UNIT 3

Importance of evidence as a foundation for prevention

Overview

To be effective, decision-making and planning interventions for road traffic injury prevention should be based on evidence, not on guesswork. This unit discusses the importance of evidence for planning and developing strategies to prevent road traffic injuries. It justifies the need for evidence, as well as discussing aspects of collecting and analysing data, research capacity and other issues.

Objectives

By the end of this unit, the trainee should be able to:

- state at least three reasons why evidence is important in efforts to prevent road traffic injuries;
- describe the main sources of data and evidence on road traffic injuries;
- discuss the different methods used to collect and analyse data on road traffic injuries;
- explain the importance of research and research capacity in road traffic injury prevention;
- explain ethical issues in research on road traffic injury prevention;
- evaluate the quality of data and evidence on road traffic injury prevention in the trainee's own country.

Why collect data and build evidence on road traffic injuries?

Rational decision-making in public policy, including road safety issues, should be dependent on evidence. Road traffic injury prevention is of concern to many individuals, groups and organizations, all of whom require data and evidence. Different people have their own opinions on what could make the roads safer, but policy decisions for effective road traffic injury prevention need to be based on reliable data and evidence of what works. We put emphasis on sound evidence, because limited resources will be wasted if they are spent on measures that are not effective or have very limited impact. Road safety policies and programmes should therefore be based on reliable and valid evidence. This is not just about collecting data on road traffic injuries; it is also about using the best validated evidence on intervention measures. In fact, there is a need to ensure the reliability not only of the data collected, but also of the methods and instruments used to collect and analyse information to generate evidence.

Reliable data and evidence are essential for:

- describing the burden of road traffic injuries;
- assessing risk factors;
- establishing priorities and allocating resources for prevention of road traffic injuries;
- developing and evaluating interventions;
- providing information for policy-makers and decision-makers;
- raising awareness.

Sources and types of data

Police departments and hospitals provide most of the data used in road traffic injury prevention. In addition to the sources indicated in Table 3.1, data are also available from published documents, such as journals, books and research reports, as well as on the Internet. As a professional in road traffic injury prevention, you can draw on data and evidence from many published sources and from the "grey literature".

A growing source of information are the systematic and comprehensive reviews of road traffic injuries. These reviews synthesize and summarize evidence from research on specific topics. Some are global and others are specific to selected regions and issues. Examples of such reviews are:

- Odero, Garner and Zwi who conducted a review of road safety research in developing countries *(2)*;
- Nordberg who reviewed the status of knowledge on injuries (including road traffic injuries) in Sub-Saharan Africa *(3)*;
- Reviews on such topics as alcohol ignition interlock programmes, helmets and pedestrian education that have been conducted by the Cochrane Injuries Group *(4, 5, 6)*;

TABLE 3.1

Key sources of data on road traffic injuries

Source	Type of data	Observations
Police	Number of road traffic incidents, fatalities and injuries Type of road users involved Age and sex of casualties Type of vehicles involved Police assessment of causes of crashes Location and sites of crashes Prosecutions	Level of detail varies from one country to another. Police records can be inaccessible. Underreporting of injuries is a common problem in all countries, particularly in low-income and middle-income countries.
Health facility settings (hospital inpatient records, emergency room records, trauma registries, ambulance or emergency technician records, health clinic records, family doctor records)	Fatal and non-fatal injuries Age and sex of casualties Costs of treatment	Level of detail varies from one health care facility to another. Injury data may be recorded under "other causes", making it difficult to extract for analysis.
Insurance firms	Fatal and non-fatal injuries Damage to vehicles Costs of claims	Access to these data may be difficult.
Other private and public institutions, including transport companies	Number of fatal and non-fatal injuries occurring among employees Damage and losses Insurance claims Legal issues Operational data	These data may be specific to the planning and operation of the firms.
Government departments and specialized agencies collecting data for national planning and development	Population denominators Income and expenditure data Health indicators Exposure data Pollution data Energy consumption Literacy levels	These data are complementary and important for analysis of road traffic injuries. The data are collected by different ministries and organizations, though there may be one central agency that compiles and produces reports, such as statistical abstracts, economic surveys and development plans.
Special interest groups (research institutes, advocacy nongovernmental organizations, victim support organizations, transport unions, consulting firms, institutions involved in road safety activities, and others)	Number of road traffic incidents, fatal and non-fatal injuries Type of road users involved Age and sex of casualties Type of vehicles involved Interaction of victims with vehicles Causes Location and sites of crashes Social and psychological impacts Interventions	The various organizations have different interests.

