Proceedings of WHO Meeting to Develop a 5-year Strategy for Road Traffic Injury Prevention

World Health Organization
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Proceedings of WHO Meeting to Develop a 5-year Strategy for Road Traffic Injury Prevention

World Health Organization
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Introduction

A WHO consultation meeting to develop a 5-year strategy to address road traffic injuries globally was held in Geneva, Switzerland on the 26-27 April 2001.

The objectives of this meeting were:

- To review the current global activities and identify needs
- To define WHO's added value
- To develop a WHO strategy and plan of action in the fields of epidemiology, prevention and advocacy
- To define partnerships and their roles
- To inform donors

The expected outcomes from the meeting were:

- A 5 year WHO strategy and plan of action
- Identification of key partnerships and their roles
- Identification of potential funders

A total of 25 international delegates from the disciplines of public health, engineering, traffic enforcement, prehospital care, etc attended the meeting (See appendix A for list of delegates).

The consultation was a mixture of presentations (see next section) and discussions in plenary sessions. Areas where the WHO would have added value were presented in the plenary sessions followed by small work groups (see agenda in Appendix B). Potential partners delivered short presentations (see section 3). In the small work groups, participants were charged with discussing the draft strategy prepared before the meeting and developing final concrete strategies, plans of action, partnerships, etc.

The final 5-year WHO strategy for road traffic injury prevention was prepared following the meeting (see section 4). The strategy aims to integrate RTI prevention into public health programmes around the world in order to reduce the unacceptably high levels of RTIs. Special emphasis has been placed on low and middle income countries (LMCs). A separate document entitled 'The 5-year WHO Strategy for Road Traffic Injury Prevention' may be found on the internet at [www.who.int/violence_injury_prevention](http://www.who.int/violence_injury_prevention) or obtained directly from the Department of Injuries and Violence.

The WHO’s current initiative into the control and prevention of RTIs is both legitimate and timely. Road traffic collisions have enormous health consequences all around the world and the public health burden attributable to these collisions is increasing. Furthermore, in most developing countries in the world where the burden is the greatest, there is little or no public health leadership for the prevention and control of the consequences of such collisions. The WHO’s constitutional mandate, as the lead coordinating agency for international public health, places it in a unique position to lead a science-based programme of activities in RTI prevention.
INTRODUCTION

Injury control, safety of individuals and societal arrangements are all interlinked. William Haddon wrote seminal pieces on the folly of focusing on “human error” as the main cause in the occurrence of accidents (1-6). He did not like the use of the word “accident” as he thought that this leads a feeling of inevitability in the occurrence of these incidents. Further, he was also convinced that the term “accident prevention” was too limiting and prevented the evolution of other safety countermeasures useful in limiting the severity of injury and in injury management after the event. Instead, he promoted the use of the phrase “injury control” as being more neutral and scientific. But, he did not address the issues of ideology and the power of elites that the societies are influenced by.

Perrow (7,8) on the other hand, agrees with Haddon that individuals cannot always be held responsible for “human error” under the system they operate in but provides a more sophisticated model of systemic imperatives: “I wish to point away from the basic and pervasive sin identified by those who casually examine organisational failures, that of operator error; this is given as the cause of about 80% of the accidents in risky systems. I would put it at under 40%. I will suggest that what is attributed to operator error stems primarily from the structure they operate in, and thus, stems from the actions of elites. Elite errors and elite interests stem from their class and historical power positions in society, and changes in these positions are glacial.” (7).

Obviously, societal responsibility in the control of road traffic crash (RTC) injuries becomes paramount when the problem is stated in these terms. Morbidity and mortality due to injuries have always existed in the past but their recognition as a public health problem is a phenomenon of the mid-twentieth century. Policy makers and safety professionals in every country find it very difficult to institute changes which actually result in a dramatic decrease in fatalities due to injuries. This is mainly because experience shows that individuals do not follow all the instructions given to them to promote safety. Attempts to educate people regarding safety are also not very effective and wide variations are found between people’s knowledge and their actual behaviour (9). This is particularly true for those situations where we cannot select the people who will be involved in a particular activity. For example, almost everyone in the population is involved in domestic chores, in road use and working in offices, factories or on farms. It is not possible to select people who will always be careful in performing these activities. While some control can be exercised in licensing drivers of motor vehicles, almost no control is possible in selection of pedestrians and bicyclists. This makes it very difficult to promote safety by relying on improvements in individual behaviour and makes injury control a very complex process. This is illustrated below by using road traffic as an example.

Almost all the people in the school going and working age groups have to be on the road at least twice a day in every country of the world. This forces many individuals to use the road even when they are not adequately equipped to do so. These situations would include individuals with any of the following problems:
• Those who cannot concentrate on the road because they have suffered a personal tragedy recently - death of a loved one, loss of a job, failure in an important examination, monetary loss, etc.

• Those who are disturbed because of problems in personal relationships with a spouse, parent, sibling or close friend.

• Persons taking medication or drugs which alter behaviour and perceptual abilities, or those who are under the influence of alcohol.

• Children whose cognitive and locomotor abilities make it difficult for them to understand or follow instructions given to them.

• Elderly people whose motor and cognitive functions are impaired.

• Disabled persons who have to be a part of regular traffic if they have to earn a living.

• All psychologically disturbed persons who may not be able to function as desired on the road but who cannot be singled out from participation in traffic.

If we add up the total number of individuals who could be included in the above categories on any given day it would amount to a significant proportion of people on the road (20-30%). These individuals cannot always be identified or prevented from using the road space. At the same time it is also a fact that their presence on the road is not out of choice, but a compulsion. In our modern ways of living we have to use products and do things at places and at times which are determined by someone else or by the society at large. The same holds true for activity at the work place or even at home. A large number of us have little choice in the design of the home we live in, the design of the tools we use, or the work place where we spend a major part of the day.

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 safe 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 of the groups listed above. These kinds of designs, rules and regulations would reduce the probability of people hurting each other or themselves even when they make mistakes. Such systems are very often referred to as “forgiving” systems.

Such systems cannot be put in place unless there is a societal and political understanding about the ethical and moral responsibility of the state and civil society to ensure the right to life of all its citizens. This right to life includes living in good health according to currently available knowledge and technology. A document prepared recently by safety professionals summarises some of these issues as follows (10):

• Safety is a fundamental human right.

• Safety is a state in which hazards and conditions leading to physical, psychological or material harm are controlled in order to preserve the health and well-being of individuals and the community. It is an essential resource for everyday life that an individual and a community need in order to realise their aspirations.

• There are two dimensions to safety: one is objective and assessed by behavioural and environmental objective parameters and the other is subjective and appreciated according to the feeling of safety of the population. Both dimensions can influence each other either positively or negatively. It is therefore necessary to consider these two dimensions to improve the safety of the population.
Safety is a pre-requisite to the maintenance and improvement of the well-being and health of the population. It is the result of a dynamic balance that is established between the different components within a specific setting.

INJURY CONTROL, PUBLIC HEALTH AND TECHNOLOGY

Once we accept that injury control is a public health problem and that we have an ethical responsibility to arrange for the safety of individuals, then it follows that we also incorporate the lessons learned from our experience of the past few decades of this century. We know that drinking water should be purified at its source; it is unreasonable to expect everyone to boil water before drinking it. Those societies which depend upon individuals to purify their own drinking water suffer from much higher rates of communicable diseases than those which purify water at source. Ironically, it is quite common to create a product or environment which is likely to cause injury, warn the user to be careful, and then blame the user if a mishap occurs. We would never tolerate a person who introduced cholera germs in the city water supply and then “educated” every citizen to boil water before drinking it with the argument that those who knowingly don’t do so would then be responsible for getting sick. This is the argument we all to often use when dealing with matters concerning safety. We put in place hazardous roads, vehicles and driving rules and then expect road users to be safe by behaving in some ideal manner.

Once we are clear that injury control activities involve the same principles as any other public health problem, then we can institute policies and programmes for institutionalising safety promotion. However, most models of safety promotion and community action have their origins in the highly motorised countries (HMC) and it is assumed that similar measure would work in the less motorised countries (LMC) also. Many of these policies are heavily dependent on introduction of expensive technologies and difficult regulation and legislation enforcement systems. Therefore, the transfer of “knowledge” from HMCs to LMCs is sometimes almost impossible. However, we forget that many advances in public health in the control of communicable diseases took place before the invention of the modern definitive disease control drugs and vaccines.

Figure 1. Decrease in disease specific mortality rates in the U.S.A 1900-1980 (Sathyamala, Sundharam and Bhanot, 1986).
Figure 1 shows the decrease in disease specific mortality rates in the U.S.A 1900-1980. This data show that medical interventions for measles, scarlet fever, tuberculosis and poliomyelitis were introduced when the incidence rates had already declined considerably (11). None of these death rates, except polio, show as marked a decline after the medical intervention as before. There is enough other evidence available to show that improvements in public health involve much more than just the introduction of new technologies and treatment methods. For example, in India the crude death rate declined from 47.2 per thousand per year from the decade of 1911-1921 to 27.4 for the decade of 1941-1951 (12). This 42% reduction in death rates over three decades in India took place when most medical technologies were not available to a vast majority of the country’s population. These reductions took place because of improvements in environmental and other social conditions.

Disease is the product of social, economic and technological environments that people live in. Within this environment the power to take decisions regarding choices available for one’s own well being and the power to influence other people’s lives plays an important role in what health benefits are available to the society as a whole. The same holds true for injury control and safety promotion.

RTC injury control activities will not be successful around the world unless we address these issues of social, economic and technological environments and the power available to people to influence decision making regarding their own well being. The lower the income of a society, the more important it becomes for RTC injury control countermeasures to be instituted at the societal and system level. Many of the current approaches in RTC injury control do not give enough importance these aspects of the problem. They focus on control at the product or environmental design levels or in the establishment of safety standards without looking at the ability of a society to influence or sustain these activities. Success in promoting safety in low income communities is further limited because LMC systems happen to be more complex than those obtaining in HMCs.

**SOCIETAL COMPLEXITY AND RTC INJURY CONTROL**

The following factors played an important role in instituting safety programmes and policies in HMCs:

- Decline of mortality due to infections and contagious diseases. This made the community more aware of RTC injuries as a health problem and therefore gave support to injury control initiatives as a priority.

- Development of a middle class society. By the mid 1980's a significant majority of Europeans had incomes which would define them as “middle class”. At the same time an equalisation process took place which made most professionals "equals". This meant that policemen, school teachers, doctors, nurses, lawyers, university professors could sit around a table and actually communicate and respect each other as equals. Cooperation between various interest groups, law enforcers, policy makers and policy implementers then becomes more possible. These processes resulted in conglomerations of people which could be called "communities" in a real sense. Most countermeasures for RTC injury control benefit large proportions of the community. It can also be assumed that particular countermeasures would not harm some sections of the population since there are less conflicts of interest by different class categories.

- Acquisition of decision making powers by local self governments. Over time local communities have been able to acquire decision making powers over most aspects of community life, owing to national governments’ inclination to decentralise policies that relate closely to the citizens’ well being. This gives them the confidence to attempt changes.

- Establishment of institutions and organisations with high degree of expertise. This makes it possible for reasonably accurate and reliable data to be collected. These data can then be used for policy making purposes with support from most sections of society.
Laws can be enforced. Because of the relative egalitarian structure of society it is assumed that most laws would affect most people in a similar manner. Since the law enforcers belong to the same social strata as the general public it becomes possible to enforce laws more efficiently and more uniformly.

Availability of safer road and vehicle technologies. Most technologies are developed and their designs controlled by the wider society where they are needed. The technologies are more in tune with the needs of the community and can be changed if necessary. Whereas, such locally suitable standard making has not been easy in LMCs.

Safety standards can be enforced. Since most production is centralised, it is possible to make standards and enforce them.

In most LMCs at the present time many of these conditions are not met. Some characteristics of LMCs are given below:

- Heterogeneity. The post-war period has witnessed the emergence of a very large number of independent nation states in Africa and Asia. Most of these nation states had never existed in the present form ever before in history. In many of these countries the national boundaries have been drawn quite arbitrarily. Because of the manner in which these countries came into existence, most of them have very mixed populations. These populations may differ in religions, languages, common law, social customs and may not have shared values.

- Inadequate public health facilities. Most LMCs have not been able to institutionalise twentieth century levels of hygiene and public health. Infant mortality and maternal mortality indices remain much higher than those in HMCs. In addition, 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 RTC injuries as an important public health problem at the official level. However, the public awareness of this problem is highly developed.

- Hierarchical societies. Most LMCs have not been able to achieve high enough levels of economic growth over the past four decades. Low economic growth combined with non-egalitarian ideologies result in very low levels of upward mobility. The poorer sections of society remain dominant in terms of proportions of the population, but they have little influence on setting the policy agenda. Within institutions the hierarchy also gets to be embedded in all functional details.

- Inadequate control over technology. Most LMCs import almost all the technological products and processes from HMCs. Even aid projects ensure movement of technology from the donor to the receiver. Very often this technology is old or less expensive, and therefore, more hazardous. Local communities have almost no control over the choice of these technologies. For example, when a highway project is executed, the design and construction are done by people who belong to the metropolis of that country aided by experts from multilateral or bilateral international agencies and multinational corporations. The local community can hardly influence the execution of these projects except in the form of protests to halt the construction or change the location of the highway. Most of the time they do not have the expertise or the power to influence design. In addition, the local community may not possess the expertise to evaluate the hazards implicit in the designs of products or technologies being put in place.

- Increase of complexity in social and technological systems. Over the past few decades standardisation of and homogenisation of technologies has resulted in the reduction of complexity in many sectors in HMCs. The roads have become identical in layout and design,
vehicles have become similar, variety of vehicles has been reduced. This reduction in complexity has made it somewhat easier to institute safety countermeasures.

On the other hand, in most LMCs, both social structures and technologies include a great deal of variety which leads to more complex systems. The most modern vehicles share the same road space with non-motorised transport, and mechanised systems co-exist with labour intensive ways of living. These issues concerning increasing complexity in LMCs are discussed below.

**THE CONSEQUENCES OF INCREASINGLY COMPLEX SYSTEMS IN LMCS**

Systems which have unfamiliar feedback loops, many potential interactions, indirect or inferential information sources, and limited understanding of some processes are considered to be more complex than those with the opposite characteristics (8). The characteristics described above show that LMCs tend to have more complex social and technological environments than those present in HMCs. The most important issue to be understood regarding increasingly complex systems in LMCs is that these societies face new problems which are different from those prevalent in HMCs today. They also have little precedence in the past of the HMCs. It is not usually possible to find solutions from the past of the HMCs and transfer these old solutions to LMCs today.

The complexity in the socio-political domain is a result of centralised decision making systems of nation states and local government bodies not being able to accommodate the interests of the poorer sections of society. This happens because the individuals who take decisions are getting more and more insulated from the daily lives and concerns of the disadvantaged communities. Ease in international travel and instantaneous communication links between the elite groups around the world tends unifies their interests and concerns. In the earlier centuries and the first few decades of the present century there was greater conflict between the elite groups across nation states than there exists today. This interaction and solidarity between richer sections of society in different communities and the conflicts between the poor sections within and across communities is at the expense of the interests of the latter.

The interests of the poor communities can also be in direct conflict with the interests of the richer ones. Slowing down traffic and providing a larger number of safer pedestrian crossings annoy car owners. Presence of bicycles on the road is considered a traffic nuisance. Removal of trees from the road side to make it "forgiving" for straying vehicles makes it much less comfortable for pedestrians and bicyclists in hot climates.

These problems are further compounded by the fact that the global information exchange makes poor people more aware of the latest happenings all over the world and raises their expectations for fair play. This results in more conflict in society making governance more difficult. Known countermeasures for safety demand the use of latest technologies which may or may not be suitable for the problem at hand. Innovative technologies need to be developed, but most LMCs do not have the financial base or the institutional structure to develop these new technologies. So communities end up trying out one unsuccessful "solution" after another. This promotes a feeling of helplessness, powerlessness and lack of trust in the policy makers.

What needs to be understood is that the theoretical base of RTC injury control countermeasures may have international applicability but the actual physical solutions may not. There is clearly a poverty of theory. For example, most road safety measures instituted in HMCs have centred around the automobile and the automobile occupant. Road and intersection designs are based only on car, bus, and truck movement. The roads in LMCs are dominated by motorcycles, human powered vehicles, pedestrians carrying loads and locally designed vehicles. No traffic flow models and computer programmes are able to account for this mix. Even if all the solutions developed in HMCs were put in place on the roads of LMCs, the decrease in fatality rates would not be of the same magnitude as experienced in the HMCs.
A good example of the above is the role of expressways in inter-city travel. When an expressway is built through the countryside it divides the landscape into separate zones. People from one side of the expressway cannot go to the other side of the expressway easily on foot or on a bicycle. In HMCs this does not pose a serious problem as most people possess motorised transport. However, in LMCs the countryside may be heavily populated on both sides of the expressway by people of low income who need to interact with each other. They need to cross the expressway carrying or pulling heavy loads. In such a situation they do not like to go long distances to cross the expressway at designated over or under-passes. They end up breaking the fences and cross the expressway at locations convenient to them. This makes the expressway much more hazardous for everyone concerned. The decision makers come from a different strata of society who are only concerned with increasing the flow of inter-city motor traffic and see the villagers as impediments to “progress”.

VEHICLES AND CRASHES

In the last three decades the incidence of traffic crash fatalities and injuries has been reduced significantly in the HMCs. On the other hand, almost no LMC has been successful in reducing the number of lives lost and people injured due to road traffic crashes in the last two decades. This is a curious situation as all the LMC societies have been seriously concerned with the significant loss of lives due to road crashes for more than a decade without much success. One cannot attribute this failure to the forms of government, culture or religious practices obtaining in more than one hundred LMCs. Among these countries there is a great variation in size (populations can vary from less than a million to more than one billion), religions, cultural practices and forms of government. If these factors had a determining influence then there should have been a few LMCs where road safety policies were successful. The fact that this has not happened means that there must be other reasons why the road safety situation in the LMCs is less than desirable.

The car population as a proportion of total motor vehicles is much less in LMCs than in the HMCs and that of pedestrians, bicyclists and motorised two-wheeler (MTW) riders constitute a larger proportion of road crash victims in LMCs than in HMCs. The prevalent high rates of pedestrian, bicycle and motorcycle traffic in LMCs (proportions do differ from country to country) result in vulnerable road user (VRU) fatalities constituting 60-80% of all traffic fatalities. The issues summarised above convince us that LMCs are experiencing a new phenomenon in road traffic patterns and accidents for which there is little precedence. Non-motorised transport (NMT) constitutes a significant share of the total traffic in many Asian cities and all have a relatively high rate of bicycle ownership and a high proportion of bicycle traffic. The same road space gets used by modern cars and buses, along with locally developed vehicles for public transport (three-wheeled scooter taxis), scooters and motorcycles, tricycle rickshaws, animal and human drawn carts. The infrastructure which is designed on the basis of homogeneous traffic models has failed to fulfil the mobility and safety needs of this traffic.

