2

How to conduct a situational assessment

Module 1 explained why good data systems are required for effective prevention of road traffic injuries and efficient targeting of resources. Module 2 provides users with guidance on how to assess what data and systems are currently available in their country, and where the gaps are. This information is important for choosing the appropriate course of action and for persuading political leaders to support the development, strengthening or adaptation of data systems. This will enable the true scale of road traffic injuries to be assessed, and countermeasures and strategies to be developed and evaluated.

The sections in this module are structured as follows:

- **2.1 Why do you need to assess the situation?** A thorough and well-planned assessment of the current data situation is a prerequisite for arguing the case for improved road safety data, and for informed decision-making about what action to take.
- **2.2 Steps for conducting a situational assessment:** This section provides guidance on identifying road safety data stakeholders; identifying data sources and systems and their characteristics; assessing data quality; identifying the needs of end-users; and identifying political factors that help or hinder the process.
- **2.3 Use the situational assessment to prioritize actions:** This section provides brief guidance on determining the next steps, with more detailed guidance provided in module 3.

2.1 Why do you need to assess the situation?

Before starting to improve or build road safety data systems, a well-planned and thorough situational assessment is necessary. It is often preferable to build on existing data systems rather than create something entirely new, so it is critical to have a solid understanding of what is already available, and the limitations thereof.

The main objectives of a situational assessment are to identify:

- people and agencies involved in the collection, processing and use of road safety data;
- data sources and systems already in place, and their strengths and limitations;
- the needs of end-users;
- political factors that will help or hinder the improvement of road safety data systems.

Information gained through the situation assessment is critical for arguing the case for improved road safety data, and for choosing the appropriate course of action (see section 2.3 and module 3).

2.2 Steps for conducting a situational assessment

This section sets out a series of steps designed to provide a thorough picture of the road safety data situation. These steps can be taken at national or local level. Situational assessments are often time-consuming and can be complex in large jurisdictions with many road safety stakeholders, so assistance from a consultant or academic institution may help the process.

The steps for conducting a situational assessment are:
- stakeholder analysis
- assessment of data sources and existing systems
- end-user needs assessment
- environmental analysis.

Module 1 summarized the main types of information required for monitoring road safety performance. They are:
- final outcomes (e.g. deaths and serious injury resulting from road traffic crashes);
- exposure measures (e.g. demographic data, information on vehicle fleet and traffic volume);
- intermediate outcomes (e.g. helmet-wearing rates, mean traffic speeds);
- socio-economic costs;
- institutional delivery output.

Where time and resources permit, a situational assessment should cover data sources, systems and end-user requirements relevant to each of these. However, such an undertaking is not always feasible. Many jurisdictions begin their quest to improve road safety data by focusing on final outcomes. In recognition of this, the guidance in this manual for situational assessment (this module) and follow-up actions (module 3) focuses on data related to final outcomes, and touches on exposure measures – these are useful aids for interpreting final outcome data. Guidance for assessing data related to intermediate outcomes can be found in other manuals in this series (helmets, drinking and driving, speed management, seat-belts and child restraints) and in the *SafetyNet manual on road safety performance indicators* (*1*).

The World Bank Global Road Safety Facility has recently published guidelines that outline detailed steps for assessing road safety management capacity. These guidelines contain a series of checklists and strategies that are complementary to the steps for situational assessment described in this manual (*2*).

2.2.1 Step one: stakeholder analysis

The *primary function* of a stakeholder analysis is to identify organizations and individuals who have an interest in the collection and/or use of road safety data,

including potential partners and those who might initially oppose efforts to improve or implement a data system.

Stakeholders most involved with road safety data are the police, health authorities and transport bodies. Within these sectors, road safety is of particular relevance to:

- traffic police who enforce traffic legislation and investigate road traffic crashes;
- trauma specialists and other doctors who deal with those injured in road traffic crashes, and epidemiologists/public health specialists in injury prevention;
- transport and civil engineers who construct roads, and whose remit includes identifying and remedying road defects and errors in traffic patterns that contribute to road traffic crashes.

Other stakeholders may include representatives of the national statistics office, the insurance industry, non-governmental organizations working for road safety, academic institutions, international donor agencies that fund road building and maintenance initiatives, the automobile industry, and media and policy-makers who might utilize or facilitate better road safety data systems.

The *second function* of stakeholder analysis is to examine the roles and activities of all stakeholders. A careful analysis should be made of the influence and interests of all major stakeholders (e.g. their expectations in terms of benefits, changes and adverse outcomes), as this will help in designing appropriate ways to approach them. It is especially important to identify supporters and opponents, and, moreover, to appreciate the reasons for their respective positions, so as to be able to develop a solution that satisfies all concerned.

A *third function* of the stakeholder analysis is to decide how stakeholders should be involved in the process to ensure the best chance of success for the programme, in particular:

- the nature of their participation (e.g. as advisers or consultants, or as collaborating partners);
- the form of their participation (e.g. as a member of a working group or as an adviser);
- the mode of their participation (e.g. as an individual participant or as a representative of a group).