Source: reproduced from reference *1.*

- Elvik and Vaa who assembled information from more than 1700 studies on the effects of road safety measures, covering land use planning, road safety audits, provision of medical services, road design, road maintenance, traffic control, vehicle design, vehicle inspection, requirements for drivers, road user education and enforcement *(7)*.

Activity

Task

Based on Table 3.1, describe the status of at least two of the sources of data on road traffic injuries available in your country.

Expected results

The purpose of this exercise is to help trainees review the kind of data collected and kept by different agencies in their countries. Trainees are expected to comment on how adequate the data are and if this information is made readily available to users.

Injury surveillance systems

Injury surveillance is ongoing systematic collection, analysis and interpretation of health data essential to the planning, implementation and evaluation of health practice, closely integrated with the timely dissemination of these data to those who need to know. The final aspect of the surveillance chain is in the application of these data to prevention and control *(8)*. A surveillance system includes capacity for collecting data, analysing them and disseminating them for public health interventions. There are several types of surveillance systems. These can be universal (whole population), based on sampling (e.g. one week of each month), based on registries, or based on settings or jurisdictions. An injury surveillance system is a subset of surveillance that is specific to different types of injuries. It is a useful source of injury data routinely collected in the health-care setting and by other agencies or institutions. It therefore presents the first approach to obtaining data on road traffic injuries. Several steps are needed to create a successful injury surveillance system (Box 3.1).

BOX 3.1

Designing and building a surveillance system

Key steps, in order, include:

- *Identification of stakeholders*. Identify agencies that need information on injuries to set prevention priorities and to evaluate their work. Agencies should not only be within the health sector, as much injury information is actually collected within other sectors such as transport or police.
- *Definition of the objectives of the system.* These objectives should address why studying a particular injury problem or group of injury problems is necessary; the type of surveillance to be used should be defined.
- *Definition of a case.* This definition determines whether or not events will be counted or classified in one way or another: different sectors and disciplines frequently define cases differently. Arriving at a common definition of a case is thus essential.
- *Identification of data sources.* Quality and reliability of sources need to be considered.
- *Assessment or evaluation of the existing resources to be used by the system.* Evaluate the expertise of the personnel, the existence of adequate technological and logistic resources, as well as the actual functioning of the agencies involved. The environment where data are gathered is also important, not only to ensure completeness and reliability, but also for providing injured people or their relatives with the best possible environment in which to address their needs.

BOX 3.1 (continued)

- *Inclusion and participation of stakeholders all along the process.* Agency involvement in decision-making processes can improve the functioning of the system by addressing and responding to agency-specific concerns.
- *Definition of data needs.* Define what types of variables will or will not be collected. There are some basic or core minimum data that need to be collected for an injury surveillance system to be effective.
- *Collection of data.* Data collection needs to start once the preceding steps have been taken. A good strategy to save time and resources is to build surveillance systems on already existing sources of information. If the use of multiple independent systems is involved, then interagency agreements will be necessary, and adequate conceptual and technical knowledge on linkage of information will be needed.
- *Establishment of a data processing system.* This includes the creation of written protocols for data collection and transmission, and defines whether these operations will be done manually or electronically. Data processing is best done electronically, and can use software that is readily and freely available. Analysis of the data implies that technical expertise for this purpose already exists among the surveillance system personnel.
- *Design and distribution of reports based on the analysed data.* Frequent reporting can keep stakeholders up to date on injury issues relevant to them. These reports are the means by which results are conveyed to stakeholders. In general, they should be produced and distributed regularly, at least quarterly.
- *Training of staff and activation of the system.* Training should occur at three levels, with everyone taking the first level and selected individuals taking the other two. The first level of training should include basic concepts of epidemiology and surveillance, and an overview of the system. The second level should include detailed review of forms, with emphasis on the categories of data and coding, and knowledge on required procedures to obtain the data, including confidentiality guarantees. The third level should include hands-on practice in extracting information, coding it and transmitting it. The activation of the system can actually be conducted as part of an exercise, thus allowing people to get acquainted with all the procedures and work routines.
- *Monitoring and evaluation of the system.* This should be continuous and should address any gathering, reporting or analysis problems. A feedback process is required to inform those responsible for data collection of the strengths of the data collected and any deficiencies that require attention.