The data available shows that vulnerable road users (VRU) are the main victims both on urban and rural roads in most LTCs (13). This flows logically from the fact that this class of road users form the majority of those using the road. In addition, because VRUs are not protected by metallic or energy absorbing materials, they sustain relatively serious injuries even at low velocity crashes. A study by Kajzer, Yang and Mohan (14) also shows that in LMCs buses and trucks are involved in a greater proportion of crashes than they are in HMCs. The situation on Indian highways is somewhat similar with the majority of those killed being VRUs. It is possible that wherever the proportion VRUs is high as a proportion of all road users similar crash rates will be experienced as in India. However, some LMCs do not have bicycle use rates which are as high as those seen in countries like India, China and Vietnam, and these countries have lower involvement of bicycle fatalities (15). In these countries where bicycle use rates are lower, it appears that MTW and pedestrian fatality rates are proportionately higher. These data show that in most LMCs safety policies must focus on issues concerning the safety of VRUs and their interactions with trucks and buses.
USE OF ROAD SAFETY INDICES

The indices used most often for understanding the road safety situation in a nation include fatalities per capita (FPC), fatalities per vehicle (FPV) and the fatality index (FI). The FI is calculated by dividing the total number of recorded fatalities by the number of injured persons. However, these indices cannot be used to compare or evaluate the level of safety in situations where the traffic conditions and vehicle usage rates are very different among countries. FPC is a good index for determining the role of road accidents as an overall public health problem. For example, the U.S.A. has an FPC index of 16 per 100,000 population (16) and China 6 per 100,000 (17). This comparison shows that the burden of road traffic accidents as a health problem is much lower in China than that in the USA. In a study undertaken for the United Nations ESCAP, Ross, Rahmatullah and Ghee (18) document that fatalities per vehicle registered in LMCs (about 20-70 deaths per 10,000 vehicles) are much higher than those in HMCs (about 2 per 10,000 vehicles). The authors conclude that “This single indicator - annual fatalities per 10,000 vehicles - indicates the severity of the road accident problem in many countries in the Asia Pacific region”. This is understood to mean that the traffic hazards are much worse in LMCs than in HMCs. Further, from this it is generalised that drivers in LMCs are very "careless", less "knowledgeable", and less "skilled" than those in HMCs. However, this generalisation is open to question. The FPV rates in the Malaysia and Delhi are 2.6 and 4.8 times greater than that in the US respectively. But, when one examines road user specific rates a different picture emerges. The car occupant fatality rate in Delhi is 30% higher and MTW rate 50% lower than the respective rates in the USA. The pedestrian fatality rate in Delhi is 3.5 times higher than that in the USA. If one considers all these factors, it appears that the number of crashes per road user in LMCs may not be as high as the FPV index tends to indicate.

THE WAY FORWARD

Institutional Mechanisms

The real issues and problems which road users face and which are associated with road safety must be identified and understood for different socioeconomic settings and traffic patterns. Institutions, both governmental and non-governmental, have to be set up and funded so that road safety programmes can be set and implemented on a sustainable basis. The identified road safety plans and strategies must have the acceptance of a wide range of community groups. New technologies and designs must be identified, developed and implemented.

Many LMCs have set up broad-based road safety councils in the past two decades. These councils are dominated by members who have little research or scientific experience and thus they support the prevailing view that most crashes are caused by bad behaviour of drivers and other road users, and so these councils' efforts are not very successful in reducing deaths and injuries due to traffic accidents. Similarly, the police departments only focus on issues concerning breach of law and negligent behaviour (“human error”) and on issues concerning punishment and “education” of violators. These
approaches do not see the need for scientific approaches for problem solving and result in dependence on layperson views and moral concerns, unco-ordinated institutional units performing transportation functions in road building, traffic management, law enforcement and “education”.

The lesson to be learned from international experience is that for establishment of safety policy and priorities, for safety programmes to be implemented and evaluated, funding and evaluation of relevant research there is an urgent need to set up well funded, large and professionally managed government departments for road safety at the national and/or regional levels which are independent of the police departments and the road construction agencies.

Training in road safety science: Most of the road safety programmes in LMCs are focusing on issues and countermeasures which have been proved to be harmful or ineffective in most parts of the world. There is an urgent need to have professionals trained in the scientific techniques in this area. This would involve setting up of multi disciplinary road safety and transportation planning centres in academic institutions and organisations of regular short term course for professionals in LMC locations.

Crash Prevention

A very large proportion of the decrease in RTC injuries in LMCs is the result of the availability of cars which provide much greater safety to the occupants in crashes, and by a very significant reduction of the presence of VRUs on HMC streets and highways. This approach can have very limited results in LMCs because car occupant fatalities are a small proportion of the total and the presence of VRUs is not likely to reduce very much in the near future. Therefore, transportation planning, exposure control, intelligent separation of non-motorised traffic on major roads, and traffic calming are likely to play a much more important role. 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 about modern methods of RTC control. Most of them are still operating on principles which were discredited over three decades ago.

Vehicle standards

Cars

Most automobiles are traded internationally these days. Therefore, it would make sense for such vehicles to conform to some minimum international standards. LMCs could apply their own standards in addition to make the vehicles more suitable for their specific traffic conditions. Some of these issues could include the possibility of making turn indicator lights more conspicuous and more easily visible to pedestrians, motorcyclists and bicyclists, pedestrian safety standards for small cars, and impact standards for bicycles and motorcycles with cars.

Country specific motor vehicles

In many LMCs there has been a growth of vehicles which have been designed locally and do not conform to international safety standards. There are a wide variety of these vehicles but they can be broadly classified into three groups: (i) three-wheeled vehicles, (ii) four wheeled vehicles, and (iii) trailers pulled by tractors or other similar vehicles. For these country specific motor vehicles, construction methods, materials used and economic considerations will not allow for the imposition of international car safety standards on these vehicles. Cooperation and involvement of biomechanics experts from around the world can make a significant contribution in making these vehicles much safer.

Design of less aggressive fronts for buses and trucks
During the past decade, the pedestrian safety problem for impacts with private cars in HMCs has been studied using mathematical models, epidemiological studies, and impact tests with mechanical dummies and biological materials. Various recommendations for the front structure design of vehicles (mainly cars) have been made. However, the fronts of buses and trucks have not been designed to be “forgiving” in impacts with VRUs. Preliminary studies show that it is possible to design fronts of buses such that impact forces in a bus pedestrian impact can be reduced significantly (14). A similar study has been done for fronts of trucks also (19). Standards will have also to be developed for crashworthiness of buses and trucks in impacts with pedestrians and bicyclists.

Bicycles and motorcycles

Since bicycles and motorcycles constitute a significant proportion of vehicles in most LMCs, and their riders a large proportion of road crash victims, we need to invest much more on research for the safety of these road users. Areas which need continuous attention are conspicuity of these vehicles, design changes to make them more stable, and work on making helmets lighter, and more comfortable at high ambient temperatures.

Blackspots and quality of roads

Blackspot analysis and treatment is given maximum importance in all international consultancy projects in LMCs. This is in spite of the fact that there is no consensus on the actual effectiveness of blackspot treatment in HMCs. A recent review concludes that “. . . the results of before-and-after studies of road accident blackspot treatment depend strongly on which of the confounding factors studies control for. Large reductions in the number of accidents, generally in the order of 50-90%, were found in studies not controlling for any confounding factors. . . Studies simultaneously controlling for general trends, regression to the mean and accident migration did not find any statistically reliable effect of blackspot treatment on the number of accidents” (20).

However, a large number of projects are being funded by international agencies only focusing on black spot treatment approaches. None of these studies control for all the confounding factors considered important by Elvik. In many cases black spots are identified as those locations where pedestrians get hit while crossing a road, then a fence is installed to stop such road crossings. The “after” study obviously shows much improvement since pedestrians are removed from that location. Such changes cannot be considered as “improvements” because no analyses are made of the different locations where the pedestrians migrated to. In addition, the inconvenience caused to pedestrians is never taken into account. Though there is no conclusive evidence regarding effectiveness of blackspot treatment from LMCs, all policy documents list this countermeasure as the most effective.

The quality of roads issue has to be addressed in terms of providing better facilities to non-motorised road users, developing suitable designs for heterogeneous traffic and those for slowing traffic in residential areas. Even on national highways, the majority of people killed are pedestrians, bicyclists, two-wheelers, and there are crashes with tractors/bullock carts in many LMCs. Therefore, unless these issues are addressed and methods developed for area wide safety improvements we will not be gaining much by concentrating on black spot treatment.

Speed control measures have particular relevance for LMCs. This holds great promise because improvements in vehicle design may have reached a point of diminishing returns. The effects of lower speeds on safety of vulnerable road users would be more significant than safer vehicle designs. Any money spent on research to develop vehicle and road designs which control speeds automatically would be money well spent. Vehicle speeds in urban areas can be controlled by adopting traffic calming measures. In the past few years many guidelines for traffic calming have been published in the HMCs. Most of the ideas included in these guidelines apply to LMCs also. However, these designs are most suitable to traffic situations where cars constitute a vast proportion of road traffic. These ideas have to be modified for traffic situations where NMVs and MTWs may be a significant proportion of road traffic. For example, chicanes, road closures, entry treatment and traffic throttles may slow down cars but may
not have the same effect on MTWs. On the other hand, some of these obstructions may make it difficult for rickshaw and hand-pulled carts to operate. Therefore, a fresh look has to be given for designing traffic calming measures for LMCs. This is particularly relevant for inter-city roads passing through the centre of small towns.

We have pointed out above that the incidence of VRU fatalities and inter-city highways is significant in LMCs. This is partly because of the high density of low income habitations along many stretches of the highway. For such situations, we need to develop standards for provision of convenient tunnels and other crossing facilities in terms of designs and frequencies. In addition there would also be a need for provision of “service roads” along the highways for short distance trips for local traffic. At present there are no such guidelines to help the local designer and planner.

CONCLUSIONS

Road safety research in the HMCs has involved a large number of very gifted professionals from a variety of disciplines over the four decades. Some very innovative work has resulted in a theoretical understanding of “accidents” as a part of a complex interaction of sociological, psychological, physical and technological phenomena. The results could be exchanged and solutions transferred from one HMC to another because the conditions in these countries were roughly similar. This understanding of injuries and accidents has helped us design safer vehicles, roads and traffic management systems. A similar effort at research, development and innovation is needed in LMCs. A much larger group of committed professionals needs to be involved in this work for new ideas to emerge. Roving “experts” cannot do the job adequately enough.

Like all other developments in science and technology, road safety measures in the HMCs developed at certain historical junctures. They have an imprint of the prevailing socioeconomic situation embedded in them. When the HMC policies and designs are transferred to societies which have much lower per capita incomes, then large parts of these policies and designs are not successful. However, the attempt at introducing these measures in LMCs also sets up a demand for instituting systems and technologies which imitate those in HMCs. Since this is not always possible at low levels of income, these projects either attain the status of status symbols without much functional value, or remain in place as demonstration projects. While a few present small LMCs can experience high growth rates for some periods, most of the other countries will continue to function as LMCs for quite some time to come.

International co-operation in the area of road safety should focus on exchange of scientific principles, experiences of successes and failures, and in scientific training of a large number of professionals in the LMCs.

This re-focusing of our efforts will not be easy. The international scientific community still does not view much of the work being done for injury control as “sophisticated” enough. However, as we become more adept at generating “socially distributed knowledge” and our work leads to benefits for a larger proportion of the population around the world this view is likely to change. Though most of the principles we discover will have universal applicability, many of the technologies and specific methods may not. Some critics may still not research work on many of these non-global technologies to be “modern” or “scientific” enough. However, the contrary is true. The issues surrounding these products are actually very modern. They are the products of late twentieth century - combination of new socio-economic living patterns, instantaneous global communication, availability of sophisticated scientific knowledge and low per-capita incomes. Work on these technologies will require very innovative thinking, familiarity with the latest scientific information, and packaging of products in ways which may require combination of technologies already available with those developed by us. Unless we change our research and development activities in these directions, we are likely to end up with very inefficient technological systems in our society.
REFERENCES

THE EPIDEMIOLOGY OF ROAD TRAFFIC INJURIES: 
WHAT EXISTS, GAPS AND THE ROLE OF PUBLIC HEALTH

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INTRODUCTION

This paper aims to provide an outline of the current state of epidemiological knowledge concerning the global burden of road traffic injuries and known risk factors for these injuries. It further seeks to identify gaps in current knowledge and to consider the role of public health in addressing these gaps. This information should provide a sufficient basis from which consideration can be given to developing a WHO strategy and plan of action, in the field of epidemiology, and in particular to identifying the potential added value that WHO can provide to efforts being undertaken by other individuals and organisations.

The focus of the material is the provision of information that should facilitate efforts aimed at reducing the burden of road traffic injuries worldwide. However, specific attention is given to current knowledge and gaps in knowledge in lower income countries, where the burden of road traffic injuries is greatest. In this regard, recognition is also given to the issue of inequalities and inequities in road traffic injury prevention, and to the need to ensure that future efforts serve to reduce these inequalities and inequities.

This paper is presented in three main sections. The first section outlines the descriptive epidemiology of road traffic injuries, in terms of mortality, morbidity and disability and costs (both social and economic). The second section focuses on information obtained from the conduct of aetiological epidemiological research. The last section of the paper provides a conceptual framework in which decisions about the role of public health in contributing to reductions in the global burden of road traffic injuries might be considered.

DESCRIPTIVE EPIDEMIOLOGY

Mortality

Data sources

Two recently published reports provide data on the global and regional burden of road traffic injury mortality. One report (1) utilises data from the World Health Report 1999 database, for 1998, and comprises data derived from the 1996 Global Burden of Disease study.(2) The second report, produced by the Transport Research Laboratory, comprises published data for 1999, from most countries in the world, combined with adjustment factors that take into account estimated levels of underreporting in these published data.(3) Findings from both these reports are presented in the next section.

In addition to the above sources, data on road traffic fatalities are published routinely by WHO in their report series entitled World Health Statistics. Other potential data sources include reports published by the OECD/IRTAD, the International Road Federation, the Development Banks (e.g. the World Bank, the Asian Development Bank, the Inter American Development Bank, and other United Nations agencies (United Nations Economic and Social Commission for Asia and the Pacific).

Within-country data sources on road traffic fatalities, from which many of the above reports derive their data, include the police and/or transport sector, the health sector (which in some countries is also
derived from police data) and, for some countries, population surveys. Such population surveys may provide an important source of data particularly in low-income countries, where routine data collection systems either do not exist or are known to be unreliable.\(4 - 6\)

Deficiencies and problems with both the aggregated and within-country data sources, particularly in relation to police-reported data, are widely acknowledged and include the following:

- Different fatality definitions
- Different road crash definitions
- Under-reporting of crashes

Consequently, the robustness of current estimates of the global and regional burdens of mortality from road traffic injuries is questionable.

Current knowledge

World Health Report 1999 database

In 1998, there was an estimated 1,170,694 road traffic injury deaths worldwide. Deaths from road traffic injuries were the 10th leading cause of death among all ages, accounting for 2.2% of the global mortality. Road traffic injuries were the leading cause of injury-related death, accounting for 20.3% of all injury deaths. However, among females, deaths from road traffic injuries were the 2nd leading cause of injury death, following suicide. Overall, males sustained 73.0% of road traffic injury deaths. Mortality rates were 28.8 per 100,000 population for males and 10.8 for females.

Road traffic injury deaths were the 2nd leading cause of death among those aged 15-44 years (21.7 deaths per 100,000) and the 3rd leading cause of death among those aged 5-14 years (13.7 deaths per 100,000). Deaths from road traffic injuries were also among the 15 leading causes of death for those aged 0-4 years (13.7 deaths per 100,000) and those aged 45-59 years (22.8 deaths per 100,000).

Road traffic injuries accounted for 1,029,037 deaths in low- and middle-income countries (87.9% of global mortality from road traffic injuries) and 141,656 deaths in high-income countries. Corresponding mortality rates per 100,000 population were 20.7 and 15.6 deaths respectively.

The numbers of deaths from road traffic injuries were greatest in the South East Asia Region, primarily accounted for by deaths in India (216,859 deaths), followed by the deaths in the Western Pacific Region, primarily accounted for by deaths in China (178,894 deaths) (Table 1). By comparison road traffic injury death rates were highest in the African region (28.3 deaths per 100,000 population), followed by those among low- and middle-income countries in the Region of the Americas (25.3 deaths per 100,000 population). In these latter countries, deaths from road traffic injuries accounted for 4% of all deaths in the region. Road traffic injury death rates were consistently higher in all low- and middle-income countries compared with high-income countries in the same regions.
Table 1: Distribution of road traffic deaths and mortality rates, by WHO Region and income group (high and low/middle), 1998

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>AFR</th>
<th>AMR</th>
<th>EMR</th>
<th>EUR</th>
<th>SEAR</th>
<th>WPR</th>
<th>WORLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCOME GROUP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Low/Middle</td>
<td>High</td>
<td>Low/Middle</td>
<td>High</td>
<td>Low/Middle</td>
<td>High</td>
<td>Low/Middle</td>
</tr>
<tr>
<td>Total RT deaths (000)</td>
<td>170</td>
<td>49</td>
<td>126</td>
<td>72</td>
<td>66</td>
<td>107</td>
<td>336</td>
</tr>
<tr>
<td>% of global RT deaths</td>
<td>14.5</td>
<td>4.2</td>
<td>10.8</td>
<td>6.1</td>
<td>5.6</td>
<td>9.1</td>
<td>28.6</td>
</tr>
<tr>
<td>RT deaths per 100,000</td>
<td>28.2</td>
<td>16.1</td>
<td>25.3</td>
<td>15.2</td>
<td>16.8</td>
<td>22.4</td>
<td>22.6</td>
</tr>
<tr>
<td>% of all deaths due to RTI</td>
<td>1.8</td>
<td>1.9</td>
<td>4</td>
<td>1.9</td>
<td>1.7</td>
<td>2</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Source: Krug, 1999

By 2020, it is projected that road traffic injuries will account for about 2.3 million deaths globally and will account for a greater proportion of all injury deaths (27.4%), with over 90% of these deaths continuing to occur in low- and middle-income countries. (3)

Transport Research Laboratory report

In 1999, estimates of the numbers of global road fatalities range from 745,769 to 876,539. The majority (44%) of these deaths occurred in the Asia and Pacific region including deaths in both India and China. Highly motorised countries accounted for the next highest proportion of deaths (14%) followed by the Latin/Central American and Caribbean regions (13%), the Central/East Europe region (12%), Africa (11%) and the Middle East (6%).