The results of the stakeholder analysis (see Box 2.1 for checklist) should give you a clear idea of who your potential partners and opponents are, possible conflicts of interest, and some of the challenges that might arise. You may wish to convene a working group now to ensure that stakeholders are engaged in a positive manner at an early stage. Be sure to include those involved in existing data collection mechanisms, whose daily work will be affected substantially by any changes. Building a good relationship with key stakeholders will facilitate other steps of the situational assessment (e.g. understanding the data and systems that each is working with, and identifying end-user data needs).

BOX 2.1: **Checklist for stakeholder analysis**

- Have you identified all stakeholders in the law enforcement, transport and health sectors?
- Have you identified other types of stakeholders (e.g. insurance industry, NGOs, academic institutions, automobile industry)?
- Have you identified the activities and roles of each stakeholder in relation to road safety data?
- Have you identified the stakeholders who will be key supporters or opponents?
- Have you convened a stakeholder meeting, including supporters and opponents, data collectors and data users?

2.2.2 Step two: assess data sources, systems and quality

When considering road crash data systems, it is important to know what information is already collected and by whom, how it is managed, and the coverage and quality of the information. Different institutions collect information about the same road traffic crash using various techniques, via interview and/or direct observation and measurement. There may already be mechanisms in place to aggregate these data within or across sectors. In most cases it is more efficient to build on an existing system than to create something new.

Rarely will one person, or even one agency, be able to answer all the questions raised by this step of the situational assessment, so a stakeholder working group may be needed.

Assess data sources

The first step is to identify what information on road traffic injuries is already collected (see Box 2.2). For each data source, you need to describe:

- what information or **variables** are collected (particularly specific location data, road user type and transport mode);
- the **format** of the data (is it hard-copy only or are there electronic records. How is it coded?);
- the **system** used to store the data (can range from a filing cabinet of paper reports to a complex electronic database) and to process the data (ranging from tallies done by hand to computerized analysis).

In many countries, police records constitute the main (and sometimes only) source of information on road traffic injuries. Start with an inventory of police data, next consider death certificate and medical examiner data, then move on to hospital data,

BOX 2.2: **Data sources for fatal and non-fatal road traffic injuries**

Data sources for fatal road traffic injuries may include:
- death certificates or other means of vital registration
- police collision reports
- autopsy/pathology reports
- verbal autopsy studies
- insurance records
- media reports.

Data sources for non-fatal road traffic injuries may include:
- police collision reports
- accident and emergency department records
- trauma registries
- hospital in-patient records or discharge data
- ambulance records.

Other data sources may include:
- vehicle and driver insurance company records
- surveys and scientific studies.

and finally insurance data. Each of these sources has its own set of strengths and limitations (see Table 2.1).

If there is no systematic aggregation of existing routine data sources, then much more attention should be given to assessing the information available from surveys and scientific studies. While information from these sources is generally not detailed and reliable enough to form the basis of a road crash data system, it can be used to get a 'snapshot' of the road safety situation, or to help improve estimates from other sources, such as vital registration or police data. Road traffic injuries may be the primary topic of these surveys, or there may be questions related to road safety included in more general surveys. Sources may include recurring national surveys (e.g. national demographic and health surveys, national income and expenditure surveys), verbal autopsy studies, community-based surveys, or scientific studies on specific aspects of road safety (see Case study 2.1).

NOTE

If data collected through conventional methods are hard to find, then newspaper reports can be used to give you a rapid overview of the situation, as many severe crashes are published or appear on television. However, the information may be limited or biased. Nonetheless, assessing newspaper reports may provide an important opportunity for road safety practitioners to influence the accuracy and coverage of these reports in their country in order to better inform the public (3).

Table 2.1 Key sources of road traffic injury data

Source	Type of data	Observations
Police	Number of road traffic incidents, fatalities and injuries Road users involved Age and sex of casualties Vehicles involved Police assessment of causes of crashes Use of safety equipment (e.g. helmets) Location and sites of crashes Prosecutions	Level of detail varies from one country to another. Police records can be inaccessible. Under-reporting is a common problem. Precise location data (e.g. map coordinates) may not be available.
Health settings (hospital in-patient 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 Alcohol or drug use	Level of detail varies from one hospital to another. Cause of injury may not be properly coded, making it difficult to extract road traffic injury data for analysis. Difficult to define catchment population.
Vital registration	Fatal injuries Age and sex of casualties Type of road users involved	Cause of death may not be properly coded, making it difficult to extract road traffic injury data for analysis. Population coverage may be poor.
Insurance firms	Fatal and non-fatal injuries Damage to vehicles Costs of claims	Frequently regarded as commercially sensitive, so access to these data may be limited.
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 estimates 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 The type of road users involved Age and sex of casualties Vehicles involved Causes Location and sites of crashes Social and psychological impacts Risk factors Interventions	The various organizations have different interests. Data collection and research methods may not be sound.