All steps indicated above are directed towards using the results to plan interventions. This is the ultimate purpose of a surveillance system. Having a surveillance system for the sake of having information is a waste of resources. This information must be shared and must be provided as a basis for key persons to make informed decisions on what are the best health options for the population.

Source: references *8, 9.*

Most countries have some form of national system for aggregating data on road traffic crashes using police records or hospital records, or both. However, the quality and reliability of data vary between surveillance systems in different countries. For road traffic injuries, certain key variables need to be collected. WHO's guidelines for developing and implementing injury surveillance systems in hospital settings contain recommendations on the core minimum data set and supplementary data that should be collected on all injury patients, including road traffic casualties *(8)*. These include age, sex, place of injury, activity at time of injury, mode of transport, road user, alcohol use, and nature of injury.

Community-based surveys

A second approach to gathering data on road traffic injuries is to conduct community-based surveys (sometimes called household surveys). Some injured patients fail to reach hospitals for a variety of reasons, in which case they will not be registered in hospital-based injury surveillance systems. Community-based surveys offer useful information on injuries. WHO has developed guidelines for conducting community surveys on injuries and violence, which provide a standardized methodology for carrying out such studies *(10)*. Community surveys have the advantage that they can be designed for local needs and adapted to resources available. Such surveys provide more comprehensive data on injuries in a defined population or setting, and can help in prioritizing problems at hand and getting the attention of local stakeholders.

Studies on selected themes

A third approach is to conduct studies on particular themes related to road traffic injuries and transport. Examples are road user surveys, roadside surveys, origin-destination surveys, pedestrian surveys, cyclist surveys and speed surveys – as well as studies on such issues as alcohol use and the cost of crashes. Different designs can be used (Box 3.2). These studies may arise from the need for specific information that is not available from surveillance systems or

BOX 3.2

Examples of epidemiological studies

Two examples of epidemiological studies are case-control and cohort studies.

Case-control studies

A case-control study is an analytic study in which the researcher identifies persons with a specific injury or condition (the outcome) and selects a comparison group consisting of persons without the injury. The proportion of each group with evidence of a particular exposure (for example, motorcyclists wearing helmets) is then compared.

Cohort studies

The cohort is made up of two groups: the target individuals who have a particular exposure and the comparison individuals who do not have that particular exposure. The study follows the cohort over a defined period of time. Cohort studies are generally not used when the outcomes are rare or if they occur long after exposure. Another difficulty of cohort studies is that individuals are likely to drop out before the study is completed for reasons such as changing jobs or moving to another town.

Source: references *11*.

BOX 3.3

In-depth crash analysis

While primary level data are useful, such data are generally not adequate for evaluating the effectiveness of changes in road or vehicle design or enforcement methods. For such evaluations, it is necessary to conduct special studies and collect data in much greater detail than available from primary sources. These in-depth studies require people specially trained for the task.

After a particular problem or safety target has been identified (in terms of a geographical area, a road location, a type of incident, or a group of road-users involved), a representative sample of crash reports is drawn from the police or court records, covering one or two recent years. The sample size required is based on the prevalence of the risk factors to be considered, along with features such as the ability to make comparisons between different road types, regions, and road users. Advice of a statistician is necessary to determine how large the sample needs to be.

Each crash process is reconstructed separately, by one to three people, using a multidisciplinary approach. Objective data are used as a framework against which to assess and interpret the verbal accounts provided by the road users involved and the witnesses. The more incomplete the crash record, the more interpretation will be necessary. Often, field visits to typical crash locations may be necessary to check some factors related to infrastructure or current behaviour. In order to obtain reliable results, practical training of the multidisciplinary team is important.

Because the data used are not intended for diagnostic purposes, some uncertainty remains in most reconstructions of crash processes: in some cases, several possible scenarios could explain how a crash occurred, and the various factors identified in these scenarios are considered as probable rather than definite. After the crash-generating processes have been reconstructed for the whole sample and the main probable factors identified, these are aggregated to identify the most prominent ones that corrective measures should primarily seek to address.