Death rates per 100,000 population and per 10,000 vehicles varied markedly between countries within each region, but not markedly across regions (Table 2). By comparison, while fatalities have decreased in highly motorised countries over the last decade, in almost all other regions there have been substantial increases. Although pedestrians comprise a higher proportion of deaths in the less motorised countries compared with highly motorised countries, in all regions (where data are available), motor vehicle occupants (including occupants of multi-passenger vehicles) comprise a comparable, if not larger, proportion of the deaths. Across all regions, females account for less than half of all road traffic fatalities.

1 Categorization of regions in this report differ markedly from those in the WHO report; highly motorised countries are categorised together, separately to the regional categorizations.
Table 2: Road traffic death rates, changes in fatality and motorisation rates and proportions of deaths sustained by pedestrian and females, by region and income group, 1999

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>HMC</th>
<th>AP</th>
<th>CEE</th>
<th>LAC</th>
<th>AFR</th>
<th>MENA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death rates per 100,000 pop</td>
<td>3.8-21.1</td>
<td>1-31</td>
<td>6-22</td>
<td>2-31</td>
<td>0.2-31</td>
<td>8-24</td>
</tr>
<tr>
<td>Death rates per 10,000 vehicles</td>
<td>0.7-4.8</td>
<td>2-52</td>
<td>3-41</td>
<td>2-58</td>
<td>3-339</td>
<td>3-36</td>
</tr>
<tr>
<td>% fatality increase (a)</td>
<td>(-9)-(-0)</td>
<td>39-40</td>
<td>(-36)-31</td>
<td>1-106</td>
<td>1-26</td>
<td>36-58</td>
</tr>
<tr>
<td>% vehicle increase (a)</td>
<td>14-27</td>
<td>113-183</td>
<td>12-43</td>
<td>45-81</td>
<td>22-na</td>
<td>na</td>
</tr>
<tr>
<td>% deaths to vehicle occupants (*cars)</td>
<td>28-63*</td>
<td>19-70</td>
<td>na</td>
<td>37-81</td>
<td>46-63</td>
<td>na</td>
</tr>
<tr>
<td>% deaths to pedestrians</td>
<td>13-28</td>
<td>9-67</td>
<td>30</td>
<td>2-45</td>
<td>37-54</td>
<td>33-62</td>
</tr>
<tr>
<td>% female deaths</td>
<td>25-33</td>
<td>33-50</td>
<td>25-33</td>
<td>20</td>
<td>25</td>
<td>20-30</td>
</tr>
</tbody>
</table>

(a) 1986-1996 in HMC (highly motorised countries); 1987-1995 in AP (Asia and the Pacific); 1988-1996 in CEE (Central and Eastern Europe); 1986-1995 in LAC (Latin America and the Caribbean); 1897-1995 in AFR (Africa); and 1988-1995 in MENA (Middle East and North Africa)

Source: Jacobs et al, 2000

Morbidity and Disability

Data sources

Morbidity

Aggregate global and regional data sources on road traffic related morbidity per se are not routinely published or accessible. The Transport Road Laboratory’s recent report produced estimates of the global incidence of non-fatal road traffic injuries, based on assumptions that about 50% of road injuries are reported, that a ratio of 100 injuries for every fatality applies in highly motorised countries and a ratio of between 20 and 30 injuries for every fatality in less motorised countries. Clearly the basis on which these assumptions have been made can be questioned, as can the robustness of the estimates that have been produced.

Within-country data on non-fatal injuries are routinely available for some countries, particularly higher income countries, where sufficient resources exist for these data to be collected and collated routinely. However, such data are not commonly available in most low- and middle-income countries. Routinely collected police and/or transport sector data provide one source of data on non-fatal road traffic injuries, although definitions and classifications of injury severity are non-standard.

Routinely collected data on non-fatal injuries may also be accessed through the health sector and specifically through the collection of hospital admission data. However, the definition of what constitutes a hospital admission and the criteria used for admission are not standard. While injury severity may be coded in individual patient notes, utilising measures such as the Abbreviated Injury Scale and the Injury Severity Score, such data are seldom collated routinely. Other health sector data sources that might be utilised to provide data on non-fatal injuries include emergency departments, health clinics and/or general practitioners. Ambulance and emergency vehicle records may also provide a source of data. Lastly, as with the collection of mortality data, information on the incidence of non-fatal injuries might
also be accessible from population surveys. Again, such population surveys may be particularly useful in low-income countries, given the absence of routinely collected and collated health sector data.\(^{(6 - 9)}\)

**Disability**

Aggregate global and regional data on road traffic-related disability, in terms of the prevalence of longer-term sequelae of road traffic injuries, are not routinely available. Similarly few countries, if any, routinely collect data on the prevalence of injury-related disability in the absence of any recognised recording systems for the range of disabilities that might be attributed to road traffic injuries. Both follow-up studies of injured persons and population surveys can usefully provide such estimates.\(^{(4, 10)}\)

Estimates of road traffic disability-adjusted life years lost are available from the World Health report 1999 database.\(^{(1)}\) Disability–adjusted life years (DALYs) combine data on the number of years of life lost (YLL) from premature death with a comparatively adjusted measure of years living with a disability (YLD). The latter adjustments are based on the severity and duration of the injury-related disability, and age and sex of the individual.

**Current knowledge**

**Morbidity**

The Transport Research Laboratory report estimates that in 1999 there were at least 11 million non-fatal injuries in highly motorised countries and 12–23 million in less motorised countries. Consequently, they estimate that in 1999 there were between 23 and 34 million road crash injuries.

**Disability**

In 1998, there was an estimated 38,848,625 disability-adjusted life years lost from road traffic injury worldwide. Road traffic injuries were the 9th leading cause of disability-adjusted life years lost among all ages, accounting for 2.8% of global disability. Road traffic injuries were also the leading cause of injury-related disability. Among males, road traffic injuries were the 6th leading cause of disability-adjusted life years lost, while among females they were the 15th leading cause, and were a less important cause of disability-adjusted life years lost than self-inflicted injuries which ranked as the 12th leading cause of disability-adjusted life years lost. Overall, males sustained 73.1% of road traffic injury-related disability-adjusted life years lost.

Road traffic injuries were the 2nd leading cause of disability-adjusted life years lost among those aged 5-14 years (8.7 million DALYs lost)) and the 3rd leading cause of disability-adjusted life years lost among those aged 15-44 years (22.8 million DALYs lost). Deaths from road traffic injuries were also among the 15 leading causes of death for those aged 0-4 years (3.1 million DALYs lost) and those aged 45-59 years (3.3 million DALYs lost).
Table 3: Distribution of road traffic DALYs lost, by WHO Region and income group (high and low/middle), 1998

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>AFR</th>
<th>AMR</th>
<th>EMR</th>
<th>EUR</th>
<th>SEAR</th>
<th>WPR</th>
<th>World</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCOME GROUP</td>
<td>High</td>
<td>Low/ middle</td>
<td>High</td>
<td>Low/ middle</td>
<td>High</td>
<td>Low/ middle</td>
<td>Total DALYs lost (millions)</td>
</tr>
<tr>
<td>% of global RT DALYs lost</td>
<td>15.7</td>
<td>4.4</td>
<td>11.3</td>
<td>6.4</td>
<td>5.4</td>
<td>8.2</td>
<td>28.9</td>
</tr>
<tr>
<td>Total DALYs lost per 100,000</td>
<td>1017.8</td>
<td>547.9</td>
<td>886.8</td>
<td>541.3</td>
<td>530.8</td>
<td>672.6</td>
<td>726.6</td>
</tr>
</tbody>
</table>

Source: Krug, 1999

Road traffic injuries accounted for 34.3 million DALYs deaths in low- and middle-income countries (88.3% of global DALYs lost from road traffic injuries). The number of disability-adjusted life years lost from road traffic injuries was greatest in the South East Asia Region, primarily accounted for by disability-adjusted life years lost in India (7.2 million DALYs lost), followed by those in the Western Pacific Region, primarily accounted for by China (5.4 million DALYs lost) (Table 3). However, the total disability-adjusted life years lost per 100,000 population were highest in Africa, followed by those in low and middle income countries in Region of the Americas.

Table 4: Disease burden (DALYs lost) for 10 leading causes

<table>
<thead>
<tr>
<th>1998 Disease or Injury</th>
<th>2020 Disease or Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lower respiratory infections</td>
<td>1. Ischaemic heart disease</td>
</tr>
<tr>
<td>2. HIV/AIDS</td>
<td>2. Unipolar major depression</td>
</tr>
<tr>
<td>3. Perinatal conditions</td>
<td>3. Road traffic injuries</td>
</tr>
<tr>
<td>4. Diarrhoeal diseases</td>
<td>4. Cerebrovascular disease</td>
</tr>
<tr>
<td>5. Unipolar major depression</td>
<td>5. Chronic obstructive pulmonary disease</td>
</tr>
<tr>
<td>6. Ischaemic heart disease</td>
<td>6. Lower respiratory infections</td>
</tr>
<tr>
<td>7. Cerebrovascular disease</td>
<td>7. Tuberculosis</td>
</tr>
<tr>
<td>8. Malaria</td>
<td>8. War</td>
</tr>
<tr>
<td>9. Road traffic injuries</td>
<td>9. Diarrhoeal diseases</td>
</tr>
<tr>
<td>10. Chronic obstructive pulmonary disease</td>
<td>10. HIV/AIDS</td>
</tr>
</tbody>
</table>

Source: WHO, Evidence, Information and Policy, 2000

By 2020, it is projected that road traffic disability-adjusted life years lost will move from being the 9th leading cause of disability-adjusted life years lost to the 3rd leading cause (Table 4).

Economic and Social Costs

Data sources

 Routinely collated and published reports of aggregate global and regional economic and social costs of road traffic injuries are not available. However, the Transport Research Laboratory recently produced estimates of these costs, based on a review of costing studies undertaken in a range of countries.
Various methods exist for the costing of road traffic injuries, but most countries use one of the following two methods:

- the “gross output” of “human capital” (HC) method
- the “willingness to pay” (WTP) method

The latter method has been adopted in a number of high-income countries, whereas the former method is the method favored in those low- and middle-income countries that have had the resources to undertake these costing studies. While the human capital approach has traditionally focused on the direct and indirect costs of traffic injuries, recent recommendations suggest the need to augment these costs with costs that take into account the “pain, grief and suffering” of all those involved in road crashes.

**Current knowledge**

The Transport Research Laboratory report indicates that road crash costs expressed as a percentage of GNP ranged from 0.3% in Vietnam to almost 5% in the USA, Malawi and Kwa Zulu, Natal. Further the report produced a crude estimate of global and regional costs, assuming that the annual cost of road crashes is about 1% of the GNP in “developing” countries, 1.5% in “transitional” countries and 2% in “highly motorised” countries. A global estimate of US$518 billion was produced (Table 5).

<table>
<thead>
<tr>
<th>Region</th>
<th>Regional GNP 1997</th>
<th>Estimated annual crash costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub total</td>
<td>5,615</td>
<td>64.5</td>
</tr>
<tr>
<td>Highly motorised countries</td>
<td>22,665</td>
<td>453.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>517.8</td>
<td></td>
</tr>
</tbody>
</table>

**Table 5:**

**Road crash costs by region (US$ billion)**

<table>
<thead>
<tr>
<th>Region</th>
<th>Regional GNP 1997</th>
<th>Estimated annual crash costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub total</td>
<td>5,615</td>
<td>64.5</td>
</tr>
<tr>
<td>Highly motorised countries</td>
<td>22,665</td>
<td>453.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>517.8</td>
<td></td>
</tr>
</tbody>
</table>

Source: Jacobs et al, 2000

**Gaps in Knowledge**

As evidenced from the material presented, some data on the global and regional burden of road traffic injuries are available. Arguably, despite the deficiencies in these data, some might argue that there is sufficient information to both show that the burden of road traffic injuries is substantial and to argue for the allocation of greater resources to address the current and predicted burden. However, it could equally be argued that the quality of the data is poor and provides only limited reliable information about high-risk regions and/or populations to whom scarce resources might be targeted.

Gaps in knowledge about the burden of road traffic injuries, include:

- Lack of reliable and valid mortality estimates, particularly in low-income countries
- Limited information available on mortality by types of road users
- Minimal information on morbidity, even for more severe injuries
- Little reliable or valid information about longer term sequelae of road traffic injuries, from which estimates of disability (including disability adjusted life years lost) can be made
- Almost no information on morbidity or disability by type of road user
- Only limited data on economic costs of road traffic injuries within countries
• Little reliable information on differentials in costs between lower and higher income countries (including social costs)
• No information on costs by type of road user

ANALYTICAL EPIDEMIOLOGY

Overview of Potential Risk Factors for Road Traffic Injuries

The causes of road traffic crashes and, in particular, road traffic injuries are clearly multi-factorial and involve a complex interplay between pre-crash, crash and post-crash factors, in relation to individual, vehicle and environmental (both physical and social) factors. This section aims to summarize current knowledge about potential causal factors during the pre-crash and crash phases. In particular, this section focuses on knowledge derived from robust epidemiological studies (e.g. cross-sectional studies, case-control studies, cohort studies and intervention studies) and also identifies studies that have examined risk factors for road traffic injuries in low-income countries. However, in relation to the latter, a comparatively recent review of epidemiological studies in the developing world identified only one controlled study among 73 studies that were identified. (11)

Data Sources

Well-conducted meta-analyses, and/or systematic reviews provide an ideal primary source for accessing data about the current state of knowledge of risk factors for road traffic injuries. Some such meta-analyses have been conducted under the auspices of the Cochrane Injuries Review Group, while others have been undertaken and published by independent researchers.

In the absence of such meta-analyses or systematic reviews, primary studies, including theses and dissertations, provide the next source of enquiry. While increasingly well-conducted epidemiological research is published in peer-reviewed journals, much of the literature on road traffic injuries has and still continues to be published in non-peer reviewed reports that are not easily accessible through traditional computerized health and medical databases, such as Medline. However, an increasing number of reports are included in computerized databases maintained by organisations such as the OECD and the Transport Research Laboratories (at a cost that is likely to be prohibitive to many in low-income countries). Unfortunately, it is probably still the case that research published in languages other than English is unlikely to be included in these databases, thus minimising the chances that research conducted in non-English speaking countries is included in systematic reviews or in some of the databases described above.

Current Knowledge

A systematic review of all the available evidence on risk factors for road traffic injuries is clearly beyond the scope of this background paper. The paper instead identifies risk factors for which there is consistent evidence from robust epidemiological studies and highlights in particular those factors for which there is any information from studies conducted in low-income countries.

Individual risk factors (associated with increased risks of road traffic injuries)

• both acute alcohol consumption and regular/usual alcohol consumption [shown in low-income countries also (7, 12 – 14)]
• other drugs and medications
• speeding [shown in low-income countries also (14)]
• non-wearing of seat belts
• non-wearing of motorcycle and bicycle helmets [shown in low income countries also (15)]
• mobile phone use
• non-conspicuity (of motorcyclists)
• minimal driver experience
• carriage of peer passengers (for young drivers)

Vehicle factors

• absence of seat belts
• smaller vehicle size (for vehicle occupants)
• larger vehicle size (for vulnerable road users)
• older vehicle age
• poor vehicle conspicuity (for motorcycles)

Environmental factors

• higher traffic speed and traffic density
• one way streets and multi-home driveways (for child pedestrian injuries)
• play area not fenced off from driveway (for child pedestrians)

Gaps in Knowledge

In summary, as can be seen from the information presented, very few aetiological, epidemiological studies have been undertaken in low-income countries. Additionally, aetiological (epidemiological) information about the role of vehicle and environmental factors is limited. Lastly, while most studies provide data on relative risks, few provide data on population attributable risks, i.e. combine data on relative risk with data on the prevalence of risk factors in the population at risk. While it is feasible that relative risks observed in higher income countries may also be observed in lower-income countries, it is highly unlikely that the prevalence of risk factors in high income countries will mirror those found in lower-income countries.

THE ROLE OF PUBLIC HEALTH IN ADDRESSING GAPS IN KNOWLEDGE ABOUT THE BURDEN AND RISK FACTORS FOR ROAD TRAFFIC INJURIES

As outlined in the previous sections, road traffic injuries clearly represent an important threat to public health globally and especially in low and middle-income countries. While the issue of safety is and should be on the agenda of the transport sector, so must this issue also be on the agenda of the health sector. Knowledge about the burden and risk factors for road traffic injuries is not the exclusive domain of any one sector, but for too long the public health sector has paid only minimal attention to this issue. While the public health sector has contributed significantly to our knowledge about the burden and risk factors for other health and medical conditions, it also has the potential to contribute significantly to knowledge about the burden and risk factors for road traffic injuries.

In an attempt to redress the comparatively minimal role of public health in road traffic injuries, WHO is in the process of defining a strategy for the prevention and control of road traffic injuries globally, with a special emphasis on low-income countries. The development of a defined strategy is critical, given both competing needs and expectations and limited resources. The strategy will need to consider:

• gaps in knowledge (as identified previously)
• current and planned efforts in the public health sector (especially in low income countries)
• current and planned efforts and expertise in the transport and other sectors
• opportunities for collaboration and co-ordination within the public health sectors and with other sectors
• the most appropriate balance between the needs for descriptive information, aetiological information, information about effective interventions and the need to implement known effective interventions
• the available public health expertise and opportunities for capacity development in both public health and road traffic injuries, especially in low income countries
The strategy will need to be sustainable and address long term goals, rather than focusing on “quick-fix” solutions. It must also facilitate the continued development of a strong evidence-base, rather than perpetuate solutions or options that seem reasonable, but for which there is little evidence. Finally, mechanisms will need to be incorporated, to ensure that both the components of the strategy are being implemented and that reductions in the burden of road traffic injuries are occurring.

REFERENCES

INTRODUCTION

In the 1960s and 70s strong emphasis was placed on attempting to make the individual road user behave correctly at all times. Now there is recognition that accidents and injuries result from a combination of factors, the road user being only one of many. This has lead to a systems approach, recognizing that combinations of factors come together to cause accidents and injuries, and thus countermeasures similarly may well have to be applied in combinations. In parallel with that development has been the spread of responsibilities from Ministries of Transport to many other agencies and organisations at local, national and international levels.

In some countries sharing responsibilities both vertically from national to regional and local levels, and horizontally across private and public sectors and professional groups has made advances. These moves illustrate how new divisions of responsibilities can create new and effective strategies for road accident reduction, illustrated for example by the Sustainable Road Safety program in the Netherlands and Vision Zero in Sweden.