Source: Based on (4)

CASE STUDY 2.1: Road traffic injury data from surveys, Mozambique, Cambodia, Uganda and India

Community surveys

A community survey* was conducted in Uganda to describe and contrast injury patterns in urban and rural areas. Community health workers used a standardized questionnaire (*5*) to interview adult respondents representing households selected through a sampling procedure. About 1 600 households were surveyed in one rural district, and about 2 300 in one of the five divisions of Kampala.

Fatal injury rates were extremely high in both areas: 92 deaths per 100 000 people in the rural district and 217 per 100 000 in the urban district. Road crashes were the second leading cause of fatal injury (18%) and the leading cause of disabling injury (35%) in the rural district. In the urban district, road crashes were the leading cause of fatal injury (46%) and (along with burns) of non-fatal injury, accounting for 39% of disabling injury. Road crashes were the most important cause of severe injury in all age groups beyond 20 years (*6*).

Injury questions in population-based surveys on other topics

A 15-question section on injuries and violence was included in the *Mozambique Demographic and Health Survey 2003*. The section contained questions on fatal and non-fatal injuries, associated disability and health seeking patterns of injured patients. The result showed that road traffic injuries were the leading cause of injury-related deaths in the country. Around 12% of the population also reported that someone in the household had suffered a road traffic injury in the 30 days before the survey. The survey demonstrated that road traffic injuries are a serious public health issue, accounting for 42% of injury-related deaths among males and 24% among females (*7*).

In 2005 a series of questions about general injuries was included in the *Cambodia Demographic and Health Survey*. The results showed that road traffic crashes were the leading cause of injuries (46%) and injury-related deaths in the previous 12 months. The survey also captured data on gender, age, place of residence, province in which the road traffic injury was sustained, and physical impairment resulting from road traffic crashes (*8*).

Verbal autopsy studies

Verbal autopsy is an interview carried out with the deceased's family members and/or caregivers, using a structured questionnaire to elicit signs and symptoms and other pertinent information that can later be used to assign a probable underlying cause of death (*9*). Verbal autopsy has become the primary source of information on causes of death in populations lacking vital registration and medical certification (*10*).

Verbal autopsy was used to collect mortality data for residents of 45 villages in the state of Andhra Pradesh, India, where routine vital registration is not kept (*11*). Results showed that injury was the second leading cause of death for all age groups – accounting for 13% of all deaths – and that 13% of all injury-related deaths were due to road traffic crashes.

*A community survey is a population-based study where a cross-section of a population is surveyed by, for example, a questionnaire. For more information on how to develop and conduct a community survey, see the *WHO Guidelines for conducting community surveys on injuries and violence,* or download a copy from http://whqlibdoc.who.int/publications/2004/9241546484.pdf.

Assess data systems

If there are electronic systems for processing police records, injury surveillance or hospital data and vital registration information, the next step is to describe the characteristics of those systems, beginning with national-level systems. This can be done through a preliminary assessment, or through the type of in-depth evaluation described in Module 3.

The objective is to understand:

- the jurisdiction of the system
- the processes by which data move through the system
- the system's strengths and weaknesses
- the accessibility of the data.

NOTE

Access to data is often problematic, as agencies that collect data may be reluctant to release information because of privacy concerns, fear of compromising clients' interests, fear of loss of control or fear that their performance will be judged if they share data. Formal and informal mechanisms for communication should be explored. The latter may be achieved through moral persuasion, compromise and stakeholder involvement. For the former, legal instruments and infrastructure may have been established to facilitate sharing of information while addressing the concerns of contributing agencies. Understanding access issues pertaining is key for identifying the action steps that follow the situational assessment.

Better understanding of these systems and their functionality can be gained by identifying reporting requirements for both police and health workers (who are responsible for follow-up with victims after the crash), and discussions with data collectors, data managers and data users about the strengths and limitations of road safety data systems. Box 2.3 contains a checklist for determining the characteristics of existing data systems.

BOX 2.3: **Checklist to assess data systems**

For each data system you need to determine:

- What population or geographical area (jurisdiction) is covered?
- Does it provide a census of incidents among a whole population, or does it include data from a sample of the population only?
- Are there estimates of population coverage/completeness?
- What events are captured (i.e. fatalities, non-fatal injuries, damage-only crashes)?
- What definitions are used?
- Which variables are included?
- How are data transferred from the crash scene to the database (including reporting requirements)?
- What are the existing and potential linkages with other databases?
- What are the formal/informal data-sharing mechanisms with other agencies/sectors?
- What format are data stored in (as case-level records, tabulations provided to customized specifications, or only as pre-tabulated results)?
- How accessible are the data?
- Who are the responsible agencies and key contacts?
- What are the funding mechanisms?

Assess data quality

The output of road safety data systems will be used to define road safety interventions and policies, and to determine resource allocation. It is therefore important to understand the quality data going into the system.