Source: reference *11*.

community surveys. Questionnaires are the most common survey instruments. Other approaches include direct observations, physical examinations, laboratory tests, and environmental measurements. In-depth crash analysis and complementary investigation can also be undertaken (Boxes 3.3 and 3.4).

Linking and sharing data

Road traffic injury data and evidence are collected and stored by a range of agencies. This is in itself a positive feature, as it reflects the multisectoral nature of the problem. However, it also raises important issues to do with access, harmonization and linkages between different data sources and users. Ideally, where there are a number of data sources available, it is important that the data should be linked, to obtain maximum value from the information. However, for many countries, especially those with a number of systems at the local level, this is not always the case. A major problem is coordination and sharing of information among different users. While there are usually issues of confidentiality and other legal restrictions involved, ways should be found of summarizing the relevant information and making it available, without violating any legal prohibitions.

BOX 3.4

Complementary investigations

Complementary investigations are needed to further explain or verify the conclusions of road crash analysis. The investigations should focus on:

- road surveys of hazardous crash locations, aimed at verifying that items of road design or of behaviour, identified from crash analyses as probable causal or risk factors, are real and relevant;
- road inventories, aimed at identifying the most current defects in road design and maintenance that may be dangerous and, more specifically, at identifying the items in the road environment that may be causal or risk factors, and checking their location and frequency;
- on-the-road vehicle surveys, aimed at assessing the quality of safety-oriented components of vehicle fleets.
- behavioural observations, aimed at assessing the frequency of dangerous behaviours identified from in-depth crash analyses, and at understanding their determinants;
- general road-user surveys, aimed at describing public opinions and attitudes towards traffic, safety conditions and safety rules, and at relating them to crash characteristics and factors, in order to be able to improve road-user information and education;
- specific road-user surveys, aimed at clarifying particular risk factors by quantifying exposure;
- specific road-user surveys, aimed at assessing the public acceptance of specific measures.

Source: reference *11*.

Data processing, analysis and dissemination

Data collected from primary and secondary sources need to be analysed to answer such questions as:

- What are the most common causes and types of road traffic injuries in different age groups?
- What are the characteristics of persons who are injured?
- What are the circumstances under which road traffic injuries are most likely to occur?
- What policies and programmes can reduce the likelihood and severity of road traffic injuries?

Analysing data, producing regular outputs and disseminating information on road traffic injuries are all vital activities. For the purposes of data analysis, there are various software packages available, for example Epi Info and Statistical Package for Social Scientists (SPSS). These packages can build automatic validity checks and quality control into the data management process. Software packages also provide powerful analysis features for diagnosing problems, enabling rational decisions to be made on priorities for intervention.

It is necessary to share and disseminate data and evidence on road traffic injuries with colleagues, other researchers, policy-makers, victims, and the community at the local, national and international levels. Though writing reports and articles is central to research, this should not be an end in itself. Information systems on road traffic injuries need to allow all appropriate outside bodies access and ensure that the information is effectively distributed. The design of databases should therefore take account of the principal needs of their users, providing high quality data without overburdening those collecting the data. Databases

also require sufficient resources to ensure their sustainability. Countries should collaborate and help support regional and global systems, so that the monitoring and evaluation of road safety can be improved and sustained.

Data issues and concerns

There are a number of issues and concerns about road traffic injury data. These are summarized below.

Indicators

Indicators are important not just for measuring the magnitude of a problem but also for setting targets and assessing performance. The most frequently used absolute and relative indicators for measuring the magnitude of the road traffic injury problem are presented in Table 3.2. There is still a need for these measures to be refined and for new ones to be explored. Road traffic injury measures need to take into account other changes taking place that can