HISTORICAL BACKGROUND

In trying to summarize and generalize about a complex subject such as road safety strategies there inevitably are contradictions and omissions in what is said. This section takes the last three decades and attempts to isolate some overall characteristics about the road safety sector.

1970s – At the national level the management of road safety was seen exclusively as a matter for the public sector, very predominantly within Ministries of Transport. Police collected the basic data but without a responsibility for conducting complete investigations, only addressing the more limited issue of whether a crime had been committed. Other than in general summary form that data was not generally or freely available to interested groups outside the ministries, and there with little research conducted other than within transport ministries themselves. Thus there was largely a public sector monopoly in road safety research and the introduction of countermeasures.

The health sector was almost totally absent on road safety issues. The management of road safety rested with the central government and regional and local authorities but without any coherent strategies at the national or local levels.

At the international level there were co-operative programs through OECD and WHO for example, both largely government to government in structure, and there were somewhat more specialized activities such as the Experimental Safety Vehicle initiative. The first generation of US standards and EU Directives on vehicle design were formulated and introduced.

Great emphasis was placed on the individual responsibility of the road user to cope with the highway system. Retribution was seen as an effective road safety policy, generalised propaganda and driver training were emphasized, and highway authorities had no liability for sub-standard design.
1980s

The worldwide growth in vehicle ownership generated increasing numbers of traffic accidents and injuries and heightened concern within the public and at the political levels nationally about road accidents. Seat belt use regulations and drink/driving laws demonstrably had major benefits; media and consumer group interest increased, and there was a rise in the plurality of research activities, notably at universities, in the insurance industry and with car manufacturers. Some governments began to separate the research and evaluation functions from the operational aspects of the highway agencies.

Target setting at the national level for specific reductions in casualties was adopted by some national governments. Specific local and regional programs with dedicated road safety budgets and targets began to be introduced. Health sector professionals in many countries became more involved in casualty reduction programs.

1990s

Target setting for casualty reductions became more widespread at the national level as it was shown to be demonstrably effective in raising political awareness and encouraging the introduction of science-based effective countermeasures. In countries with high rates of growth and increasing numbers of casualties however, setting an absolute number for a reduction in road casualties is impractical. One approach, used by Malaysia for example is to project a “do nothing” trend line and aim for say a 20% reduction in five years time below that projection. Private sector initiatives within the insurance and car industries, and co-operative private/public activities such as EuroNCAP developed. The Vision Zero aspiration was articulated in Sweden.

In general the 1990s saw continuing diversity in research programs and a shift towards cost-effective measures and criteria and the more scientific evaluation of road safety programs at national and local levels. Some tentative efforts began to address the needs for better data, such as the CARE program in Europe, but openness to data sources remained limited. Government health sector involvement remained tentative.

THE CURRENT SITUATION

From this rough and ready summary of the last 30 years what useful principles about sharing responsibilities for road safety can be deduced?

Data Collection and Data Quality

Those who ignore history are condemned to repeat it. The same is true if you have inadequate data. Police data must not be considered as the only data source for adequate knowledge about the specifics of accident and injury causation, and the epidemiology of road accidents. Comparison studies of police and hospital records show gross under-reporting of several casualty classes. Police data by its very nature cannot provide the in-depth information necessary to evaluate highway design and behavioural causation issues, nor vehicle design and the biomechanics of injuries. However, only police departments are capable of collecting traffic crash data from all parts of the country on a regular basis and therefore it is a good source for primary data analysis. It can provide a basis for selecting samples for in-depth studies on different issues at secondary and tertiary levels. The use and meaning of different variables must always be understood in the context of the primary purpose of recording and background of the person recording it.

Adequate data is fundamental to science-based strategies and their evaluation. Building basic data collection systems will help to raise the awareness of politicians and opinion formers at every level. This is an area where WHO initiatives can have great added value. It could be based on police data or on hospital data combined, but limited to those data elements which are simple and objective. Beyond that, longer-term programs based on sampling of specific accident types, injury patterns or specific environments will be necessary. This would involve sharing responsibilities between health and
transport sectors and developing public/private partnerships in specific projects and in in-depth crash investigation.

Knowledge-Based Strategies

Transport safety is demonstrably a science. Effective policies whether at international, regional, national or local levels involve the use of the five strategies of:
- exposure control
- crash prevention
- behavioural modification
- injury control
- Post-crash management

Within this framework sharing of responsibilities will vary between public and private organisations.

The Systems Approach

At present we are seeing a shift in thinking about road traffic accidents which is of fundamental importance. It has long been accepted in other activities such as industrial safety, the railways and aviation that the operator (be he pilot, driver or skipper) is only one part of a dynamic system, with his specific limitations as to performance over time, effects of fatigue and alcohol, and predictable error rates. Therefore the other parts of the system, in this case the highway, the vehicle and the traffic management components must be designed with a recognition of the limitations of road users. This is contrary to the historical view that road users through training, supervision and retribution can cope with the demands of traditional highways without causing accidents. From that view it follows that when accidents do occur they are the responsibility of the individual road user. The systems approach on the other hand recognizes the variability of road users and their intrinsic limitations and seeks to minimize the consequences by failsafe design and operation.

This systems approach for road transport has been articulated in policy terms most clearly in Sweden, but is inherent in the current programs of a number of other countries such as the Netherlands and Finland. It is that those who build and operate the highway system, together with vehicle manufacturers, those who write rules and regulations and those who use the system professionally, exert a substantial influence on road safety.

"In order to achieve a safe road transport system, there must be a change in our views concerning responsibility, to the extent that system designers are given clearly defined responsibility for designing the road system on the basis of human capabilities, thereby preventing the occurrence of those cases of death and serious injury that are possible to predict and prevent" (Committee of Inquiry into Road Traffic Responsibility, Stockholm, 2000).

Costs and Effectiveness

As a subset of the more scientific approach, cost-effective analyses are increasingly being used for justifying expenditure on road safety countermeasures. Within the EU Commission’s program of action for 1997 – 2001 for example, a level of one million EUROs is proposed for the criterion for an activity, which will prevent one fatality. Whilst one can debate whether that number realistically reflects the social costs of a fatality and the associated other levels of trauma which came with each accident in which there is a fatality and the other accidents which occur proportionally with each fatality, nevertheless cost-effective evaluations are a useful tool in examining where best, within the system, solutions can be applied and who therefore is responsible for applying them.
A Philosophy for Shared Responsibility

Within the view of a systems approach and the application of a rational, target-based strategy for road accident reduction, it is clear that responsibilities extend much further than the historical approach of the individual road user and the Ministry of Transport. What is a new approach for Europe seeks to create linkages between private and public organisations at EU, national, regional and local levels. There may well be aspects of this approach, which are applicable elsewhere. Such activities, for example are EuroNCAP, a grading system for the crash performance of new cars initiated by consumer organisations but now supported largely by the FIA and the European Commission; the Finnish insurance companies initiative in providing a national accident investigation service and accident data base through VALT; the Folksam Insurance Company’s ratings of vehicle crash performance in accidents, and many private/public partnerships at the local level to address specific problems. Many of these activities can have applicability in other countries.

Accountability

Implicit in sharing responsibilities for road safety is accountability. Many years ago, when giving evidence in court, a well known traffic engineer in England, John Leeming, noted that when a driver was found guilty of defective driving he was fined and sometimes sent to jail - should not a county highway engineer if responsible for a defective junction design receive similar treatment? At the time that was considered highly subversive. This point illustrates some of the consequences of the shared approach but it logically follows from the recognition that the driver is only one element in an interactive system. Used correctly, accountability can be a great incentive for the introduction of best practice procedures as it strengthens the hand of the professional engineer or designer. Thus local authorities, hospitals, police and all other organisations with an interest in road safety should define explicitly and accept what their responsibilities are. In principle it places the onus on such organisations to use current best practices.

In some countries a number of ways are being explored to make explicit where the various responsibilities lie. Contracts between national and local governments are one such approach; auditing of performance over time is another. In Sweden a specific Road Traffic Inspectorate is being set up which will apply quality assurance assessments to traffic safety.

HOW TO INITIATE SHARING OF RESPONSIBILITIES –Specific Opportunities

Questions of Scale

In developing an effective systems approach and creating the linkages between the various entities the issues of scale are fundamental. At the level of a community of say 20,000 people a vision zero target (zero fatalities per year) is a practical objective in the near term. This probably applies across countries and communities at almost every level of motorisation. It is a concept and target which local leaders, politicians, company executives, health and education professionals and traffic managers can appreciate and promote, and with appropriate countermeasures enacted, expect a good success rate.

In larger communities and at the national level competing claims from other social issues; unemployment, crime, social deprivation and education mean that road safety initiatives are harder to launch. It is at this level that demonstration projects are important to illustrate what can be done by a new division of responsibilities. It is at this level that target setting for casualty reductions becomes an appropriate policy.

At the professional and academic level issues of shared responsibilities need to be examined. For example road engineering measures need to be more compatible with vehicle characteristics and vice versa. Road surface and tyre characteristics need to be more compatible, vehicle design and roadside barriers need to be co-ordinated better. The ways in which road user behaviour is influenced by road
design and appearance needs to be examined. The relationships between accident risk, mobility and land use are poorly understood. The role of the systems engineer in accident investigation in the context of aviation is well established, in the road environment there is a need to build a body of knowledge, which will apply the same principles to road traffic. Many of these issues have strikingly different characteristics in countries where the levels of motorisation are different. Hence appropriate policies for accident reduction need to have recognize these underlying differences.

CONCLUSIONS

At present there is no single organisational framework, which can be identified which designates how responsibilities can best be shared between all of the players. Indeed who the players are varies according to the level at which road safety issues are addressed, whether at local, regional, national or international levels. What can be said is that effective strategies for dealing with traffic accidents at whatever level requires the involvement of all those who carry some responsibility for road safety whether they currently realize and accept that or not. The list is long:

- Land use planners
- Those involved in the design, management and maintenance of roads
- Shops, factories, residences, schools whose sites are affected by traffic
- Vehicle manufacturers
- Vehicle insurers
- Fleet operators
- Employers
- Those who educate, train and advise road users
- Those who make laws and regulations governing the road systems
- Those who enforce such laws and regulations
- The emergency services
- The medical profession who deal with traffic injuries
- Those who deal with rehabilitation
- Crash investigators
- Transport safety research workers
- Government at local, provincial, national, regional and international levels

How such constituencies and organisations can contribute varies according to the level at which action is aimed. What is clear however is that a systems approach involving private and public sectors at every level is the likely way forward.

The systems approach assumes new dimension in the present context of experts working in narrow field of specialization. Transportation and traffic safety is an intrinsic characteristic of a given system. However, transportation and traffic planners continue to focus on capacity augmentation and congestion relief measures in isolation. They often have limited understanding of the principles of safety science. Similarly, safety experts have poor understanding of mobility issues. With the growing concern of adverse impacts of air pollution on human health, environmental experts have added yet another dimension to transportation system. These different expertise systems have to be merged together to ensure safe and clean transportation system.

Motorised vehicles are designed to operate at much higher speeds for better fuel economy and emission levels. Roads are also designed to increase throughput of motorised vehicles only. These measures decrease safety of NMV occupants and pedestrians sharing the same road space. Environment and sustainable transport experts are worried about increasing share of car ownership levels and decline in public transport and NMV trips. There is ample evidence to show that if public transport use has to be promoted in cities much more attention has to be given to the improvement in safety levels of bus commuters (in low income countries) and the non-motorised transport segment of the road users. This is particularly important because promotion of public transport use can also result
in an increase in the number of pedestrians and bicycle users on city streets. Unless people actually perceive that they are not inconvenienced or exposed to greater risks as bicyclists, pedestrians and bus commuters it will be difficult to reduce private vehicle use. In LIC cities non-motorised modes of transport already constitute a significant proportion of all trips. It will be difficult to increase this share of public transport and non-motorised modes unless these modes are made much more convenient and safer.

The systems approach has to be redefined in the context of low-income countries to integrate the concerns for mobility, clean environment and safety of economically diverse groups. A large section of the population, which is dependent on walking, bicycling and public transport has to travel for survival, to access income-generating opportunities. A safe transport system has to fulfil the mobility requirements of this group along with clean environment policies.

**Vulnerable road users (VRUs) are the ‘critical element’ in the city transport fabric**

If the needs of VRUs are not met by the urban transport infrastructure, mobility of other modes gets affected adversely. Despite low level of vehicle ownership, high share of public transport and presence of NMVs, the concentrations of various pollutants exceed levels permitted by WHO standards for ambient air quality in most cities in low income countries. Urban transport system in low income cities can become sustainable, providing mobility with minimal adverse effect on the environment, only if it provides safe and affordable transport for all sections of the population. Nearly 50% of the population in these cities needs to live close to place of employment. They need inexpensive modes of travel to work for survival. If the planned transport system does not provide for their travel needs, they are forced to operate under sub-optimal conditions. They continue to exist at places, which have not been planned for them. Consequently, landuse and transport plans are violated and all modes of transport operate under sub-optimal conditions. It is evident that investments in projects, which benefit only the car users, have not been able to improve urban speeds. Congestion relief has been short lived due to the impact of latent travel demand. Construction of capital intensive systems like Metro (MRTS) has also not had lasting improvement on congestion and air pollution. In fact, some of the intended congestion relief measures (construction of flyovers, expressways) may have contributed to the increase in NMV and pedestrian fatalities due to increased speeds. The experience of past decades of long term integrated landuse transport plan exercise suggests that the existence of informal sector and their travel needs must be recognised for preparing effective plans. This should encourage mixed landuse patterns and transport infrastructure especially designed for bicycles and other non-motorised modes.

**Highway Safety**

The presence of small towns and villages along the main highway changes the character of highways in low-income countries. Speed, volume and density data on highway sections away from village and towns, which create friction, show the absence of delays and low speeds. Often, when long distance traffic passes through villages, which create friction, show the absence of delays and low speeds. Wherever local traffic and conflict between local traffic and long distance traffic results in lower speeds and low level of service. High speed facilities through towns or villages also create unsafe conditions for local traffic. Capacity improvement and speed improvement is given higher priority than safety of local traffic. This is evident in the designs of pedestrian crossings and fences along the medians in recent highway construction. Pedestrian overbridges and underpasses are designed to ‘remove’ the impediments to the motorized traffic, and not to facilitate the movement of pedestrian traffic. Similarly on divided highways high fences are constructed to prevent pedestrians crossing the road instead of providing safe refuge to them while crossing the road. There are ample examples from Asian and African countries illustrating the weakness of such designs. However, very little research and experiments have been done to understand these issues. One can expect improvement in level of service (LOS) of a given highway by resolving the conflict between local traffic and long distance traffic sharing the carriageway. This may require a different cross-section design of the highway.
Generally slow moving vehicles—such as bicycles, tractors, animal carts, etc.—are not present in large numbers (low flow rates compared to other motorised vehicles) on inter-city highways in low-income countries. However, because of low speeds, they have much higher shares in densities as compared to volume shares. They consume large capacity of the road because of low speeds. Their presence on the main carriageway even if it is in small numbers, results in reduced capacity of the highway. In a four-lane highway, slow moving vehicles occupy side lane and only the middle lanes are available for fast motorised vehicles.

The future highway designs must account for the users of different transport modes having conflicting requirements. The new highway designs must account for motorised vehicles needs of clear roads for uninterrupted traffic flow, at the same time they must address the needs of bicyclists and pedestrians of shady trees, kiosks for drinks, food and bicycle repair shops etc. at shorter distances. Highway planning standards provide for services needed by motorised vehicle users. However, there are no standards for providing services needed by NMT. These services mushroom along urban or inter-city highways to fulfill the demand of road users, however their existence is viewed as "illegal encroachment" on the designed road space.

Urban arterial roads passing through the commercial development and highways passing through small towns serve multiple purposes. They carry through traffic. However, the adjacent land use generates cross traffic and demands multiple space usage, for example, space for parking vehicles, space for hawkers and informal shopping etc. The existing design standards do not account for the conflicting demand between the local traffic and through traffic resulting in sub-optimal conditions for both kinds of traffic.

There is a need to accommodate the conflicting requirements of NMV occupants and pedestrians and motorised traffic on our urban and inter-city highways. This includes redesigning the road cross section setting more exclusive space for pedestrians and NMVs and giving pedestrians and bicyclists priority over cars at certain places.

CANDIDATE AREAS FOR WHO PROGRAMMES

Vulnerable Road Users

In low-income countries the majority of casualties are not vehicle occupants; they are pedestrians, cyclists and riders of motorised two-wheelers. Most are killed and injured in urban areas, especially in the fast growing mega cities of Asia and South America. Successful remedial programs involve the recognition of the specific needs of these groups of road users, e.g.:

- Traffic segregation
- Traffic calming
- Specific provisions for pedestrians crossing roads
- Better night-time vision conditions
- Planning and land use requirements of VRUs
- Crash helmet use by MTW riders
- Leg protection of MTW riders
- Visibility of cyclists and MTW riders, especially at night
- Car, bus and truck exterior design relating to VRUs

For most of these areas the successful remedial measures are well defined. However because of the diversity in socio-economic conditions, high density of villages and towns along the highway and heterogeneous nature of traffic in low-income countries, traffic engineering solutions in the areas of traffic calming and segregation need to be developed specifically for such traffic conditions.
Alcohol and Drug Use

Successful countermeasures have been applied in Australia and some European member states, although not in many other motorised countries such as the United States. High rates of detection of drinking and driving require an efficient infrastructure of policing and strong political commitment. In several Australian states for example, on average every driver can expect to be tested at least once each year. Such a countermeasure will be more difficult to apply in countries without such effective policing. However, behavioural modification programs coupled with better deterrence of drinking and driving behaviour have applicability.

Restraint Use

The use of seat belts and child restraints is a demonstrably effective countermeasure. The health sector could take a specific lead in encouraging child restraint use, particularly at the pre- and post-natal stages. General seat belt use through mandatory seat belt laws has been shown to be practical and effective in countries at many levels of development and becomes increasingly important with the growth of car ownership. Because car owners in developing countries are also the most affluent and likely to be the opinion formers within their communities, there is a beneficial spill-over effect from the acceptance of seat belt laws on other road safety issues.