Data quality is affected by the data collection and management process (*12*). Factors that can compromise quality include:

- **definitions** that determine which events are included/excluded from the system, and how injuries and crashes are classified;
- **reporting/under-reporting of crashes or injuries to and by authorities** – this affects the accuracy of counts, and therefore the degree to which the statistical output of a data system reflects the reality on the roads;
- **missing data** – if data are missing systematically for certain fields or types of crash, data analysis becomes problematic;
- **errors** – measurement and response errors, data recording, coding and entry errors affect the accuracy and reliability of data.

These issues must be assessed for all data sources identified.

Along with assessments of definitions and under-reporting levels (see discussion below), Box 2.4 contains a checklist of questions to assess the degree to which the each data source is representative of all incidents, and to assess the reliability of recorded data.

BOX 2.4: **Checklist to assess data quality**

How reliable and representative are the data?

- Does the system capture all crashes (or injuries if that is the defining criteria)?
- If not, what kind of bias is created by the exclusion of some events?
- How does that affect utilization of the data?
- For the events captured, are the data complete and accurate? What validation procedures are in place?
- What is the frequency with which missing data occurs?
- Are data systematically missing for certain variables or certain types of crashes – i.e. is there a bias in what does and does not get recorded?

Various statistical techniques are available to help answer these questions, see (*12*).

How data quality is affected by definitions

Definitions affect data quality by determining which incidents are counted as road crashes, and by determining injury and crash severity classifications. Standard definitions of road traffic crashes and fatal and non-fatal road traffic injuries are not universally applied. This has implications for the international comparability of road safety data. Furthermore, when jurisdictions and sectors or agencies within a country do not use the same definitions, it is difficult to compile road safety data that is useful for planning.

Some definitions of *road traffic crashes* exclude non-motorized vehicles, and crashes that occur on private roadways such as on farms, driveways or unsurfaced roads. Such exclusions may result in artificially low estimates of crashes and injuries in low- and middle-income countries, where animal-drawn and non-motorized transport is the norm, and a substantial portion of traffic is not on surfaced roadways.

NOTE

The recommended definition of road traffic crash/accident is "a collision or incident involving at least one road vehicle in motion, on a public road or private road to which the public has right of access".

According to the *UNECE Glossary for Transport Statistics 2009,* 'road vehicle' includes both motorized and non-motorized vehicles running or drawn on wheels, and the definition of 'road' includes unpaved roads with stabilized bases, such as gravel roads *(13).* Note that some countries have started to collect information on road traffic crashes regardless of the event location, and therefore include incidents that occur off roadways, for example on private farm roads. Jurisdictions may wish to consider this as they choose or refine definitions.

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The classification of the *severity* of injuries and crashes is also subject to inconsistent definitions. *Injury severity* refers to the extent of physical damage sustained by the injured person as a result of the crash. The range of injury severity categories that may be used by health professionals or police officers includes slight/minor, moderate, serious/severe, and fatal. Definitions of these categories vary among countries and sectors.

The scientific classifications health workers use to distinguish between these categories may not be easily understood or applied by police officers, who are called upon to determine road traffic injury severity without clinical training or knowledge of trauma care practice. Injury severity can also change over time, for example internal injuries not apparent at the crash scene can become a life-threatening emergency on the way to hospital. While there is no single internationally accepted classification of injury severity, there is international consensus on the definition of a road traffic fatality.

NOTE

The recommended definition of a road traffic fatality is "any person killed immediately or dying within 30 days as a result of a road traffic injury accident, excluding suicides" (*13, 14*)**.**

Research has shown that most people who die as a result of a road crash do so within 30 days of sustaining injuries in the crash. If only deaths at the scene or within seven days are counted, a significant proportion of all road traffic deaths is overlooked (*14*). Countries should take steps towards adopting this definition, or at least adjust reported road traffic fatalities to a 30-day definition using relevant conversion techniques (see *15* and Box 2.5). The legal requirement of the 30-day definition is that the injury severity level, and possibly the crash severity level, must be updated to fatal if an injured person dies from his injuries within 30 days. Operationally, this requires follow-up by a dedicated police officer or arrangements for regular notification from the hospital or the community.

Crash severity is determined by the most severe injury resulting from a crash, requiring police officers to make judgments about injury severity. Figure 2.1 shows the relationship between injury severity and crash severity.