TABLE 3.2

Examples of commonly used indicators of the road traffic injury problem

Index	Description	Use and limitations
Number of injuries	Absolute figure indicating the number of people injured in road traffic crashes Injuries sustained may be serious or slight	Useful for planning at the local level for emergency medical services Useful for calculating the cost of medical care Not very useful for making comparisons A large proportion of slight injuries are not reported
Number of deaths	Absolute figure indicating the number of people who die as a result of a road traffic crash	Gives a partial estimate of the magnitude of the road traffic injury problem, in terms of deaths Useful for planning at the local level for emergency medical services Not very useful for making comparisons
Fatalities per 10 000 vehicles	Relative figure showing ratio of fatalities to motor vehicles	Shows the probability vehicle involvement in fatal crashes A limited measure for assessing safety in a society because it omits non-motorized transport and other indicators of exposure. Usually declines with motorization
Fatalities per 100 000 population	Relative figure showing ratio of fatalities to population	Shows the impact of road traffic crashes on human population as a public health problem Useful for comparing road traffic injuries as a health problem in different communities Useful for estimating severity of crashes
Fatalities per vehicle-kilometre travelled	Number of road deaths per billion kilometres travelled	Useful for some international comparisons, decreases with motorization Does not take into account non-motorized travel
Disability-adjusted life years (DALYs)	Measures healthy life years lost to disability and mortality One disability-adjusted life year (DALY) lost is equal to one year of healthy life lost, either due to premature death or disability	DALYs combine both mortality and disability DALYs do not include all the health consequences associated with injury, such as mental health consequences

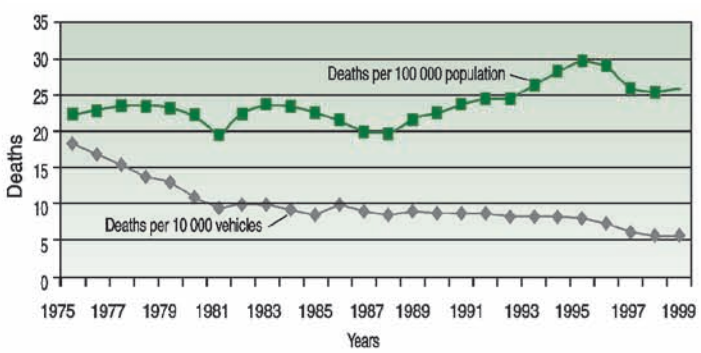
Source: reproduced from reference *1*.

indirectly affect road traffic injury, such as increases in population and in transport. When monitoring safety, changes in transport, movement patterns and motorization are important.

Two very common indicators are the number of deaths per 100 000 population, and the number of deaths per 10 000 vehicles. However, both of these indicators, have limitations regarding their reliability and validity that place restrictions on how they can be used and interpreted. The number of deaths per 100 000 population is widely used with reasonable confidence to monitor changes over time in "personal risk" levels and to make comparisons between countries. Errors in population statistics are assumed to have little impact on the observed changes or comparisons. The number of deaths per 10 000 vehicles relies on vehicle registerations as an estimate of motorization. However, it is more problematic as there can be errors in country databases because of delays in adding or removing records of vehicles. Furthermore, changes in vehicle numbers do not generally provide a good estimate of changes in exposure to risk on the road network, especially when making comparisons between countries. An example from Malaysia in the use of these two indicators is presented in Figure 3.1. The figure shows that since 1975 Malaysia has experienced a continuous decline in deaths per 10 000 vehicles, whereas the rate of deaths per 100 000 population has shown a slight increase. Over the same period, there has been a rapid growth in motorization and increased movement among Malaysia's population. The opposing trends in the two indicators reflect the fact that road traffic fatalities have increased more slowly in Malaysia than the growth in the vehicle fleet, but that they have increased a little faster in recent years than the growth in the population.

FIGURE 3.1

Road traffic deaths in Malaysia



Source: reproduced from reference *1*.

Activity

Task

Using the example presented in Figure 3.1, draw graphs showing the trend in fatalities per 10 000 vehicles and fatalities per 100 000 persons for any country of your choice. The trainer is expected to provide data on motor vehicles, population and road traffic fatalities for a period of at least 10 years for selected countries. Where possible, the trainer should ask trainees to look for the data before the training session. This may be possible in situations where trainers have contact with trainees several days before the training session.

Expected results

This exercise seeks to give trainees a practical exercise to compute the two indicators, draw graphs and describe the trends that emerge.

Definitions and standardization of data

There are a number of potential problems with the definitions of a road traffic death or injury, arising from:

- variations in the interpretation of the specified time period;
- the actual interpretation of the definition in different countries and by different people recording the information;
- differing levels of enforcement;
- differing techniques for assessing the severity of injuries.