Sustainable Transport Strategies

Traffic safety must be recognized as an integral part of sustainable transport policies. Current transportation policies in mega-cities worldwide lead to major threats to health; through traffic injuries, air pollution, noise, and reduction in physical activities, adverse impact on urban quality of life and by contributing to climate change. There is an urgent need for preventive strategies that address the whole range of health and environment impacts of transportation policy options, which are available to large cities in emerging economies. Even though we have evidence of health impacts of a few traffic-related pollutants and risks, there is little knowledge about the health benefits of certain transport modes and strategies; no methods to consider these risks and benefits jointly; and no tools for taking account of the synergies and conflicts for health and environment of alternative transport policies. Implications of traffic safety as a health problem must be understood along with air pollution, noise etc. This is possible by creating cross-sectoral research opportunities and database involving health, transport and environment.
INTRODUCTION

In many motorised countries, advocacy by individuals and groups plays an important role in reducing motor vehicle crash deaths and injuries. Highway safety advocates typically were active well before governments became involved. For example, in the United States the National Safety Council had become active by the 1930s. But it was not until the late 1960s that the U.S. federal government played a significant role in highway safety.

Advocacy continues to be important today, even in a country like the United States that has significant government programs, both federal and state, aimed at reducing motor vehicle crash losses. Among other things committed advocates can raise the consciousness of the public, which typically is apathetic about motor vehicle crash deaths and injuries, and prompt governments to address neglected highway safety problems with effective countermeasures.

But highway safety advocacy does not always have positive effects, and in some circumstances it can be harmful. For example, well-intentioned advocates in the early days of highway safety in the United States claimed “ownership” of solutions to the problem, which actually delayed progress. These advocates promoted ineffective countermeasures while, at the same time, ignoring or opposing other approaches that did not fit within the prevailing highway safety paradigm. This delayed the adoption of many countermeasures that subsequently have been shown to be effective. Eventually other advocates, in particular some committed physicians, challenged the prevailing wisdom and succeeded in getting their ideas implemented. Their more enlightened advocacy directly resulted in the adoption of a number of important countermeasures such as safety belts in cars.

Today the contributions of advocates continue to be mixed. Many who have embraced the notion of scientifically supported countermeasures are making important positive contributions, but there still are people and groups who advocate unproven or even discredited solutions.

Organisations working to promote highway safety around the world need effective local advocates, but their advocacy must be based on science and engineering, not wishful thinking. There is an important need for education and training in this regard — not the ineffective education and training of drivers that incorrectly continues to be widely promoted, but instead education and training of the advocates themselves. Successful advocates do not need to be researchers or engineers, but they do need to understand the scientific underpinnings of effective countermeasures. They need to recognize what does and, perhaps more importantly, what does not work.

To illustrate I will review some good and bad examples of highway safety advocacy, primarily from the United States.

Background

A brief history of some aspects of advocacy provides a useful background. By the late 1920s about 30,000 motor vehicle deaths were occurring each year in the United States, and they were increasing rapidly. The death rate per 100 million miles was about 16, and the rate per 100,000 population was about 27. Motor vehicle crash deaths and injuries were already a significant — and growing — public health problem, but at that time it was not considered a medical problem. Instead it was a “safety” problem, and the National Safety Council, which then (as now) depended on volunteers to conduct
much of its work, played a key role in setting the early highway safety agenda. The people involved in these activities were all advocates, and I am sure they all believed strongly in what they were doing. But it was largely ineffectual.

The highway safety paradigm for the United States adopted in the 1920s, and the one that continued well into the 1960s, was “The Three Es,” which referred to enforcement of traffic laws, education of motorists, and engineering of highways. Today it is easy to recognize one glaring omission, which is that the engineering “E” did not include vehicles. Perhaps you might think the rest is not so bad. After all traffic law enforcement is important, driver education cannot hurt, and engineering highways to make them safer is clearly good. You would be wrong, however. Traffic law enforcement was the “E” perhaps most likely to make a difference, but even here the original concept was flawed. A necessary component for traffic laws to actually change motorists’ behaviour, and in turn reduce crash losses, is the perception by the motorists of a significant risk of being apprehended for a violation. This perception is rarely achieved without some significant publicity about the laws and their enforcement.

The second “E,” educating motorists, was even more ineffective. There now is overwhelming evidence that education and/or publicity aimed at motorists does not reduce crash losses (more on this later). However, these activities were the focus of highway safety for almost 50 years.

The third “E” — highway engineering, or building roads to reduce the likelihood of crashes — is not particularly effective except for limited access divided highways, which were not part of the early U.S. road system. Engineering to make roadsides less hazardous by eliminating hazards alongside the road or using guard-rails, etc. so that when motorists did crash the consequences would be less serious, was not considered part of the engineering “E.” This road engineering mindset continued for a very long time. In the late 1960s a senior federal official responsible for highway construction, in response to pleas for forgiving roadsides, stated that “nice people do not drive off the travelled right-of-way.” (1) As late as 1972 the National Safety Council made available a “safety” poster with a picture of a roadway lined with trees and utility poles. The poster’s caption was, “They don’t hit you!”

“The Three Es” approach was geared entirely to accident prevention. Nowhere was there room for countermeasures to reduce motorists’ risks during the crash. Thus in the early 1960s when safety belts first began appearing in cars, members of the safety establishment who were strong advocates of education did not believe that trying to educate motorists to use belts was appropriate because it did not promote accident prevention!

Even though groups like the National Safety Council, in effect, “owned” the highway safety problem for many decades, other advocates recognized that there was more to highway safety than accident prevention. In particular they focused on the importance of reducing risks during the crash. Physicians such as Claire L. Straith, a Detroit plastic surgeon who treated people injured in car crashes, was an early advocate of safety belts and other car designs to reduce crash injuries. (2) But getting belts in new cars took a long time from the first efforts in the 1930s. In 1953 the American Medical Association adopted a resolution that “recommends to the motorcar manufacturers of America that they consider equipping all automobiles with safety belts.” A few years later the domestic automobile makers offered lap belts as optional equipment, but it was not until the mid-1960s that belts became standard equipment in response to state laws. (3) Although it took a long time to get safety belts, it would have taken even longer without the early advocacy of various individuals and, later, of medical groups.

As far as engineering roadsides to mitigate the consequences of running off the road, the pioneering advocate for this approach was a television repairman from New York named Joe Linko. Starting in 1963 he began a personal crusade against roadside hazards. As he drove around the New York area he took pictures of the hazards he saw and contacted state and local highway officials. Nothing happened until 1967 when Linko showed his photography to a Congressional subcommittee with jurisdiction over the Federal Highway Program. (4) Linko’s testimony led to recognition of how widespread this problem was, including on newly completed and soon-to-be-opened sections of the interstate highway system, the most up-to-date roads in the world at that time. Linko’s advocacy
By the 1960s a growing number of influential advocates held broader views of highway safety than those espoused by the National Safety Council and other members of what, by then, had become known as the “road safety establishment.” Many of the enlightened advocates were physicians, including William Haddon, Jr., who edited Accident Research,\(^5\) the first compendium of important and illustrative examples of research in this area. There was Ralph Nader, a lawyer and perhaps the most famous advocate for vehicle safety improvements and author of Unsafe at Any Speed.\(^6\) A third activist was Daniel Patrick Moynihan (this was sometime before he became the eminent and well-respected senator from New York), who described some of the characteristics of the advocates who challenged “The Three Es” paradigm:

> Three qualities are uppermost. First with but few exceptions they were well-educated men, having attended first-rate universities. Second, to quite an astonishing degree they were trained to a profession. These professions varied widely — law, medicine, engineering, social science — but they shared a sense of commitment to personal standards of ethical conduct. Thirdly to quite a surprising degree these were persons with few institutional connections.\(^7\) 

The road safety establishment, which had become institutionalised (and by now included car company representatives), did not listen to these individuals. Instead it challenged their ideas. For example, in the keynote address at the 1961 National Safety Congress, the then-president of General Motors declared:

> The traffic safety field has in recent years been particularly beset by self-styled experts with radical and ill-conceived proposals.... The general thesis of these amateur engineers is that cars could be made virtually foolproof and crash-proof, that this is the only practical route to greater safety and that federal regulation of vehicle design is needed.... The suggestion that we abandon hope of teaching drivers to avoid traffic accidents and concentrate on designing cars that will make collisions harmless is a perplexing combination of defeatism and wishful thinking.\(^6\) 

It is reported that this criticism of “self-styled” experts was well received by the audience and subsequently circulated widely. Nevertheless, the self-styled experts (or enlightened advocates) prevailed, and just six years later federal regulation of vehicle designs for safety became a reality.

Nader, Moynihan, Haddon, and others played key roles in getting the U.S. Congress to enact the legislation in 1967, which for the first time gave the federal government significant power to regulate motorist behaviour (such regulation previously had been handled exclusively at the state level) and to set safety standards for new vehicles and highways. Haddon became the first federal highway and vehicle safety chief, and he quickly replaced “The Three Es” with a new paradigm based on science. The centrepiece of the new approach was a matrix in which the human, vehicle, and environmental factors of a crash are shown interacting with the three phases of a crash — precrash, during the crash, and postcrash — to form a nine-cell matrix, which became known as the Haddon matrix (see figure on next page). Each cell in this matrix offers opportunities for intervention or countermeasures to reduce motor vehicle crash losses.

The greater breadth of the new paradigm compared with “The Three Es” is apparent. The prior approach focused all attention on only two cells of the Haddon matrix, precrash human and precrash environment (accident prevention by improving drivers and roads). The new approach focused on all nine cells. Equally important, it emphasized the critical need for countermeasures to be scientifically evaluated.

In retrospect, the early efforts were unacceptable not just because “teaching drivers to avoid traffic accidents” was the exclusive focus. The problem also was the attitudes of the early advocates. They
were so certain that educating drivers was the correct approach that there never was any need to measure effectiveness (or lack thereof) or consider alternatives.

Haddon Matrix

<table>
<thead>
<tr>
<th>Factors</th>
<th>Human</th>
<th>Vehicle and Equipment</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phases</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Precrash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postcrash</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The role of advocacy today

Today blind faith in any countermeasure should not be acceptable anywhere in the world. One very important lesson from the U.S. experience is that lives will be lost unnecessarily unless highway safety countermeasures are rooted in science or engineering. For example, even before field data repeatedly confirmed the lifesaving benefits of safety belts, their worth could be inferred from the physics and biomechanics of car crashes. Physicians and others understood this and advocated the installation of belts in cars. Yet this approach was resisted for decades because improving drivers was the approach. Today there is an awareness that motor vehicle crash deaths and injuries are more than a safety problem. They are recognized as a public health problem, requiring countermeasures based on science and engineering rather than wishful thinking. Most vehicle and highway countermeasures now have solid engineering and scientific underpinnings. The exception tends to be in the area of precrash vehicle countermeasures, where the benefits of some crash avoidance features (e.g., antilock brakes) are hard to project from engineering and test data, largely because the interaction between drivers and the vehicle features is difficult to predict.

When it comes to many human factors countermeasures, science still does not always prevail. Although a large body of behavioural research has evaluated a range of countermeasures aimed at motorists and other road users, approaches shown by this research to be ineffective still are frequently advocated and adopted. Effective countermeasures that change the behaviour of motorists and other road users are important and needed because improved vehicles and highways are not sufficient by themselves. But research shows that changing people’s behaviour is not easy to achieve. Perhaps because it is difficult and because behavioural science sometimes is considered less rigorous than physics, biomechanics, or other “hard” sciences, research is ignored and ineffective behavioural countermeasures still are promoted.
Advocacy, education, and training

Driver education was almost the exclusive focus of highway safety improvement efforts in the United States and elsewhere for 50+ years, and the evidence is clear it did not work. Yet it still is a favoured approach by many. Just as in the days of “The Three Es,” new educational programs are promoted and adopted today because their proponents “know” they will work.

The fact is, most highway safety educational programs do not work. They do not reduce motor vehicle crash deaths and injuries. Only a few programs have ever been shown to work, and contrary to the view that education cannot do any harm some of these programs have been shown to make matters worse. Education programs by themselves usually are insufficient to change behaviour. They may increase knowledge, but increased knowledge rarely results in appropriate behaviour change.

The belief that increasing motorists’ or other road users’ knowledge will produce behaviour change reflects a naive view of human behaviour. At one level all drivers know, for example, that ignoring stop signs and running red lights are inappropriate behaviours. Yet these obviously unsafe behaviours are commonplace. They are leading causes of crashes. Similarly, by now all motorists know that driving after consuming significant amounts of alcohol increases crash risk. Yet millions of trips are taken each year by seriously impaired drivers.

Ways to teach beginners the skills to drive obviously are needed, and driver education is a way to teach such skills. But it should not be viewed as an effective way to reduce crash losses. In large part this is because skill deficiencies or bad driving is not what leads to most crashes. Instead the problem is more likely to be deliberate lawbreaking prompted by attitudinal factors and assumptions about risk. Research in the early 1970s showed that a group of highly skilled competition race drivers actually had worse on-the-road crash records than a group of average drivers.(8)

Because poor driving has much to do with attitudes, safety messages and slogans (“Drive gently,” “Friends don’t let friends drive drunk”) can be expected to have no effect. In reality, the simplest educational message for safe driving would be, “Obey all traffic laws.” But such a message would not change behaviour unless accompanied by enhanced law enforcement. The fact that blatant disregard of many traffic laws is a leading cause of crashes highlights a longstanding finding of behavioural research in this area, namely that higher risk individuals who most need to change their behaviour are the most difficult group to influence through education. This means that even when educational programs have some limited success, they typically fail to reach the higher risk groups. For example, some early educational efforts may have produced small increases in safety belt use, but the drivers most likely to be involved in crashes — young drivers, speeders, alcohol-impaired drivers, etc. — were least likely to respond to this education.

There are only a few conditions under which education is likely to be effective. For example, the behaviour of children generally is easier to change than that of adults, and some child pedestrian programs have been shown to be successful.(9) Educational programs also are likely to be more effective when the communicator has control over something of importance to the audience (e.g. maintaining a job).

Education is least likely to succeed when a desired behaviour has to be performed repeatedly. This is important because most of the behaviours we want motorists to change are ones that must be performed on every vehicle trip (e.g. do not run stop signs, use a safety belt, etc.).

The bottom line is that driver education and/or training programs do not reduce crash losses. A comprehensive evaluation of the worldwide driver education literature indicates that “no adequately conducted and analysed study...demonstrates a significant individual or community-level beneficial effect of driver education for high school-aged students.”(10) A review of motorcycle programs concludes that “the few evaluations that have been undertaken have generally produced discouraging findings and led many to question the value of formal motorcycle rider education and training as an
effective loss reduction measure."(11) A review of ways to increase bicycle helmet use concludes that “there remains little evidence that education alone, without additional incentives such as legislation or price manipulation, has produced major changes.”(12)

Educational programs not only waste resources but sometimes actually increase motor vehicle crash losses. This can happen by increasing exposure, in particular high-risk exposure, or by engendering overconfidence or somehow rewarding risky behaviour. For example, making driver education readily available in high schools can worsen the problem by increasing the amount of driving by teenagers without any compensating reductions in crashes. The net result is a crash increase.(10) Other driver education courses have been found to result directly in adverse outcomes. For example, among young males advanced courses that teach skid control, off-road recovery, and other emergency manoeuvres have produced drivers with higher crash rates than young males who did not take the courses.(11) This is thought to occur because the courses produce overconfidence and/or because the young people trained in such courses create opportunities to try out the advanced manoeuvres to show off their new “skills.” Similarly, a school-based bicycle safety education program found that those who took the course had increased injuries, possibly because of inadvertent encouragement to take risks and/or ride unsupervised.(12)

Despite such research findings, a wide variety of education/persuasion programs continue to be advocated. Such programs include high school driver education; motorcycle education and training courses; programs to increase safety belt and helmet use; and driver improvement programs for problem drivers, young drivers, older drivers, or drivers in general. Vast amounts of money have been spent on such programs, many of which have become institutionalised, so they continue despite overwhelming scientific evidence of their ineffectiveness. One example is the National Safety Council’s continued support for its “Defensive Driving Course,” even though research shows this approach is ineffective.(13)

Belief is widespread that education and/or training is effective, so it continues to be promoted at all levels. As part of the World Bank’s Global Road Safety Partnership initiative, a web page (GRSProadsafety.org) disseminates “good practice” for road safety. This site includes a list that “focuses on the key issues that you need to know about ensuring greater safety in transport.” Included is the following statement about driver training and testing:

> With road user error contributing to the vast majority of road crashes, the development of safe drivers, skilled in defensive driving techniques, should be the primary objective of any road safety program. Driving examiners in developing countries are rarely given special training and driving tests are an inadequate test of ability to drive safely in traffic on real roads.

Such statements are not based on scientific evidence and thus can be misleading.

Safety belt use, education, and advocacy

Getting safety belts in new cars was one of the early and important successes resulting largely from the advocacy of individual physicians and medical groups. But as belts became more widespread, observations indicated they were being used by fewer than 20% of motorists. This human failure presented another opportunity for the education of motorists, this time on the benefits of buckling up. From the late 1960s and continuing well into the 1970s, many safety belt education programs were tried, including several that were intensive. But as with earlier educational efforts, these programs rarely were evaluated, even though in this instance the outcome measures (changes in belt use) could easily be observed. On the rare occasions when belt use advertising or education was evaluated, it was shown to work. It became clear that education and/or advertising by itself is not an effective strategy to increase belt use.(14)

Research first from Australia, later many European countries, then Canadian provinces, and finally some U.S. states clearly shows that the only effective way to get most motorists to use safety belts is with good laws requiring their use. When laws are in place, education and/or advertising can be used to
inform the public about the laws and their enforcement. In some jurisdictions where the political support for good safety belt laws is not present, however, enthusiastic advocates continue to promote expensive and ineffective advertising approaches.\(^{(14)}\)

Educational activities often are supported by corporations anxious to be seen doing good things for highway safety. Corporate advocacy typically supports what I term “feel good” countermeasures. Many programs qualify for this descriptor, which basically refers to programs that offend no one (except perhaps safety professionals). Thus numerous corporations have produced trinkets of one kind or another (belt buckle key chains are very common) with corporate logos on them. Such trinkets are intended to promote safety belt use, but they do not increase belt use one iota!

Another example of corporate “feel good” advocacy is Shell Oil Company’s current promotion, through television and other advertising, of a series of booklets that provide “driving safety tips.” This kind of education will not reduce crash losses. The reality is that such advocacy is intended primarily to promote corporations’ images rather than to actually reduce motor vehicle crash deaths and injuries. As with any kind of advocacy, what corporations are practising will be useful if it promotes effective countermeasures. If it does not, then it simply will represent wasted resources as far as safety is concerned (though perhaps not a waste for the corporate image).

**Traffic safety laws, education, and advocacy**

Almost all of the demonstrable gains produced by changing road user behaviour have resulted from traffic safety laws. However, laws by themselves do not always change behaviour. They need societal support to be effective. The deterrent effect of a law is determined in part by the severity and swiftness of the penalty for disobeying it, but a key factor is the perceived likelihood of being detected and sanctioned. Some people will obey a law just because it is a law, but these people typically are not the drivers at high risk of crashing. Compliance with traffic safety laws is enhanced to the extent that the perceived likelihood of detection is high and a meaningful penalty is delivered with certainty and swiftness. For example, motorcycle helmet use laws produce compliance close to 100% largely because offences are so easy to detect.