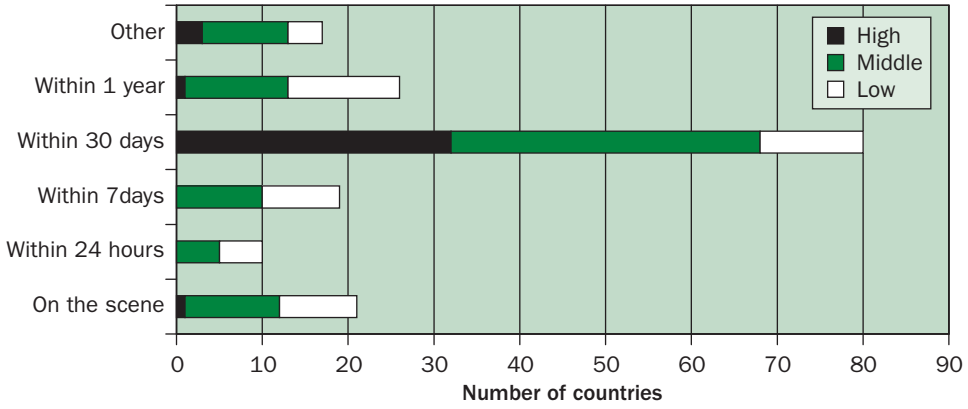
It is important to address the following questions when assessing the impact of definitions on data quality:

- What events are excluded by the definition of a road traffic crash, and what kind of bias does this create? Has anyone estimated the number of crashes that are excluded from the data because of definition?

BOX 2.5: **Definitions and adjustment factors for road traffic fatalities**

WHO's *Global status report on road safety* found that less than half of the 178 countries and areas participating in the report use the recommended definition of a road traffic fatality – the '30-day' definition – for their official statistics (*14*).

Time period used to define a road traffic fatality, by country/area income level



Source: (*14*)

When a road fatality is not defined as someone who has 'died within 30 days of the crash', the reported number of fatalities can be made more accurate by multiplying the reported number by the appropriate adjustment factor, depending on the definition used. The European Conference of Ministers of Transport has recommended the following standardized 30-day road crash fatality adjustment factors (*14*):

Time period specified in road fatality definition	30-day total	Adjustment factor
At the scene or within 24 hours	77%	1.30
3 days	87%	1.15
6 days	92%	1.09
7 days	93%	1.08
30 days	100%	1.00
365 days	103%	0.97

These adjustment factors may not always be appropriate. Survival times following road crashes depend on many factors, including the type of road user and access to (and quality of) post-crash care (*15, 16, 17*). For instance, in countries where vulnerable road users comprise a high proportion of road traffic deaths, and/or post-crash care is scarce or of poor quality, a larger proportion of road fatalities will die at the scene or within 24 hours of the crash. To address this issue, an adjustment factor of 1.15 (rather than 1.30) is sometimes used to adjust data from low- and middle-income countries that use a definition of 'at the scene' or 'within 24 hours' (*15*). Though determining the appropriate adjustment factor can be complicated and requires careful consideration, guidance is available from researchers, institutions and published reports (see *14, 15, 16*).

Figure 2.1 Injury severity and crash severity: definitions and relationships

Injury Severity	Crash Severity
Fatal Person killed immediately or dies within 30 days as a result of a road traffic injury accident	**Fatal** Any road traffic crash resulting in a person killed immediately or dying within 30 days as a result of the crash
Serious/severe Injury that requires admission to hospital for at least 24 hours, or specialist attention, such as fractures, concussions, severe shock and severe lacerations	**Serious/severe** Any road traffic crash resulting in at least one serious injury, and no fatalities
Slight/minor Injury that requires little or no medical attention (e.g. sprains, bruises, superficial cuts and scratches)	**Slight/minor** Any road traffic crash resulting in at least one minor injury, and no serious injuries or fatalities
No injury	**Damage-only** Any road traffic crash which does not result in any injuries

- Are police required to judge injury severity? Is this done at the crash scene only, or through follow-up with the victim and health services? Are the definitions for injury severity straightforward enough for police officers to understand and apply? Do police receive training to determine injury severity? Have comparisons been made with hospital data to evaluate the accuracy of police-reported injury severity?
- Are definitions used by various sectors harmonized? Are there opportunities to harmonize?

How data quality is affected by under-reporting

Under-reporting refers to the situation where not all crashes and injuries that occur are documented in the data system. It has long been recognized that a problem exists with under-reporting of road crashes, particularly those that result in slight injury or are property-damage only (*12, 18, 19*). Under-reporting affects the degree to which the statistical output of a data system reflects reality on the roads. The level of under-reporting in a road safety data system should be evaluated so that appropriate adjustments can be made to ensure more accurate estimates are available to inform policy development and resource allocation.

Where it has been studied, the degree of under-reporting varies according to crash severity, transport mode, road user type, victim age and place of crash (see Case study 2.2

and also (*12, 20*). Reporting rates are generally highest for road traffic fatalities, and become less representative with decreasing severity (*12, 21*).

A review of international road crash data by the International Road Traffic and Accident Database (IRTAD) Group identified several factors contributing to **under-reporting in police data** (*21*):

- **The police may not be informed when a crash occurs.** This is particularly likely if the persons involved are unaware of any obligation to report the incident to the police, or if there are no injuries or only minor injuries. If there are no reporting

CASE STUDY 2.2: Estimates of under-reporting in Pakistan, Viet Nam, New Zealand and Europe

Research on under-reporting of road traffic injuries has grown steadily in recent decades, yielding useful estimates and insights from a variety of countries.