The most commonly cited definition of a road traffic fatality is: "any person killed immediately or dying within 30 days as a result of an injury accident"*(12)*. However, a recent study has revealed considerable variations in working definitions of the period used to define a road traffic

fatality. For example, in the European Union, Greece, Portugal and Spain use 24 hours, France uses 6 days, Italy uses 7 days, and the other countries use 30 days *(13)*. To adjust for this variation, correction factors are applied to arrive at a 30-day equivalent. However, such factors introduce uncertainty as to what the real numbers would be at 30 days.

There are a number of other problems of definition relating to the classification of injury, including:

- the method of assessment;
- the location of a fatal crash – whether on a public or private road;
- the mode of transport – with some classifications emphasizing the presence of at least one moving vehicle;
- the source reporting the data – whether police or a self-report;
- whether or not to include confirmed suicides;
- whether or not postmortem examinations are routinely conducted on road traffic deaths.

Problems of definition also arise with regard to survivors of road traffic crashes, including:

- the actual definition and interpretation of a serious injury in different countries;
- whether the police, who record most of the information, are sufficiently trained to ascertain and correctly assign injury severity.

Road traffic injury and death data can be missed by the data collection system because of different definitions used in different countries and contexts. This highlights the need for definitions to be standardized and applied across different countries and settings.

Underreporting

Underreporting of both deaths and injuries is a major global problem affecting not only low-income and middle-income countries but also high-income ones. Underreporting can arise from:

- a failure on the part of the public to report;
- the police not recording cases reported to them;
- hospitals not reporting cases presenting to them;
- an exemption for certain institutions, such as the military, from reporting directly to the police;
- victims sometimes being unable to afford to attend hospital, especially in some low-income and middle-income countries.

The problem of underreporting highlights a number of other structural, methodological and practical issues affecting the quality of data collected on road traffic injuries, including:

- the coordination and reconciliation of data between sources;
- the harmonization and application of agreed definitions – especially the definition of a road crash fatality;
- the actual process of classification and the completion of data forms.

These problems make it difficult to obtain reliable estimates of road traffic fatalities and injuries worldwide, and also for certain countries. Harmonization of data at the national and international levels can be facilitated by adopting international definitions. The International Classification of Diseases (ICD-10) *(14)* and the Abbreviated Injury Scale can be used for non-fatal road crash injuries *(15)*. Agreements to adhere to regional systems such as the International Road Traffic Accident Database and the Asia–Pacific Road Accident Database will encourage uniformity of definitions.

Other issues

Studies have uncovered a number of other problems related to road traffic injury data and evidence. These include:

- missing information within individual records;
- the unavailability of certain specific data – for example, the crash location, type of injury, and identification of the vehicle in which the casualty occurred;
- the scientific soundness of the methods used;
- inadequate quality control;
- lack of data collection on cycling and walking in transport information systems;
- lack of data on exposure;
- the accuracy and completeness of police assessment of cause of crash;
- lack of rigorous evaluation of interventions, particularly in low-income and middle-income countries.

Research and research capacity

Research forms the basis for generating data and evidence for informed and effective decision-making. Developing research capacity nationally is important for road traffic injury prevention (Boxes 3.5, 3.6, 3.7). Without research capacity, there exist few means to overcome misconceptions and prejudices about road traffic injuries *(1)*. National and community research – as opposed to solely relying on international research – is important for identifying local problems and localized groups who are at increased risk of road traffic injuries. It also helps to ensure a cadre of national and local professionals who can use research findings to assess the implications for policy and programmes. The national evaluation effort needs to be led by research professionals, since it is only through implementation and thorough evaluation that effective programmes evolve. The independence of research and its separation from the executive function in developing public policy is necessary for ensuring quality, and it protects the research body against political pressures.

Ethical issues in road traffic injury research

Research into road traffic injuries must take into consideration ethical issues. Research ethics deals with questions concerning the professional and moral responsibility of the researcher in relation to the subjects of study, the research sponsors, the general public, and his or her own beliefs. A conflict of interest can easily arise because of the values and interests of different groups involved in research. It must be noted that each of the stages of the entire

BOX 3.5

What are some of the research needs in the area of road traffic injury prevention?