Education and publicity can be important components of laws. They can help to develop the impetus to pass the laws in the first place. Education on the provisions and penalties of laws can increase their deterrent effects. Most important is that good publicity can help to generate support for enforcement programs — even supplement the programs — by increasing motorists’ perceptions of the risk of apprehension and thus also increase the deterrent effect of the law.

Advocacy often is critical in getting good highway safety laws enacted and enforced. For example, in 1982 the American Association for Automotive Medicine and Medical Society of the State of New York established the New York Coalition for Safety Belt Use. This group was influential in getting the first safety belt law enacted in New York in 1984, and then similar coalitions were formed in other U.S. states. Similarly a Tennessee paediatrician, Dr. Robert Sanders, was extremely influential in getting the first U.S. child restraint use law passed in 1977.

Probably the best known, and certainly the largest, highway safety advocacy group in the United States is Mothers Against Drunk Driving (MADD). It was formed in 1980 by a small group of California mothers after a child was killed by a hit-and-run driver who had multiple convictions for drunk driving. MADD quickly became a national advocacy group responsible for numerous changes (in most cases improvements) to various state laws aimed at reducing alcohol-impaired driving. But even in this area where enacting legal curbs against alcohol-impaired driving might seem straightforward, some of MADD’s earliest efforts were off target. The group initially focused heavily on increasing the severity of punishments for alcohol-impaired driving, even though research had shown that this can be counterproductive. The problem is that police and prosecutors who perceive that sanctions are too severe become less likely to arrest and/or prosecute offenders. Soon MADD did begin to focus on
countermeasures shown by good research to be effective, and this group continues to be a very powerful force in the fight against alcohol-impaired driving.

CONCLUSIONS

This brief sketch of some of the history of highway safety advocacy in the United States is relevant to the role of advocacy today. It shows that institutionalised advocacy, such as that promoted by the National Safety Council, was dominant for a long time, but it was largely ineffective. In contrast, the efforts of individual advocates such as Straith, Nader, Haddon, Linko, and others ultimately prevailed despite resistance by the establishment.

Does this mean individuals can be more effective than organisations or groups? The answer is no. Successful advocacy has everything to do with the ideas being promoted. “The Three Es” may have seemed reasonable (even today many people believe that countermeasures aimed at preventing crashes should have a higher priority than those aimed at reducing the consequences of crashes), but it was not effective because its focus was on ineffective approaches.

Advocacy will continue to have a role in highway safety. For it to contribute to reductions in motor vehicle crash deaths and injuries it must support countermeasures shown by good research to be effective. Yet even in highly motorised societies like the United States, strong support continues among some groups for ineffective behavioural countermeasures. The challenge for highway safety professionals is to ensure the same commitment to science-based countermeasures for human factors problems that now exists for problems associated with vehicle and highway factors. The education and training of advocates on what works and does not work is central to this challenge.

REFERENCES


Partnerships

RESEARCH COLLABORATION ON ROAD TRAFFIC INJURIES IN THE DEVELOPING WORLD
Adnan A. Hyder
Focal Point, RTI Collaboration
Consultant, Global Forum

A Group Supported by the Global Forum for Health Research

A research partnership between institutions developed from a June 1999 meeting in Geneva of the Global Forum for Health Research, during which the session “Road Traffic Injuries in Developing Countries” stirred enormous interest. Presentations from colleagues in Kenya, Mexico and Pakistan highlighted the potential for collaboration in this field. As a result of this meeting, an informal network was created and regular communication initiated by electronic mail. The “research collaboration” decided that the following activities would need to be done.

1. Formally establish and strengthen the network of partners committed to road traffic injury research
2. Conduct research on specific topics related to road traffic injuries and design, pilot test and evaluate measures, which can be taken to prevent the problem
3. Raise awareness of efforts to promote road traffic injury prevention and control
4. Promote and evaluate efforts to conduct public health research in low- and middle-income countries.

In April 2000 the first meeting of interested partners was convened in Kampala, Uganda to discuss ways to reduce the impact of road traffic injuries on health globally. During the Kampala meeting, the group proposed:

- Formation of active research groups for the development of specific proposals
- Mapping of donors and their priorities, as well as research groups in the field of RTI
- Promotion of more discussion and deliberation of RTI at policy level
- Mobilization of more funds to support activities related to RTI

These research groups initiated work after the Uganda meeting and began to develop concept papers (pre-proposals).

The research collaboration then had an informal meeting at the time of the International Conference in Bangkok, October 2000. The objectives of the informal meeting in Bangkok were the presentation of working pre-proposals to colleagues and donors and help their further development based on feedback. As a result of the discussions in Bangkok, the partners involved in the research collaboration decided that:

- Each specific proposal needs further work and the working groups should take serious note of the suggestions at the meeting
- The pre-proposals should be developed into full proposals (with budgets) by the next meeting of the collaboration, which should be held within 6 months
- The proposals should be completed and presented at the next meeting of the collaboration
- Potential donors should be invited to a special meeting of the collaboration to express interest in each of the proposals.

The second meeting of partners is being held 23-24 April 2001 in Geneva. The goal of the meeting is to facilitate completion of the research proposals. The specific objectives are:
• To facilitate the completion of 3 research proposals through a proposal completion workshop organized as part of the second meeting of partners
• To facilitate the meeting by calling upon experts within the partners to contribute to the development of research proposals
• To develop the plan for dissemination of completed research proposals to potential donors and funding agencies
• To strengthen the partnership by inviting partners to offer their field sites for research and forging greater links with WHO as well.

The research collaboration is currently working with a small “core group” of partners to develop research protocols and secure their funding. At the same time, the overall collaboration, email discussions and interactions are open. Other partners interested in research on road traffic injuries in the developing world are welcome to send their expression of interest and keep abreast of developments.

For further information contact Adnan Hyder at hydera@who.ch
THE RED CROSS AND THE RED CRESCENT SOCIETIES
WITH REGARD TO ROAD SAFETY
Eric Bernes,
International Federation of the Red Cross and Red Crescent, Geneva, Switzerland

To improve the lives of vulnerable people by mobilizing the power of humanity. This is the heart of the mission and work of the International Federation of Red Cross and Red Crescent Societies. The International Federation’s Strategy 2010 addresses the key issues of vulnerability, the need to support National Society capacity building and the desirability of building appropriate ties of cooperation and long-term partnerships with international organisations, including the UN, WHO, the World Bank, as well as with national and international business communities.

In nearly every country and for nearly all of its history, the Red Cross and Red Crescent has addressed the needs of vulnerable road users: the victims of road accidents, the poor, pedestrians, children, cyclists, motorcyclists, users of public transport, etc. Most recently, the Federation’s own 1998 World Disaster Report was instrumental in raising global awareness regarding the scale of the road safety problem: the large number of deaths, injuries and economic costs. It calls road accidents “a worsening global disaster destroying lives and livelihoods, hampering development and leaving millions in greater vulnerability.”

On account of its ongoing role in this field, the Federation Secretariat was invited to be a founding member of the Global Road Safety Partnership, which brings together stakeholders from civil society, government and the business community to pro-actively tackle the problems of road accidents in developing and transition countries. The World Bank initiated the program and the Federation Secretariat agreed to host the GRSP Secretariat as its objectives fit within the framework of Strategy 2010 and the Plan of Action outlined by the 1999 International Conference of the Red Cross and Red Crescent.

CAPACITY OF NATIONAL SOCIETIES WITH REGARD TO ROAD SAFETY

Many Red Cross and Red Crescent National Societies are already active in promoting road safety and responding with aid to victims. As a first step of mapping National Society competencies in this area, the Federation Secretariat undertook a survey of its National Society members during the summer of 1999. This Report reflects the findings of that survey and reflects the common experiences and challenges facing National Societies in this field. It also provides many new ideas and points of view on how National Societies could address the issue of road safety in the future.

The survey results demonstrate that Red Cross and Red Crescent Societies have the key competencies in the following areas:

1. National Societies provide a forum for helping to prevent road crashes through cooperation with governments, private sector and communities;
2. National Societies ensure assistance to victims through first aid training, ambulance services, psycho-social support and First Aid posts;
3. And National Societies contribute to efforts to improve the road safety environment through road safety awareness campaigns of decision-makers, of drivers, and of the population at large.

The next steps in this area include:

- Establishing a network among National Societies which are interested to develop capacity in these domains, especially for the development of related guidelines for road safety in schools, ambulance services, First Aid training for road users, psycho-social programmes for road victims, etc.
• Encouraging and facilitating National Society participation in road safety projects in the field through the Global Road Safety Partnership;

• Assisting in the implementation of commitments made under the Plan of Action of the 1999 International Conference\(^2\) to “respond to the growing global problem of road accidents through, for example, the further development of road safety measures in collaboration with all concerned partners, in particular National Societies. Concerned National Societies will develop their role in support of first aid training and public awareness activities to reduce levels of road accidents and the resulting casualties, especially amongst vulnerable populations.”

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\(^2\) The International Conference is the supreme deliberative body for the International Red Cross and Red Crescent Movement. It generally meets every four years. The Members are:
- International Committee of the Red Cross
- International Federation of Red Cross and Red Crescent Societies
- Red Cross and Red Crescent Societies recognized (176 in October 1999)
- States party to the Geneva Conventions (186 in October 1999)
On January 13, 2000, the Bone and Joint Decade was formally launched at the headquarters of the World Health Organization in Geneva, Switzerland. This comes on the heels of the November 30, 1999 endorsement by the United Nations. UN Secretary General, Kofi Annan said, “There are effective ways to prevent and treat these disabling disorders, but we must act now. Joint diseases, back complaints, osteoporosis and limb trauma resulting from accidents have an enormous impact on individuals and societies, and on healthcare services and economies.”

The goal of the Bone and Joint Decade is to improve the health-related quality of life for people with musculoskeletal disorders throughout the world. These disorders are the most notorious and common causes of severe long-term pain and physical disability, affecting hundreds of millions of people across the world. The Decade aims to raise awareness and promote positive actions to combat the suffering and costs to society associated with musculoskeletal disorders such as joint diseases, osteoporosis, spinal disorders, severe trauma to the extremities and crippling diseases and deformities in children.

The goal will be achieved by:
- Raising awareness of the growing burden of musculoskeletal disorders on society
- Empowering patients to participate in their own care
- Promoting cost-effective prevention and treatment
- Advancing understanding of musculoskeletal disorders through research to improve prevention and treatment

No one single organisation alone can accomplish the desired benefits for the patient or his or her family. The Decade is a multi-disciplinary, global campaign that will implement and promote initiatives in all parts of the world. These will be developed in partnership with appropriate patient, professional and scientific organisations, companies, healthcare providers, governments and non-government organisations in consultation with global and regional stakeholders.

Beginnings

The Bone and Joint Decade began with an inaugural consensus meeting in Lund, Sweden in April 1998 at which time its goal and objectives were agreed. An International Steering Committee of fifteen experts from various geographical regions and disciplines guide the Bone and Joint Decade. The diversity of the ISC and its staff includes rheumatologists, researchers, orthopaedic surgeons, patient advocates, trauma, rehabilitation, and emergency medicine specialists from Japan, United States, Sweden, United Kingdom, Netherlands, Brazil, France, Switzerland, Germany, and the Sultanate of Oman. The staff consists of one full-time secretariat (Sweden), two part-time managing directors (Director of Development in Germany and Spokesperson and Director of Strategic Relations in the United States) and a technical engineer (Sweden). The ISC meets monthly via teleconference and/or face-to-face meetings to provide hands-on guidance to the initiative.

The Bone and Joint Decade is headquartered in Lund, Sweden under the leadership of the ISC Chairman, Prof. Lars Lidgren, MD, who is Chairman of the Department of Orthopaedics at the University of Lund.

The initial outreach calls for a 3-part strategy: (1) the endorsement of the Bone and Joint Decade by patient and health professional organisations throughout the world; (2) the call for coordinators to step forward to coalesce the endorsing organisations within nation borders into National Action Networks to leverage their national priorities within the framework of the Bone and Joint Decade umbrella and mission; and (3) the call for broad dissemination about the Decade through health professional journals around the world.
**Year 2000**

**Endorsements:** Within its first year, the Bone and Joint Decade has gained international recognition by endorsements and support from the United Nations, the World Health Organization, the World Bank, and the Vatican. The initiative has been the subject of editorials and articles in over 150 professional health and patient advocacy journals and newsletters, including *the British Medical Journal, Annuals of Rheumatology* and the *Journal of Bone and Joint Surgery*. As of January 2001, the Bone and Joint Decade has received declared support by 30 governments and 750 professional health and patient advocacy organisations around the world. In 45 nations, core groups of musculoskeletal-related organisations have convened to develop National Action Networks to work together for the first time on common issues to advance the mission of the BJD. These organisations include the predominant musculoskeletal professional health and patient advocacy groups in each country. For example, in the US alone they include 46 organisations.

**Global Strategic Plan:** Under the guidance of the ISC, a global strategic plan is in development to identify and leverage partnerships within the multi-disciplinary fields addressing the target areas. The plan will also create opportunities to develop and implement global and trans-regional projects with Bone and Joint Decade stakeholders.

**Communications:** To communicate effectively with its National Action Networks, coordinators and participating organisations, a four-part strategy was initiated: (1) An electronic and fax Infoletter provides bi-monthly updates to the National Coordinators and Corporate Partners; (2) an annual Network Coordinator’s Meeting was established to provide training and networking opportunities to build synergy among and between National Action Networks (the 2000 second meeting was held in Muscat, Oman in November); (3) the web site [www.boneandjointdecade.org](http://www.boneandjointdecade.org) is in redesign and will be re-launched by February 1, 2001; and (4) a Portal Project was initiated with a major Corporate Partner to further develop a web-based communications and education system between the Bone and Joint Decade, its professional societies, their members and patients of the members;

**The Bone and Joint Decade Monitor Project:** The Monitor Project was launched January 2000 at the WHO headquarters to identify the global burden of the major musculoskeletal disorders. WHO Director-General, Dr. Gro Harlem Brundtland said “I am confident that the outcome will be of great value not only to rheumatologists, physicians and health care workers throughout the world, but that it leads to action that will bring relief and hope to the millions who suffer from musculoskeletal diseases.” Under the direction of Prof. Anthony Woolf, MD (United Kingdom) and Kristina Akesson, MD, PhD (Sweden) and with input from musculoskeletal and epidemiological experts around the world, the BJD Monitor Project will, for the first time, identify datasets and produce evidence-based documents on the size and severity of the problem, risk factors, prevention strategies, provision of care, and health and economic indicators. This is a critical step to leverage the Bone and Joint Decade message about the need for increased research, improved prevention and treatment, access to care and education, and patient empowerment in health decisions.

**Year 2001 Opportunities**

Specific projects include the strategic development, implementation and support for:

**United Nations Meeting on the Global Road Traffic Injury Epidemic (planned for Fall):** The Bone and Joint Decade, the United Nations, the World Health Organization, and the World Bank will be co-sponsoring a broad-based international 2-day meeting at the United Nations to stimulate collaboration and coordinated efforts to control this growing problem. Every thirty seconds someone in the world dies from a road traffic injury. The WHO Global Burden of Disease predicts by 2020 that road traffic injuries will move from 9th to 3rd place in the list of the leading disabling disorders. Until now, there has been no broad-based, multi-disciplinary alliance to control this epidemic. The Bone and Joint Decade will coordinate and facilitate this unique meeting of international organisations and stakeholders to build a foundation for coordinated actions.
The 2001 Bone and Joint Decade Network Co-ordinator’s Meeting: The Bone and Joint Decade will convene for the third time its Network Coordinators and patient advocates from around the world for education and training. The two-day meeting will include information about international projects, stimulating activities of the National Action Networks, and networking with corporate partners.

The Bone and Joint Decade Monitor Project Expansion: To coordinate communication and epidemiological research methodology in the field of musculoskeletal disorders at the trans-regional and international levels, expansion of the Monitor Project is necessary to effectively coordinate among and between international organisations, such as the World Health Organization, regional and national bodies, such as the US Centers for Disease Control and Prevention.

National and Trans-Regional Awareness and Action Campaigns: The Bone and Joint Decade intends to utilize its vast network of National Networks and participating organisations to work with corporate partners and stakeholders to call media and public attention to the burden of musculoskeletal disorders. The Bone and Joint Decade will work with its partners to create appropriate campaigns to improve access to musculoskeletal treatment, health services, medical education training, and increase research funding.
HOW CAN WE DISCOVER WHAT WORKS IN THE PREVENTION OF ROAD TRAFFIC CRASHES?

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Each year worldwide over a million people die and some ten million people sustain permanent disabilities in road traffic crashes.\(^1\) For people under 35 years, road traffic crashes are now the leading cause of death and disablement. Nevertheless, the epidemic of road traffic crashes is only beginning. It is estimated that by 2020 road traffic crashes will be the third leading cause of disability adjusted life years lost world-wide, and the second leading cause in developing countries.\(^2\)

An epidemic of this scale demands an appropriate response. Effective strategies must be identified for the prevention of road traffic crashes. The first step must be to find out what we already know about the effectiveness of strategies for the prevention of road traffic crashes by conducting systematic reviews of the available controlled evaluation studies. The Cochrane Injuries Group, an international network to prepare, maintain and promote the accessibility of systematic reviews of the effectiveness of interventions in the prevention, treatment and rehabilitation of injury, has been established to facilitate this.\(^3\) The Group maintains a register of controlled trials in the prevention, treatment and rehabilitation of injury to facilitate the preparation and updating of systematic reviews.\(^3\)

Finding controlled trials of interventions in the treatment and rehabilitation of injury is no small task, but finding controlled trials in the prevention of road traffic crashes is a major challenge. Search strategies for controlled trials on medical databases can achieve high sensitivity and positive predictive value because terms describing the study methodology are included among the indexing (descriptor) terms. Road safety databases however, have a limited range of indexing terms describing the study methodology, and as a result, the identification of studies with designs that reduce the likelihood of bias (e.g. controlled evaluation studies) is almost impossible.

TRANSPORT is the largest and most widely used road related database. It includes over 600,000 records from the Transportation Research Information Services (TRIS) database, the International Road Research Documentation (IRRD) database, and the TRANSDOC database of the European Conference of Ministers of Transport. However, finding controlled trials on the TRANSPORT database is extraordinarily difficult. For example, the Urban Safety Project is a prospective controlled trial of area wide traffic calming in five UK cities.\(^4\) Nowhere in the TRANSPORT database record for this report is there an indication that this is a controlled trial. TRANSPORT includes over 10,000 records on traffic calming and it would be very easy to overlook this important study in a search for controlled trials of traffic calming.