A study in Pakistan using the capture-recapture methodology to compare traffic police records and a non-government ambulance service's logs estimated that official statistics counted only 56% of road traffic deaths and 4% of serious injuries (*22*).

In Thai Nguyen City, Viet Nam, traffic police records were compared to hospital records for the period 2000-2004 using the capture-recapture methodology. Results estimated that official statistics include only 22% to 60% of all non-fatal road traffic injuries (*23*).

Under-reporting is not only an important issue for low-income countries. While many high-income countries estimate reporting rates for road traffic fatalities to be greater than 90%, research has shown that non-fatal injuries are significantly under-reported even in countries with 'state-of-the-art' road crash data systems.

A New Zealand study compared police reports with hospital discharge records to determine the validity of police-reported information on the severity of non-fatal road traffic injuries (*24*). The study found that overestimation and underestimation of injury severity by police were both common: less than half (48%) of injuries classified as 'serious' in police records were similarly classified by an objective standard using the hospital records, while 15% of those classified as 'minor' injury in policy records were actually judged to have an injury with a significant threat to life. Pedestrians were more likely to have the severity of their injuries underestimated compared to vehicle occupants.

Extensive research on many aspects of road safety data were conducted as part of *SafetyNet,* a project funded by DG-TREN of the European Commission. *SafetyNet* ran from 2003 to 2008 with the goal of building a framework for a European Road Safety Observatory (see www.erso.eu/safetynet/content/safetynet.htm). One *SafetyNet* study compared and linked police and hospital road crash records in eight European countries with the aim of estimating the under-reporting level of fatal and non-fatal road traffic injuries, and developing a common measurement unit to estimate and compare non-fatal injuries more accurately (*25*).

Results comparing national data in the Netherlands found that the police reporting rate for hospitalized casualties (as classified by police) was about 62%. In the Rhône, France, the police reporting rate for non-fatal road traffic injuries was found to be 38%. The reporting rate varied according to injury severity, generally increasing as severity rose.

Results from the Czech Republic study (conducted in one town only), found that police data were more reliable than hospital data. Hospital statistics were found to focus more on medical aspects of the injuries, rather than documentation of circumstances of the crash that caused them. Police data captured 66% of all road traffic injury records, while hospital data captured only 50%. Police data reporting rates were 90% for car occupants, 86% for motorcyclists, 61% for pedestrians, and 32% for pedal cyclists – higher than hospital data reporting rates for all categories except pedal cyclists (*25*).

agreements in place, police may not be informed when only emergency services are called to the crash scene.

- **The police do not always go to the scene** when a crash is reported. Their availability depends on competing priorities and proximity.
- **The police may go to the crash scene, but not formally register the crash**. This may happen if the crash is minor and the persons involved agree to coordinate follow-up themselves, if no injuries are apparent at the time of the crash, or if administrative procedures are too burdensome.
- **Formal registration does not ensure complete data collection**. Due to lack of training, expertise, interest or time, the attending officer may not record all relevant details of the crash, or may record incorrect information (for example, injury severity may be incorrectly classified).
- **Crash data recorded at the scene do not always get entered into the crash database**, and sometimes errors are introduced during data entry.
- **Data may be lost in the process of transfer** from a decentralized location to a central location, where data processing and collation occur.

Vital statistics refer to summary measures of events such as births, deaths and marriages, and are derived from vital registrations systems that record such events through legal certificates or other, informal means. Whatever the mechanisms for registering vital events, production of vital statistics is often the responsibility of the national statistical office, with technical support from the Ministry of Health *(26)*. Cause-of-death statistics – a subset of vital statistics – are usually compiled by assigning codes to causes of death according to the *International Classification of Diseases (ICD)* (*27*). These statistics can be an important source for estimating the magnitude of road traffic fatalities by sex, age and geographic or administrative area.

However, **reporting rates of road traffic deaths in vital statistics** are influenced by factors such as (*28*):

- **coverage** – percentage of general population covered by medical certification of cause of death;
- **completeness** – percentage of all deaths assigned a medically certified cause of death;
- **missing data** on death certificates;
- **misclassification** of cause of death – doctors must be sufficiently trained to record and code correctly the underlying cause of death;
- **inadequate coding** – the external cause of the injury must be properly recorded to distinguish road traffic injuries as a cause of death. Coding deficiencies may arise from lack of training, use of older versions of ICD, or use of non-standard cause-of-death codes.

Currently about 40% of WHO Member States report vital registration data coded with sufficient sensitivity to use for monitoring road traffic deaths, and very few countries have national data on non-fatal injuries (*14*). For more information on assessing the strengths and weaknesses of the vital registration system, see (*28, 29*).

NOTE

The *International Classification of Diseases* does not specify any time period for classification of road traffic deaths. This means that vital statistics for a given year may over-count road traffic deaths compared to police statistics, since they include deaths occurring beyond the 30-day window after the crash.