There are many research-related needs for road injury prevention but there is a pressing need for better collection and analysis of data to enable more reliable estimates to be made of:

- the burden of road traffic injuries on different road users;
- the economic and social impacts of road traffic injuries;
- the effectiveness of specific interventions for road traffic injuries;
- the adequacy of design standards and guidelines for intercity roads carrying mixed traffic.

The following specific areas require research:

- how best to assess the effectiveness of packages of road safety measures combining different actions — such as area-wide traffic calming and urban design;
- the interaction between transport planning and urban planning, and how these affect road safety;
- the design of roads and traffic management, taking into account traffic environments and traffic mixes encountered in specific locations;
- how various types of successful preventive measures can be transferred between countries with differing socioeconomic conditions and differing rates of motorization and traffic mixes;
- how improvements in post-impact care can be made at an affordable cost;
- mechanisms causing head injury and whiplash injury in road crashes, and treatments for these injuries;
- how to harmonize to incompatibility between vehicles of different sizes involved in crashes
- how to manage exposure to risk — the least-used strategy.

Source: reference *1*.

BOX 3.6

Research capacity development

The development of national research capacity is urgently needed in many parts of the world. Experience from many countries that have been successful in reducing the incidence of traffic injuries shows the importance of having at least one — preferably independent — adequately funded national organization that deals with road safety research. Countries that have encouraged the development of professional expertise across a range of disciplines at national level, and regional cooperation and exchange of information, have reaped much benefit. Developing these mechanisms should be a priority where they do not exist.

In the field of road traffic injury prevention, several types of initiatives can provide models for capacity development:

- Network development at the institutional level allows for exchange of information, the sharing of experiences, and the fostering of collaborative projects and research studies. WHO's Collaborating Centres for Violence and Injury Prevention are one global example of this model. A regional example is the Injury Prevention Initiative for Africa.
- Another model is to support schemes that allow scientists and professionals to exchange research ideas and findings, develop proposals, mentor less experienced researchers, and carry out research directed at policy-making. The Road Traffic Injuries Research Network is an example of such a framework that focuses on assisting researchers from low-income and middle-income countries.
- A third model for capacity development is to strengthen university departments and research institutes so as to generate a critical mass of appropriately trained professionals. The Indian Institute of Technology (New Delhi) and University Putra Malaysia are examples of centres with regular training programmes on road safety.
- A fourth model is to strengthen the career development pathways of trained professionals. This is important both for attracting and retaining valuable human resources. Part of such a strategy includes establishing positions for road traffic injury prevention in appropriate ministries – such as those of health and transport, and finding incentives to encourage professionals in such posts to perform at a high level.

Source: reference *1.*

research process may involve ethical considerations, in addition to scientific issues. There are guidelines to assist researchers in approaching ethical issues in a professional manner. These guidelines focus on relations between researchers and subjects of study, confidentiality, anonymity, accountability, responsibility and privacy. Researchers need to follow national guidelines on research ethics. These are published and available in different countries.

Key points

- Effective decision-making and planning should be based on evidence, and should not promote strategies that have no evidence supporting their effectiveness.
- Reliable data and evidence are essential for describing the burden of road traffic injuries, assessing risk factors, establishing priorities for prevention, developing and evaluating interventions, providing information for policy-makers and decision-makers, and raising awareness.
- Police departments and hospitals provide most of the data used in road traffic injury prevention. In addition, data are also available from published documents and research reports, as well as on the Internet.

BOX 3.7

Technology and evidence transfer from high-income countries

Transport system priorities developed in high-income countries may not always fit well with the safety needs of low-income and middle-income countries for a variety of reasons, including the differences in traffic mix. In low-income countries, walking, cycling, motorcycling and use of public transport are the dominant transport modes. In North America and Europe, car ownership is high, there are between two and three people per car, whereas in China and India car ownership is much lower, about 280 and 220 people per car, respectively. While it is predicted that car ownership will increase in China and India, it will still remain low in terms of cars per capita for another 20–30 years. With a low rate of car ownership, there is a much wider mix of road users — pedestrians, riders of bicycles, motorcycles and three-wheeled vehicles, and drivers and passengers of cars, trucks, buses, and vehicles pulled by humans and animals. These modes of transport operate at different speeds. Technology transfer, therefore, needs to be appropriate for the mix of different vehicle types and the patterns of road use in a particular place.