How can the retrieval of controlled trials of road safety interventions be improved? First, by including indexing terms describing controlled evaluation studies in road safety databases thesauri. Second, by consistent indexing of the study methodology using these terms. Methodology indexing terms can only be applied however, if authors explicitly describe the study design in their reports. Authors can facilitate indexing by taking care to document the study design in the title, abstract and methods section of the research report. Editors can support indexing by insisting on the use of structured abstracts that give details of study methodology.

Prospective indexing of controlled trials of road safety interventions is surely within our reach. Finding the existing controlled trials and re-tagging them will be more demanding. Because of the efforts of Cochrane Collaboration to re-tag controlled trials of healthcare interventions, thousands of previously inaccessible controlled trials are now available to health professionals. A similar effort by the international road safety community is urgently required. But who will pay for this? In comparison with the burden of disability, funding for road safety research is less than that for almost any other cause of human misery.\(^5\) The obvious source of funding is the industry that will profit from increasing global
motorization. In the face of the growing epidemic of road traffic crashes, the world’s car manufacturers must take some responsibility for preventing its tragic consequences.

References

The International Traffic Medicine Association (ITMA) was founded in 1960 in San Remo, Italy, under its former name, the International Association for Accident and Traffic Medicine (IAATM). IAATM has been in official relationship with the WHO since 1970.

After the current president took office in May 2000, the organisation acquired its present name. The name change was stimulated mainly by advances in injury control that had occurred since 1960, and in which IAATM and the WHO played important roles. One change was the gradual discontinuance of the use of the word accident by safety professionals. The change by professionals has been generally followed by the mass media and public. This term accident was discarded because of the conceptual ambiguities surrounding it and the general sense it conveys that the injuries are due only to random fate and are not understandable or controllable. Yet the whole purpose of ITMA is to better understand the factors that are relevant to traffic crashes so that measures may be adopted to reduce the harm they cause.

In November 2000 ITMA started invited formal dues-paying membership – association with the former IAATM was of an informal nature. For cost and efficiency reasons, ITMA is aiming to be almost entirely based on electronic communications. On 12 February 2001 ITMA had its first membership meeting. This was conducted by email, and 40 members from 15 countries (Argentina, Australia, Brazil, Canada, China, Egypt, Finland, Germany, Hungary, Ireland, Korea, Sweden, the Netherlands, UK, and USA) participated. This meeting formally approved the ITMA Bylaws, which include the organisation’s name. After a somewhat fuzzy and ambiguous transition period, this meeting placed ITMA on a solid organisational and constitutional basis in which the organisation is controlled by its members.

ITMA’s present activities are described in the following three internet sites:

http://www.TrafficMedicine.org
General information, membership application form, definition of the traffic medicine, discussion of why the term accident is to be avoided.

http://www.JTrafficMedicine.com
Journal of Traffic Medicine, including author instructions

http://www.ITMA2002.com
World Congress, Cairo, Egypt, 22-25 Sep. 2002

ITMA is clearly an organisation in the midst of enormous growth and change. It aims to enhance the effectiveness of the multitude of disciplines and people struggling to reduce the enormous harm from traffic crashes, and to co-operate with other organisations, most particularly the WHO, with which ITMA shares common goals.
CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)

David Sleet,
Director for Science, National Center for Injury Prevention and Control
Centers for Disease Control and Prevention, Atlanta, USA

National Center for Injury Prevention and Control

The Division of Unintentional Injury Prevention (DUIP) houses a motor vehicle injury prevention unit comprised of scientists, researchers, public health advisers and fellows. The mission of the unit is to reduce morbidity, mortality, disabilities and costs related to motor vehicle and transportation-related injuries. One theme of the Injury Center is “safe on the move”. Part of CDC’s central mission is improving global health and the Injury Center at CDC is a WHO international collaborating center on injury prevention.

Dr. Sleet, the Associate Director for Science in DUIP, spent 4 years at NHTSA developing public health programs, 2 years as acting director of the Road Accident Prevention Research Center (ROADWATCH) in Perth, Australia, and conducted research on the benefits of airbags in Finland.

Recent International Activities:

In 2000, Huan Linnan, from CDC, was posted with UNICEF in Hanoi, Vietnam to design unintentional injury prevention education materials. Her work supports a local “Safe Vietnam” project modeled after “Safe USA” at CDC (more Vietnamese children, ages 1-5 years, die from road crashes than Malaria) To this end, a helmet law was enacted for Vietnam that requires helmets be worn by operators and all passengers, resulting in a 50% increase in helmet use.

In 2001, CDC is participating with Transport Canada in traffic consultative meetings on developing a framework for “road safety as a social construct” and to develop a national strategy to make Canada’s roads the safest in the world.

International Visitors and technical assistance

Dr Wei Lu, Deputy Director General of Shanghai Municipal Center for Disease Control and Prevention visited to learn about MV injury surveillance (health officials in Shanghai, China recognize that injury is the fourth leading cause of death)

Dr. David Nyamwaya of Nairobi, Kenya. His organisation, African Medical and Research Foundation (AMREF) is interested in traffic injury prevention.

Dr. Maria Teresa Cequeira, Regional Advisor in Health Education and Social Preparation, PAHO/WHO and The International Union of Health Education, Paris discussed joint projects in developing countries around injury prevention and health promotion.

CDC has been requested to provide for injury prevention and surveillance training in Jordan, Egypt, Israel, Philippines, South America.


CDC assisted World Bank in a 2001 funding proposal for a Regional Road Safety Operation to Reduce Road Mortality in Central/Eastern Europe, and Central Asia

CDC researchers traveled to Egypt, Australia and Israel to work with local injury professionals to develop local data and policy documents (e.g. INJURY IN EGYPT).
CDC works with the “Global Burden of Disease” efforts at Harvard University

The Injury Center funds 10 “Centers of Excellence” ($1 million each/year) to conduct research on injury issues, including international motor vehicle research and biomechanics.

Asia is an area of particular interest to CDC because it has the second highest injury death rate, after sub-Saharan Africa.
WHO Collaborating Centres are designated for their "excellence" in a field of interest for WHO. For road traffic injury prevention, such fields of interest include:
- epidemiology and accident research, injury research;
- biomechanics of trauma;
- emergency rescue, medical treatment of accident victims;
- social and psychological aspects of vehicle use;
- urban planning, transportation planning and safety;
- road safety measures, strategies, programmes and management systems (design, follow up, evaluation);
- health promotion, health and safety education.

In order to cover the scope, the network of Collaborating Centres for Violence and Injury Prevention is necessarily multi-sectoral. The CCs anchored in Health Sciences are thus complementary with those in Transport. The latter area of work is itself multi-disciplinary as engineers usually team with sociologists, psychologists, economists, statisticians, etc.

WHO Collaborating Centres are expected to produce knowledge and methods of general value and use in their area. For example, in road injury prevention, knowledge of how accidents and injuries are generated, of the short and long term consequences of accidents, of the effects on injuries and of the acceptability of measures and prevention strategies, is relevant; so are methods for road safety management (diagnosis, programme building, decision making). Fundamental knowledge as, for example, in biomechanics, is obviously applicable to all countries and peoples; methodologies as well as knowledge obtained through evaluation studies should be developed over a range of conditions as they need to apply to different types of countries, cultures and environments. Knowledge and findings should be widely disseminated, either through documents or web-sites, or through training programmes.

Cooperation between WHO Collaborating Centres is useful to complement and structure knowledge acquired through different disciplinary approaches as well as to compare findings in different types of countries and validate them. Such cooperation has been found stimulating in the past as seen from the success of jointly organised courses on road accident and injury prevention, of seminars on health and safety promotion, etc.

Besides providing knowledge, Collaborating Centres are expected to contribute to WHO operational objective, namely strengthening injury prevention activities and promoting good practice in order to effectively reduce the numbers of road traffic casualties worldwide. One of the tasks of Collaborating Centres is thus to assist WHO in the design of a sound multi-annual work plan, which may include editing collective documents (guidelines, methodologies, sensitisation material etc.), setting up resources networks, organising pilot-studies or demonstration projects, providing a methodological framework and technical assistance to countries, local authorities or groups of citizens involved in injury surveillance and prevention. Collaborating Centres are meant to participate in the work plan, which can be done both individually within their respective work programmes, and on a co-operative basis. Cooperation is essential on pilot projects as epidemiology of accidents and injuries is not in itself sufficient to devise prevention strategies, and must therefore be supplemented with knowledge of the possible remedial measures, the conditions they need to be efficient, the way they work and how they are implemented.

Some examples of operational activities of the network of Collaborating Centres are the world network of Safe Communities, the development of a communal road safety plan for seven West African countries, the development of a minimum road safety package for African countries, etc.
In recent years, the network of WHO Collaborating Centres has had to raise its own resources as no budget has been provided by WHO. Each Centre obviously generates funding for its own activities, but demonstration projects or technical assistance to the less advantaged countries require that sponsors be found (see, for example, the injury surveillance network set up in East African countries). This is generally not easy and seldom allows for co-ordinated projects to develop in several countries due to the way international donors or money-lenders operate.
SOME FINDINGS FROM A DIAGNOSIS OF ROAD TRAFFIC SAFETY SITUATIONS AND MANAGEMENT IN SEVEN AFRICAN COUNTRIES

Nicole Muhlrad, INRETS
WHO Collaborating Centre on Road Accident and Injury Prevention

Introduction

The following elements of discussion and proposals emerge from a study carried out on seven West African countries by a team of "experts" of INRETS's Collaborating Centre in co-operation with the SITRASS network. The study was requested by UEMOA (Economic and Monetary Union of West Africa) and financed by the European Union. It is currently underway and should be finalised by the end of March 2000. Some (maybe most) of the problems identified are not specific to the countries included in the diagnosis, but are likely to apply to other African countries as well.

The UEMOA study aimed at defining regional policies for road safety management. Only the findings of interest for WHO and the Health sector are indicated below. Funding aspects have not been considered, although the Health sector could play a part in generating resources. Four goals for future activities have been retained:
1. Fact finding and raising awareness
2. Direct action
3. Safety promotion
4. Professional training
5. Road traffic safety management

The paper is kept voluntarily very short and can be expanded if necessary at a later stage.

Fact finding and raising awareness

Diagnosis

The road accident and injury situation is African countries is not at all well described and the number of injuries is grossly underestimated. Previous attempts at collecting injury data in some hospitals have failed when economic conditions worsened, due to lack of manpower (health professionals and physicians). Accident and injury data collected by enforcement agencies (police and gendarmerie in French speaking countries) is incomplete due to lack of follow up of accident victims (fatalities are often only counted when death occurs "on the spot"). Moreover, accidents, even when they produce bodily damage, are not always reported to officers of the law.

Governments and the administration are not enthusiastic about dealing with the accident prevention issue when there are so many more "positive" issues at stake. Lack of data facilitates neglect of the road safety problem. Thus, resistance has to be expected, not only to action, but also to fact finding. International pressure is useful to overcome the latter problem.

The role of the health sector

- Collecting epidemiological data through the health network (this issue is being dealt with elsewhere).
- Producing epidemiological studies. The following topics are of particular interest for awareness raising and for prevention:
  - realistic cost data for the medical treatment of road injuries
  - disabilities and handicaps resulting from accidents
• Setting up partnerships with the transport and law enforcement sectors to promote reliable systems of statistical data collections on road accidents and injuries and co-operate to make them work. Some difficult questions that need to be addressed are:
  - how to get better reporting of injury producing accidents by the population?
  - definition of indicators collected (fatality, serious injury) and compliance with international practice
  - follow up of accident victims to assess fatalities and injuries better than in the current situation
  - keeping the data collection system going once it has been set up and experimented
  - producing periodical information bulletins on injuries and accidents
  - training people in charge

Direct action

Diagnosis

The Health sector is usually too little involved in road accident and injury prevention, although the medical infrastructure has to deal with the whole aftermath of the road safety situation. Resources are clearly restricted and preference is given to more “traditional” aspects of health activities. Intervention of the Health sector is usually somewhat discouraged by lack of any contacts (at any levels) with the transport sector which is usually in charge with road safety management. However, there are areas of injury prevention and safety promotion where improvement is sorely needed and the Health sector needs to be directly involved:

a) Care of accident victims: we are not even talking of emergency rescue systems when access to medical care is restricted to the fraction of the population getting some form of medical insurance or enough private means to be able to buy medicines and pay the marginal costs charged by hospitals and health centres. Lack of generalised medical coverage leads to (often long) delays at the admission of accident victims (maybe even to refusals, although this is never acknowledged). Moreover, restructuring policies of international donors (such as the World Bank) tend to encourage financial self-sufficiency of public and private medical services, thus raising the costs charged to the patients and accident victims and enlarging the population to whom access to proper care is denied. Rehabilitation to reduce disabilities and resulting handicaps seems to be virtually non-existent in the public health sector.

b) Safety education: it should be considered as part of health education, but isn’t in practice. Traffic education in primary schools has been or is being introduced in a number of countries, mostly by the transport sector in co-operation with National Education. However, content of what is taught and pedagogical material (when existing) appear inadequate, as neither age and corresponding abilities of the children addressed, nor the existing state of the road and traffic environment, are actually taken into account. Providing proper training of teachers on a network basis is also proving difficult. Moreover, some countries display a high proportion of children that do not attend school (and whose exposure in traffic is higher than that of school children); no alternative traffic education channels are provided from them.

In countries where traffic and transport conditions are rapidly changing, adults may also need some traffic education, if only to help protect the children. There are usually no direct channels for informing adults on road accident and injury risk and the precautions to take. Some information is given through the media: some journalists focus on accidents (which does not necessarily help with prevention, depending upon the way it’s done), and non-governmental organisations as well as the transport sector or the authority co-ordinating road safety management design “safety campaigns” with various levels of professionalism and often little efficiency.

c) Driver training: Some form(s) of driver training are to be found in all countries, with the aim of preparing candidates for the licensing exam. “Informal” training dominates among professional drivers. In driving schools, safety rules and practice are usually not clearly taught. No alternative channels are provided to deliver minimum safety knowledge to future users of bicycles and light motorcycles, the more vulnerable road users, who will not have to go through licensing exams.
d) **Urban safety**: Local authority's power and responsibilities vary from country to country. For the local authorities endowed with decision-making power, road safety is usually a very new preoccupation that remains in the background when urban traffic and transport issues are so prominent in developing cities. Meanwhile, large populations are at risk of a traffic injury, and the higher risks are for the "vulnerable road users" (pedestrians and cyclists), a category that includes the urban poor. Citizen groups (and/or communities) could emerge to take up injury prevention, but initial action is needed to mobilise such groups, as well as to support them when they have to negotiate with the authorities.

e) **Health problems**: although data is lacking, drinking-and-driving and drug taking are widely acknowledged (the first one only in non-Moslem countries) to participate in the accident and injury generation processes. Laws are being passed to correct the problem, but nothing is being done to treat it at the root.

**The Role of the Health sector**

a) **Care of accident victims**: Normal Health sector development involves providing a tight enough network of hospitals and health centres over the country. In addition, the Health sector should contribute to organising some form of overall coverage of medical costs for injury treatment, so that accident victims are accepted in hospitals or care centres and actually treated without undue delay. Partnership will be necessary, with other sectors of the government, but also with insurance companies. Legal aspects may be important.

b) **Safety education**: A national Health network can be convinced to co-operate in providing safety education as part of health education. Primary target groups are children that do not attend primary school, and adults that may help protecting the most vulnerable road users (including children).

The Health network can also initiate local road safety initiatives or campaigns, hopefully in close partnership with professionals (pedagogy, road safety information, communication). Partnership should also be established locally with NGO's.

c) **Driver training**: this is not a normal duty of the Health sector. However, seeing that two-wheelers, who are among the most vulnerable road users, are usually unprepared to face difficult traffic conditions, it does not seem too far fetched to imagine that local health workers could organise training sessions for young two-wheelers. Again, this requires co-operation with professionals and possible partnership with NGO's.

d) **Urban safety**: Health professionals can play a part in initiating and supporting local accident and injury prevention schemes (see the Safe Communities approach, for example). This could imply gathering local accident and injury data, piloting working groups, enlisting local or other professionals with some knowledge of road injury prevention to help design action plans, co-ordinating local actors, etc.

e) **Health problems**: National Health networks should undertake activities at the local level to reduce alcohol and drug consumption. Partnership with professional drivers' organisations and transport unions should be useful.

**Safety promotion**

Within its duties of Health promotion, including safety promotion, the Health sector is entitled to promote, encourage, support accident and injury prevention activities that fall under the responsibility of other sectors.
Diagnosis

Health promotion aims at providing environments conducive to health, which implies among other characteristics that they are not conducive to accidents and injuries. Three main areas of activities have to be considered:

a) Regulatory environment and enforcement: In all the countries investigated, traffic regulations are incomplete and need to be updated. The rules governing driver licensing are heterogeneous, even the basic traffic rules may have to be revisited. The main problems that need to be addressed are, however, those which govern the rights of vulnerable road users, especially the pedestrians, and the organisation of enforcement of the laws and regulations.

Enforcement is simply not working. Misuse of power is the current practice of traffic law enforcement agencies, to the point that enforcement has now been completely stopped in several countries or cities, under the pressure of transport professionals that have started protesting the inequity of the procedures: in actual facts, the issue of inequity and the corrupted image of enforcement agencies have obliterated all the useful aspects of law enforcement in the eyes of the public. This situation will not be easy to straighten out.

b) Physical environment: Infrastructure characteristics and their integration into the environment play an important part in generating road accidents and injuries. There is a fair amount of knowledge available on "good practice" in building, improving and managing urban and rural roads, but one can see that the information is not systematically applied, even when new infrastructure is being planned. This is particularly important in urban areas where pedestrians are the road-users most penalised by current infrastructure design and management. Road and street design conducive to speeding on routes used both by motorised and non-motorised traffic is a major problem.

c) Traffic management in urban areas: Traffic plans are being developed at least in the larger cities. In most cases, they do not take enough care of non-motorised road users and create problems for pedestrians. "Deregulation" of public transport generates competition between drivers, resulting in speeding, accident and injuries, involving most often unprotected road users (again). Urban traffic also generates other health problems through pollution and noise, and these tend to attract more attention than safety.

d) Professional transport organisations and rules: Professional drivers work long daily hours and may have to take drugs to withstand the pressure. Tiredness plays a part in accident generation, and the proportion of night accidents is high. Employment conditions also create situations where "official drivers" (especially of taxis or minibuses) get replaced by non-authorised ones with unknown qualifications to extend the daily commercial use of the vehicle.