Health facility level (e.g. hospital) data on road traffic injuries may also under-report road traffic injuries, although many studies have found that health data are more complete than police crash databases (*19, 25*). Like cause-of-death statistics, health facility statistics should be compiled by assigning codes to diseases and conditions according to the *International Classification of Diseases* (*27*). Table 2.2 presents the external cause-of-injury codes relating to road traffic crashes. Health records however may only record information on the nature of the injury (e.g. fractured femur) and not its external cause, therefore making it impossible to know if the injury was road crash-related.

Table 2.2 International Classification of Disease version 10 — external cause codes for road traffic injuries

Transport accidents*	
V01-V09	Pedestrian injured in transport accident
V10-V19	Pedal cyclist injured in transport accident
V20-V29	Motorcycle rider injured in transport accident
V30-V39	Occupant of three-wheeled motor vehicle injured in transport accident
V40-V49	Car occupant injured in transport accident
V50-V59	Occupant of pick-up truck or van injured in transport accident
V60-V69	Occupant of heavy transport vehicle injured in transport accident
V70-V79	Bus occupant injured in transport accident
V80-V89	Other land transport accidents
V90-V94	Water transport accidents
V95-V97	Air and space transport accidents
V98-V99	Other and unspecified transport accidents

*Note: the term 'accident' is still used in the current version of ICD, as opposed to 'crash'.

Source: *(27)*

Factors affecting **under-reporting of road traffic injuries in health facility data** include:

- people with minor injuries not seeking formal medical care;
- poor access to health facilities;
- injuries treated at private hospitals remaining unrecorded, as non-government hospitals may not participate in surveillance activities or be required to record injury data;
- the cause of the injury not being apparent or disclosed by the patient;
- lack of training, expertise, interest or time on the part of health workers, who may not record all relevant details of the injury;
- data being incorrectly coded by the health worker, or by the person responsible for data extraction or data entry.

For more information on assessing the strengths and weaknesses of health facility-based information, see (*29, 30*).

Information gained on data sources, systems and procedures in the preceding steps should provide insight into some of these under-reporting issues. For example, you should know by now whether the death certificates and hospital records are coded properly, and you should have an understanding of the procedures involved in formal registration of a crash report by police officers. The next step is to determine whether or not under-reporting levels have been estimated for any existing crash databases. If this has not been done in the previous five years, under-reporting should be estimated as part of the situational assessment (see Box 2.6 for methods to assess under-reporting).

BOX 2.6: **Methods for assessing under-reporting** (see *12, 21, 25*)

The factors that affect under-reporting change with time, as police and health sector practices evolve. Under-reporting levels should therefore be assessed regularly. A variety of methods is available to assess under-reporting, with varying degrees of complexity and accuracy:

- Compare the number of police reports filed on certain events to those captured in the database, to assess the proportion of attended crashes that are captured in the system.
- Compare the number of road traffic fatalities and/or injuries counted by one data source, usually the police database, to those counted in a survey. It may be a special road traffic injury survey, or a general survey that includes questions on road traffic injury. It is important to make the comparison for different severity levels, as well as by transport mode and road user type if possible.
- Compare the number of road traffic fatalities and/or injuries counted in the police database to the number counted in other databases – cause-of-death statistics, hospital admissions, accident and emergency records, trauma registries. It is important to make the comparison for different severity levels, as well as by transport mode and road user type if possible. When comparing police and hospital data at a local or regional level, it is important to consider the geographic area covered by each, and any overlap in records.
- Use linkage or capture-recapture methods to match records from different databases and identify the proportion of road traffic injuries appearing in one or both databases. Capture-recapture methods can also be used to estimate the number of records missing altogether – i.e. the number of incidents that are not captured in either database (*22, 23, 25*).

Assess exposure data

Information on the following factors is important for understanding road safety and developing effective interventions in any jurisdiction:

- road layout, design and environment
- traffic flows and characteristics
- vehicle fleet
- driver information.

These factors are most often monitored by the transport sector and usually not captured in police data systems. Table 2.3 presents the basic elements of transport data that should be collected regularly and made available for road safety management, and therefore should be considered in the situational assessment. Vehicle and driver data are most often collected and kept in central registry systems. Roadway data may be collected through road safety audits or other infrastructure

