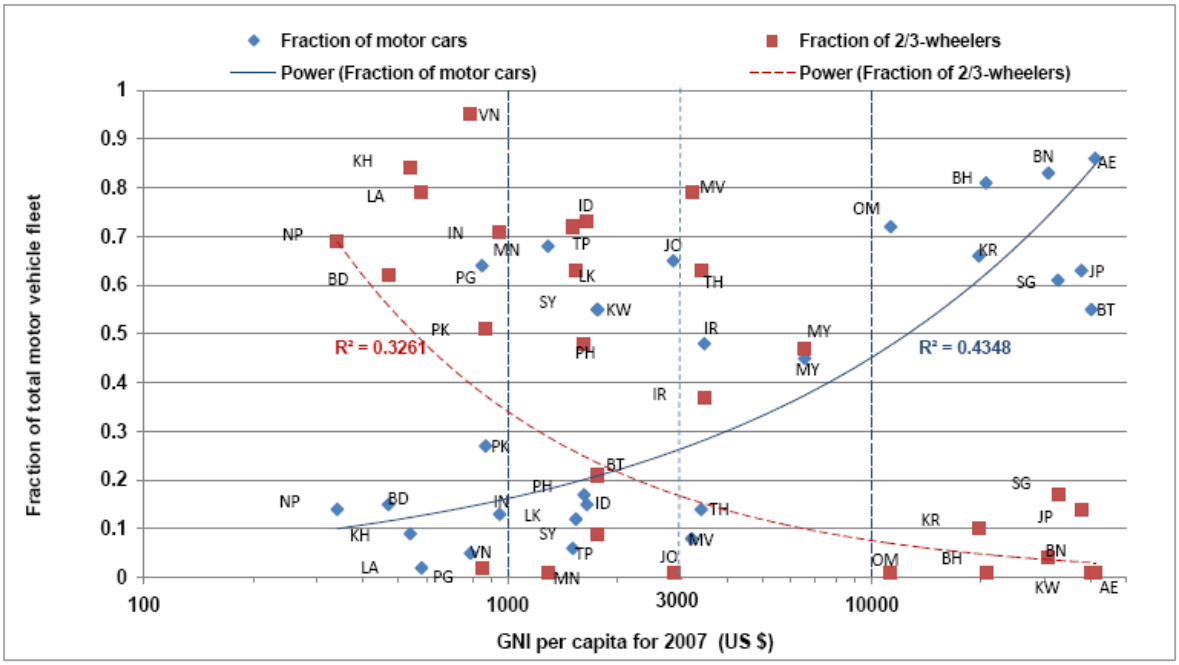


Figure 4. Proportion of 2/3-wheelers and motor cars in vehicle fleet vs. per-capita income in Asian countries.

3. 2/3-wheeled vehicles constitute a high proportion of all vehicles in large low and middle-income countries in Asia and this is not likely to change over the next two decades. Even Japan and Singapore have a greater 2/3-wheeler proportion in their vehicle fleets than many other high-income countries around the world.

4. Overall and road user specific fatality rates do not have a high correlation with income levels. The reasons for this are not known.

5. It appears that factors other than income levels, car and road design, and policing influence fatality rates per-capita for each country. Much more work will have to be done in this area before the variability in crash rates can be explained satisfactorily for Asian countries.

Recommendations

In the absence of more reliable data and identification of risk factors for each country, it is not possible to give very specific country based countermeasures for road safety. t would be adequate at present to focus on measures that have international validity and are known not to have negative side-effects (Mohan, Dinesh, 2008; Elvik, R. & Vaa Truls, 2004; Peden, Margie et al., 2004). Some of these are listed below:

Pedestrian and bicyclist safety

1. Reserve special space for non-motorized modes on all arterial roads and highways.
2. Speed control in urban areas: maximum speed limits of 50 km/h on arterial roads need to be enforced by road design and police monitoring, and 30 km/h in residential areas and by judicious use of speed-breakers, dead-end streets and mini- roundabouts.

3. Increase the conspicuousness of bicycles and small by fixing reflectors on all sides and wheels and painting them yellow, white or orange.

Motorcycle and motor vehicle safety

1. Notify and enforce mandatory use of helmets and daytime headlights by motorised two-wheeler riders.
2. All cars must conform to international crashworthiness regulations and enforcement of seatbelt use laws.
3. Restrict front-seat travel in cars by children and the use of child seats.

Road measures

1. Traffic calming in urban areas and on rural highways passing through towns and villages and reserve spaces for bicycles and pedestrians.
2. Improve existing traffic circles by bringing them in accordance with modern roundabout practices and substitute existing signalized junctions with roundabouts.

Enforcement

1. Enforce speed limits with a combination of technological aids and policing.
2. Strict control of drinking and driving.

Research and Policy

1. Since all policy measures and research activities need reliable data, all countries must set up data recording systems to get minimum victim, vehicle and location details.
2. Every country must have a national road safety board staffed with professionals who set policy and research agenda.
3. There are wide variations in crash patterns within countries of similar income. The reasons for these variations need to be investigated on an urgent basis.

REFERENCES

Elvik, R. & Vaa Truls (2004). The handbook of road safety measures. Amsterdam: Elsevier.

Expert committee on auto fuel policy (2002). Urban road traffic and air pollution in major cities: Volume 1 New Delhi: Government of India.

Kopits, E. & Cropper, M. (2005). Traffic fatalities and economic growth. Accident Analysis & Prevention, 37, 169-178.

Mohan, D. (2008). Traffic Safety and City Structure: Lessons for the Future. Salud Publica de Mexico, 50, S93-S100.

Mohan, D., Tsimhoni, O., Sivak, M., & Flannagan, M. J. (2009). Road Safety in India: Challenges and Opportunities (Rep. No. UMTRI-2009-1). Ann Arbor, MI: The University of Michigan Transportation Research Institute.

Mohan, D. (2008). Road traffic injuries: a stocktaking. Best Practice & Research Clinical Rheumatology, 22, 725-739.

NCRB (2008). Accidental Deaths & Suicides in India - 2007 New Delhi: National Crime Records Bureau, Ministry of Home Affairs.

Peden, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A. A., Jarawan, E., & Mathers, C. (2004). World report on road traffic injury prevention. Geneva: World Health Organization.

WHO (2009). Global status report on road safety: time for action Geneva: World Health Organization.