Road safety in countries that are in the process of becoming motorized is further hindered by the perception that current levels of walking, cycling and motorcycling are temporary. Such a view may have arisen through imported expertise from developed countries as much as from domestic sources. This tends to lead to models of infrastructure from developed countries being adopted to cater to the longer-term transport needs. However, in most low-income countries, safety should be promoted within existing conditions, and these include: low per-capita incomes, the presence of mixed traffic, a low capacity for capital intensive infrastructure, and a different situation as regards law enforcement.

In high-income settings, strategies and programmes for traffic injury prevention generally require considerable analysis and planning beforehand. Priority should be given to importing and adapting proven and promising methods from all nations, and to pooling information among low-income countries as to their effectiveness in the imported settings.

Source: reference *1*.

- Since road traffic injury data and evidence are collected and stored by a range of agencies, there is a need to ensure access, harmonization and linkages between different data sources and users. Ideally, where there are a number of data sources available, it is important that the data should be linked, to obtain maximum value from the information.
- There are a number of areas where road traffic injury data are often problematic. These include: integration of sources of data – from police or the health system; the types of data collected; inappropriate use of indicators; non-standardization of data; definitional issues related to traffic deaths and injuries; underreporting; and poor harmonization and linkages between different sources of data.
- National and community research – as opposed to relying solely on international research – is important for identifying local problems and localized groups at increased risk of road traffic injuries.
- Research on road traffic injuries, like any other research activity, must take into consideration ethical issues.

Definitions of key concepts

- Evidence: proof or the grounds for demonstrating the validity of a knowledge claim.

- Research design: a set of concise, clear instructions or procedures indicating how to conduct research.
- Ethics: principles of morality, particularly those dealing with the rights and wrongs of an action, such as the rules of conduct for members of a particular profession.

Questions to think about

a) Based on your experience, identify any two major decisions you have made in the past regarding road traffic injury prevention. Explain what was the basis for making these decisions. Did you consider the body of evidence around this issue when making the two decisions?

b) Discuss the prevailing situation with regard to coordination and sharing of data among agencies that collect information on road traffic injuries in your country. If you identify limited coordination and linkage, indicate steps that can be taken to improve this situation.

c) There is a general concern about the gap between evidence and policy implementation. Does this situation exist in your country with respect to road traffic injury prevention? If so, what leads to this? What steps can be taken to address this situation?

d) Underreporting of both deaths and injuries is a major global problem affecting not only low-income and middle-income countries but also high-income countries. What is the situation in your country? What efforts have been made to address this problem?

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Further reading

Rosman DL, Knuiman MW. A comparison of hospital and police road injury data. *Accident Analysis & Prevention*, 1994, 26:215-222.

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Notes

Trainee's evaluation of Unit 3: Importance of evidence as a foundation for prevention

This form is to be completed by the trainee at the end of this unit to assess the content and approach used. This evaluation is helpful to the trainee, trainer and developer of this manual.

1. To what extent did you achieve the objectives set for this unit? (Please check once using "X" for each objective)

Objectives	Completely successful	Generally successful	Completely unsuccessful
State at least three reasons why evidence is important in efforts to prevent road traffic injuries.			
Describe the main sources of data and evidence on road traffic injuries.			
Discuss the different methods used to collect and analyse data on road traffic injuries.			
Explain the importance of research and research capacity in road traffic injury prevention.			
Explain ethical issues in research on road traffic injury prevention.			
Evaluate the quality of data and evidence on road traffic injury prevention in the trainee's own country.			

2. What is your overall rating of the content presented in this unit? (Please check one using "X")

Scale	Excellent	Better than expected	Satisfactory	Below average
Rating				

3. How do you rate the balance between theoretical and practical content in this unit? (Please check one using "X")

Scale	Good balance	Too theoretical	Too practical
Rating			

4. a) Did you find the activities presented in the unit helpful? (Please check one)

   Yes_____ No_____

b) If yes, in what ways were they helpful? What improvements do you suggest?

c) If no, what were the shortcomings? What suggestions do you have to make them helpful?

5. What did you like most about the unit?

6. What did you like least about the unit?

7. What did you learn most from this unit?

8. Explain how your organization, community, city and country, and other interested parties will benefit from your having read this unit.

9. What do you think should be added to this unit?

10. What do you think should be dropped from this unit?