The Role of the Health sector

a) Regulatory environment and enforcement: The Health sector should address the Transport and Law sectors in order to promote enacting and enforcement of the laws that are particularly likely to decrease accident occurrence and severity, in particular speed limits, safety belt equipment and wearing, motorcycle helmet wearing, legal limits to drinking-and-driving.

The Health sector should also push for a reform of enforcement organisations and strategies. New enforcement groups focusing on safety rules and laws may have to be created, involving other people than the present police officers (and maybe even placed under a different authority). Employment conditions need to be adjusted so as to ensure that enforcement agents make a proper living without the need to find additional sources of money. A wide partnership is necessary to treat such questions, involving at least the Transport, Justice and Enforcement sectors as well as transport professionals and representatives of the public. The Health sector could play moderator.
b) **Physical environment and traffic management**: Effect of excess speeds are one of the major accident and injury factors; it is of primary importance in the action of the Health sector as it is directly related to the severity of injuries. The Health sector should therefore be a strong advocate against changes in the physical road environment that may induce excess speeds, and for changes aimed at "traffic calming". Cooperation with road engineers proficient in safety work is necessary.

A similar approach is needed with regards to traffic management in urban areas: advocacy and lobbying from the Health sector should aim at focusing attention on non-motorised traffic and the provision of safer public transport. Joined policies of reduction of traffic injuries and of noise and pollution should increase feasibility.

Partnerships are to be established, at the national level with the Transport sector, and at the local level with local authorities, professional transport organisations or operators and other NGOs.

c) **Professional transport organisations and rules**: The Health sector cannot ignore the fact that current commercial conditions in professional transport (employment contracts, working conditions and constraints, working hours) affect the health of drivers, which in turn decreases safety. Negotiating better transport conditions is a task that involves long-term negotiations and a wide partnership. The Health sector should take part in it and may play moderator.

**Professional training**

**Diagnosis**

Actors involved (or potentially involved) in road injury prevention offer a wide range of disciplinary backgrounds and social positions. Most of them haven't received any specialist training and react, at least initially, with their own feelings as ordinary road users (which are obviously different if they drive a car, use a bicycle or walk!). Road injury prevention has been introduced in very few curricula in universities or professional colleges (usually, only civil engineers in some countries get any sort of road safety education), and little exists to provide usable knowledge to actors in function.

**The Role of the Health sector**

The Health sector should first provide proper training in injury prevention methods to the health personnel, both in medical schools and in Public Health schools. It should also participate in an effort at organising professional road safety training at different levels, from decision-making to basic implementation, on a national and/or international level (see Fiwoco paper on organising a World Network for training in road injury prevention). Partnership being of the utmost importance, training should be provided also at high level with a view to facilitating communication between sectors as Health, Transport, Urban Planning, Enforcement, etc.

**Road traffic safety management**

**Diagnosis**

In the African countries investigated, road safety management is still disorganised. Different formulae have been adopted to coordinate multi-sectoral efforts at accident and injury prevention, but adequate resources have usually not been allocated, know-how is sorely missing, and the role to be played by objective fact finding (data, diagnostic studies, observations and surveys) has been minimised. In practice, the Health sector is absent from most of the road safety management structures.

At the local level(s), road safety management structures are virtually non-existent.

**The Role of the Health sector**

From the above points of discussion and proposals, it appears that the Health sector has clearly an important part to play in road traffic injury prevention, either as a direct field actor and a provider of data,
or, to defend its own interests, in partnership with other sectors. This role makes it essential for the Health sector to actively participate in road safety management at the higher level, and to take steps to make the coordination structures more operational.

The Health network, the Transport and/or Public Works administration, and the (Traffic) Police are the active networks at the local level. Better communication between them should make it possible to launch local road safety initiatives. NGOs should join in.

References


The Global Road Safety Partnership (GRSP) is a global partnership between business, civil society and governmental organizations collaborating to improve road safety conditions around the world.

Initiated by the [World Bank Group](http://www.worldbank.org) in February 1999, GRSP stakeholders have been identifying ways in which they could work together to improve road safety globally. The [International Federation of Red Cross and Red Crescent Societies](http://www.ifrc.org) hosts the GRSP Secretariat at its headquarters in Geneva, Switzerland. The GRSP is governed by a [Steering Committee](http://www.grsproadsafety.org) and assisted by a small Secretariat. Over 200 organizations have taken an active role in establishing the GRSP and it is now active in over 10 countries.

GRSP is one of four [Business Partners for Development (BPD)](http://www.bpd.worldbank.org) programs initiated by the World Bank. BPD is a project-based initiative that studies, supports and promotes strategic examples of partnerships for the development of communities around the world. The underlying concept of BPD is build on the premise that partnerships benefit the long-term interests of the business sector while meeting the social objectives of communities by helping to create stable social and financial environments.

Road safety offers an opportunity for a wide range of stakeholders to actively engage in addressing the global problem of road accidents, deaths and injuries. Previous efforts by governments and donors to try to improve road safety in developing and transitional countries have had limited success and many interventions simply have not been financially or institutionally sustainable. The Global Road Safety Partnership aims to identify innovative ways to improve road safety by applying the business partnership approach. It hopes to produce solid evidence that partnerships offer win-win benefits for all parties and that this approach can be widely used throughout the world.

The GRSP is not a funding agency and does not finance road safety interventions of the type normally financed by governments, bilateral and multi-lateral donors.
WHO Strategy for Road Traffic Injury Prevention

WHO Strategic Vision for RTI Prevention

This WHO Strategy aims to integrate RTI prevention into public health programmes around the world in order to reduce the unacceptably high levels of RTIs. Special emphasis will be placed on low and middle income countries (LMCs).

Strategy Objectives

• To build capacity at a national and local level to monitor the magnitude, severity and burden of RTIs
• To incorporate RTI prevention and control into public health agendas around the world
• To promote action-orientated strategies and advocate for prevention and control of the health consequences of motor vehicle collisions.

Strategic Framework

The development of this five-year strategy took into consideration competing needs and expectations as well as the limited resources in many countries. The strategy addresses:

• gaps in knowledge (as identified previously)
• current and planned efforts in the public health sector (especially in LMCs)
• current and planned efforts and expertise in the transport and other sectors
• opportunities for collaboration and co-ordination within the public health sector and with other sectors
• the most appropriate balance between the needs for descriptive information, aetiological (cause) information, information about effective interventions and the need to implement known effective interventions
• the available public health expertise and opportunities for capacity development in both public health and road traffic injury prevention, especially in low income countries

The strategy is sustainable and addresses long term goals, rather than focusing on “quick-fix” solutions. It also facilitates the continued development of a strong evidence-base, rather than perpetuate solutions or options that seem reasonable, but for which there is little evidence.
The strategy is presented in the three areas where the WHO can add value, i.e. epidemiology, prevention and advocacy.

The strategic framework in the following section is presented in tabular form to make it as user-friendly as possible. For each of the three areas where WHO can add value, the framework presents the strategy, plan of action, proposed products, partners and timeline.
## Five-year WHO Strategy for Road Traffic Injury Prevention

### Epidemiology

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<th>PARTNERSHIPS</th>
<th>PRODUCTS</th>
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<tr>
<td>2. Set a research agenda focused on the determinants of road traffic injuries particularly in low and middle income countries, e.g. poverty, alcohol, conspicuity.</td>
<td>Review past and current data collection systems. Include qualitative and quantitative methods of investigation. Undertake multi-country studies to investigate risk factors and other determinants (such as inequalities) in low and middle income countries. Work with partners from LMCs to address the health consequences of poverty.</td>
<td>Collaborating research institutes GFHR Regional offices</td>
<td>Database of risk factors for road traffic injuries in low/middle income countries.</td>
<td>2002 - 2004</td>
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<td>STRATEGY</td>
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| 3. To facilitate regional networks in low/middle income countries and build capacity at country level | • Create sub-regional networks  
• Link governmental organisations with universities  
• Encourage partnerships, fellowships and meetings  
• Provide technical support to countries to develop road traffic injury policies  
• Encourage Ministries of Health to designate a School of Public health or similar institution to act as a road injury research centre in each country  
• Conduct field epidemiology training programmes  
• Promote exchange programmes, e.g. North – South as well as regional collaboration  
• Promote research through awards, prizes, etc. | • Training guidelines for assessing the economic and social costs related to road traffic collisions and injuries  
• Interactive CD – ROM on road traffic injury prevention  
• Curriculum development for higher education of professionals | Collaborating centres  
Regional offices  
GFHR  
GRSP | Ongoing |
| 4. To strengthen the links between the environment, mobility and road traffic safety | • Make links with the environment and healthy city-related initiatives  
• Develop partnerships that link mobility, safety, environment and safety  
• Working with partners from LMCs to address the health consequences of poverty | • Partnerships | Other WHO Departments  
Collaborating Centres  
GRSP | 2003 - 2005 |
## Prevention

### TIMELINE

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
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<tbody>
<tr>
<td>2001 - 2002</td>
<td>Cochrane Centre Collaborating Centres OECD Transport Research Board IFRC</td>
</tr>
<tr>
<td>2001 - 2005</td>
<td>Governments: DoH, DoT, DoJ Collaborating Centres WHO Regional Offices NGOs, e.g., MADD, BJU</td>
</tr>
</tbody>
</table>

### PARTNERSHIPS

Governments: DoH, DoT, DoJ<br>Cochrane Centre Collaborating Centres WHO Regional Offices Transport Sector NGOs, e.g., MADD, BJU

### PRODUCTS

- Multi-country database on effective intervention programmes in low and middle income countries<br>- Ongoing interventions<br>- Manual of Good Practice<br>- Guidelines on prehospital care systems<br>- Guidelines for the implementation and evaluation of prevention studies

### PLAN OF ACTION

- Give technical support to pilot studies: Focus on vulnerable road users<br>- Assess interventions in low to middle income countries<br>- Conduct multi-country studies including urban and rural settings<br>- Create a register or warehouse of controlled evaluation interventions through coordination with multiple centers<br>- Include grey literature from low and middle income countries<br>- Make materials widely available and preferably free<br>- Promote known prevention strategies<br>- Coordinate these activities (WHO responsibility)

### STRATEGY

1. To support interventions focusing on vulnerable road users based on the available knowledge and using models of interventions applicable to different regions in the world
2. To gather and package state-of-the-art knowledge on road traffic injury prevention through systematic reviews which are applicable to low and middle income countries
<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>PLAN OF ACTION</th>
<th>PRODUCTS</th>
<th>PARTNERSHIPS</th>
<th>TIMELINE</th>
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</thead>
<tbody>
<tr>
<td>3. To provide guidance for governments and institutions to manage road</td>
<td>• Develop guidelines on road safety management based on existing best safety practices worldwide&lt;br&gt;• Encourage governments to enact appropriate&lt;br&gt;road safety legislation</td>
<td>• Guidelines on road safety management</td>
<td>Local governments GRSP Committee 13 on Road Safety (PIARC) World Bank&lt;br&gt;Collaborating Centres</td>
<td>2003 - 2005</td>
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<tr>
<td>safety efficiently and sustainably</td>
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<td>4. To develop new knowledge based on interventions taking into account</td>
<td>• Encourage establishment of road safety research institutes in countries (or jointly by a group of countries with similar traffic conditions and income level)&lt;br&gt;• Encourage long term partnerships&lt;br&gt;• Encourage collaborative research between research institutes in the north and south&lt;br&gt;• Generate international funding for research organisations focused on low and middle income countries</td>
<td>• Best practice manual&lt;br&gt;• New partnerships and institutional mechanisms&lt;br&gt;• Road safety research institutes in countries</td>
<td>Research institutes (North-South, South-South partnerships) GFHR Governments: DoH, DoT, DoJ</td>
<td>2003 - 2005</td>
</tr>
<tr>
<td>STRATEGY</td>
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</table>
| 1. To raise the general awareness for the potential for prevention of road traffic injuries | • Target general population and specific sub-groups such as victims’ groups, community organisations  
• Empower and mobilise people’s voices  
• Use grassroots communication strategies  
• Foster a demand for change in middle and low income countries  
• Target policy makers, decision makers  
• Deliver relevant, easily understood, evidence-based messages  
• Disseminate at global, regional, national and local levels | • Advocacy documents  
• Fact sheets  
• Interactive CD-ROM on RTI prevention | Collaborating centres  
Legal departments  
IFRC  
Research Institutes  
NGOs, e.g. MADD, BJD | 2001 - 2005 |
| 2. To promote the inter-sectoral approach to road traffic injury prevention in low and middle income countries | • Target Ministries of Health and Transport (and others such as Finance)  
• Facilitate intra-national co-operation  
• Empower both health and transport  
• Advocate for creation of effective Departments of Road Traffic Safety  
• Advocate for inter-sectoral co-operation for RTI prevention at the global and regional level  
• Fund training courses | • Consultative meetings between MoH/MoT and WHO  
• Good Practice Manual  
• Campaigns for ‘people friendly’ roads  
• Funding from multi-lateral and bilateral donors  
• Institutes for road safety research in countries | Regional WHO offices  
Governments: DoH, DoT | Ongoing |
<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>PLAN OF ACTION</th>
<th>PRODUCTS</th>
<th>PARTNERSHIPS</th>
<th>TIMELINE</th>
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</thead>
</table>
| 3. To promote road safety research        | • Coordinate research efforts  
• Foster development of partnerships and networks  
• Provide technical support to national and regional initiatives  
• Advocate research investments for RTIs  
• Promote relevant research in low and middle income countries  
• Facilitate the transfer of knowledge between north and south research institutes | • Research networks  
• Evaluated interventions | WHO regional offices  
Collaborating Centres  
GRSP  
IFRC  
ITMA | 2002 - 2005 |
| 4. To advocate for resources for road traffic injury prevention | • Target multi and bi-lateral donors, foundations, national governments, local agencies and the private sector  
• Promote resource allocation for capacity development, research, intervention programmes, North-South consultations, regional initiatives  
• Advocate the ‘cost savings’ in RTI prevention including social costs | • Funding from donors | Collaborating Centres  
WHO regional offices  
GFHR  
NGOs | 2002 - 2005 |
Conclusion

The major gaps in RTI prevention are broadly threefold: (1) inaccurate data on the magnitude of the problem, risk factors and economic consequences, (2) inadequate evaluation of prevention efforts in middle and low income countries, and (3) limited awareness of the problem, particularly among policy-makers and donors.

WHO’s added value in the area of RTI prevention would follow the public health approach and, in so doing, would attempt to address the gaps, inequalities and inequities. WHO and its partners will promote the development of a multi-disciplinary national strategic plan within countries by strengthening capacity, collection of data, research, training and the development of appropriate RTI prevention interventions. In addition, WHO will be instrumental in pushing forward the agenda of RTI prevention by advocating at a global and regional level and encouraging donors to support efforts to reduce the magnitude of the burden. However, it should be stressed that concerted multi-sectoral efforts, strong partnerships and international co-operation will be required to take such an agenda forward.
Appendix A

CONSULTATION TO DEVELOP A WHO STRATEGY ON ROAD TRAFFIC INJURY PREVENTION

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## Agenda

### DAY ONE: Thursday 26 April 2001

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00-9:30</td>
<td>OPENING and adoption of the agenda</td>
<td>Dr Ann Kern, EXD: Sustainable Developments and Healthy Environments</td>
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<tr>
<td>9:30-10:00</td>
<td>OPENING ADDRESS: The public health approach to reducing road traffic injuries worldwide</td>
<td>Dinesh Mohan</td>
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<tr>
<td>10.00 – 10.30</td>
<td>Discussions</td>
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<tr>
<td>10.30 – 11.00</td>
<td>Tea/Coffee Break</td>
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<tr>
<td>11:00-11:30</td>
<td>The epidemiology of road traffic injuries: what exists, gaps, the role of public health</td>
<td>Robyn Norton, Adnan Hyder, Carlos Dora, Margie Peden</td>
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<tr>
<td>11:30 – 12.00</td>
<td>Discussions</td>
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<tr>
<td>12:00 - 12:30</td>
<td>The prevention of road traffic injuries: good practices, gaps, WHOs added value</td>
<td>Murray MacKay, Geetam Tiwari</td>
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<tr>
<td>12:30 – 13.00</td>
<td>Discussions</td>
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<tr>
<td>13:00 – 14:00</td>
<td>Lunch</td>
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<tr>
<td>14:00 – 14:30</td>
<td>The role of advocacy and capacity development in road traffic injury prevention</td>
<td>Brian O’Neill</td>
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<tr>
<td>14:30 – 15:00</td>
<td>Discussions</td>
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<tr>
<td>15:00-15:30</td>
<td>Tea/Coffee Break</td>
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### Objective 2: Develop a WHO strategy and plan of action in the fields of epidemiology, prevention and advocacy

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Moderator</th>
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<tr>
<td>15:30-17:30</td>
<td>Parallel workshops</td>
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<tr>
<td></td>
<td><strong>Workshop 1: The epidemiology of RTIs.</strong> Discuss four areas where the WHO can have added value and develop a strategy and plan of action</td>
<td>Carlos Dora</td>
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<td></td>
<td><strong>Workshop 2: Prevention of RTIs.</strong> Discuss four areas where the WHO can have added value and develop a strategy and plan of action</td>
<td>Robyn Norton</td>
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<td></td>
<td><strong>Workshop 3: Advocacy and capacity development.</strong> Discuss educational activities, training programmes and institution building where the WHO can have added value and develop a strategy and plan or action.</td>
<td>Adnan Hyder</td>
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### DAY TWO: Friday 27 April 2001

#### Objective 3: To define partnerships and their roles

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Moderator</th>
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<tbody>
<tr>
<td>8:30-10:30</td>
<td>Other global initiatives addressing road traffic injuries</td>
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<td>* Global Forum</td>
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<td>* GRSP</td>
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<td>* Bone and Joint Decade</td>
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<td>* Cochrane Center</td>
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<td>* CDC</td>
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<td>* Collaborating Centres</td>
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<td></td>
<td>* Discussions</td>
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<tr>
<td>10:30-10:45</td>
<td>Tea/Coffee Break</td>
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<tr>
<td>10:45-12:45</td>
<td>Workshops continued</td>
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<tr>
<td>12:45-14:00</td>
<td>Lunch</td>
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<td>14:00-15:30</td>
<td>Report back from each Workshop (30 minutes for each report back).</td>
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<tr>
<td>15:30 - 16:00</td>
<td>Tea/Coffee Break</td>
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| Objective 4: To inform donors | 16:00-16:30 | Debriefing, proposed strategy and plan of action to participants and invited donors/missions  
*Discussions* | Etienne Krug, Margie Peden, Dinesh Mohan |
|-------------------------------|-------------|-----------------------------------------------------------------|----------------------------------|
|                               | 16:30-17:00 | CLOSING  
Reporting on the outcome of the consultation | Dr D. Nabarro, Executive Director, Director Generals Office |