Table 2.3 Transport-related data elements

Roadway data	Traffic data	Vehicle data	Driver data
• Number, class and length of road • Road type, by number of lanes, median width • Number of lanes and lane width • Crossing type, intersection design • Type of traffic control (signals, roundabouts, stop or give way) • Alignment (horizontal and vertical curvature, grade, etc.) • Road surface (bitumen, concrete, unsurfaced) • Surface condition (roughness, rutting, potholes) • Shoulders: width, type and condition • Drainage • Speed limits • Lighting by type and location • Parking regulations	• Location data (*x,y* coordinates, route number and nearest km post or a node-link system) • Traffic volumes as vehicles per day, or short specific counts at given locations • Traffic composition by types of vehicles in the traffic mix • Traffic variation (as required by time of day, day of week, month or annually) • Turning movements at junctions • Vehicle speed data	• Details of ownership: date of birth, sex, name, address, year of ownership • Vehicle registration number together with chassis and engine number • Engine size and type, i.e. petrol or diesel • Seating capacity • Year of manufacture and year of first registration in country • Body type (car, van, pick up etc), number of doors, together with details of modifications • Roadworthiness certificate	• Full name and address • DOB, sex • Type of licence held, i.e. full or provisional, and type of vehicle for which licence is valid. • Year and place of issue • Year driving test was passed • Record of offences committed • Record of driving suspensions • Essential medical information

monitoring mechanisms. Traffic data may be collected through a national traffic census, automatic traffic counters, manual traffic counts and specialized surveys.

Exposure-related data such as passenger travel modes, vehicle-kilometres travelled, passenger-kilometres travelled, and results of origin-destination surveys, can be highly valuable for analysis and interpretation of the road safety situation. The situational assessment should consider their existence, but keep in mind that these data are rarely simple to collect and even many high-income countries are not able to provide them.

2.2.3 Step three: end-user needs assessment

It is important to conduct an end-user needs assessment when setting up and expanding a road safety information system, as this will enhance the usability of the system by the road safety community.

Why conduct an end-user needs assessment?

There are many users and suppliers of road safety information. A user needs assessment is important to (*31*):

- understand better the composition and diversity of users;
- understand better the kind of information intended users want or expect from an information system;
- determine financial and human resources required, and request or mobilize these resources from relevant sources;
- make better use of available financial and human resources;
- design a user-centred information system that adequately meets the needs of intended users.

What to assess

A road safety end-user needs assessment should reveal:

- who the users are – the stakeholder analysis should help you identify this group;
- circumstances or situations that lead them to require road safety information;
- the type of information different users require and expect from an information system;
- sources of information the users currently use;
- preferred format in which users would like to access information;
- factors that affect or determine their access to, and use of, road safety information.

How to gather information about user needs

Information about user needs can be gathered from potential users through:

- surveys
- in-depth interviews
- focus group discussions

- observation of user behaviour
- analysis of requests for information to libraries and agencies
- library reports
- a working group or committee review.

2.2.4 Step four: environmental analysis

Road safety is often the responsibility of the highway or transport authority or ministry, or a national road safety council. These bodies may be responsible for monitoring safety on the road network and improving safety through measures such as hazardous location improvements and safety audits. When these bodies initiate changes to a road crash data system, it is vitally important that they collaborate with the police. Crash data collection is primarily the responsibility of the police, who have responsibilities and priorities that compete with the need to collect information. Without dialogue and collaboration between the generators/collectors of road safety data and the end-users of that data, it is unlikely that improvements to the road crash data system will succeed.

The political environment may help or hinder improvements to road safety data and determine how improvements are made. The checklist in Box 2.7 will help provide an overall picture of the political situation. The World Bank Global Road Safety Facility guidelines contain a variety of tools that can be used to help answer the questions in this checklist (*2*).

BOX 2.7: **Checklist for overview of political environment**

- Is there a lead agency responsible for road safety? What is it and what is its main function?
- Which are the main government departments involved in road safety decision-making, and what role does each department play?
- What is the nature of inter-agency relationships?
- Is there a road safety strategy, and does it include a data component?
- What is the current budget for road safety in the country? Are there priorities in the budget for improvements in the field of road safety? Are there funds that might be accessed for road safety data systems?
- What are the existing policies in transport, law enforcement, health and finance that are relevant to road safety? Do they have data components?
- Which factors in the political environment will drive change, and which will oppose it?
- Is there adequate capacity for implementation/improvement of data collection, data processing, data analysis, and dissemination and use of data?

Financial requirements and possible funding sources

Without secure and consistent funding, no serious measures can be introduced to improve road safety in any country. Interventions in many countries have failed due to a lack of sustainable funding, including the introduction of improved data systems. It is therefore critical to identify possible funding sources for road safety data systems. Possible sources of funding include the following:

- General taxation to support public sector agencies, including the police, transport ministry etc. This therefore must be seen as the main source of funding for data collection, storage, analysis and dissemination activities.
- Specific taxes, including traffic fines, earmarked to support spending on road safety. In this way, additional funds can be raised to support police activities. This approach is relatively uncommon and only worth pursuing if earmarked fines can be clearly shown to generate extra income.
- Levies added to insurance premiums, which must be acceptable to both the insurance companies and the public. While useful, this approach is much less effective in countries where many vehicles are uninsured. In South Africa, this is avoided by applying third party insurance premiums through a fuel levy.
- Road funds which derive their income from road user charges, including a levy on fuel, vehicle registration fees, vehicle licence fees and on road user charges such as tolls. These funds can then be used to support specific road safety activities.
- Sponsorship from private companies, with funds used to support activities such as publicity campaigns or police activities – e.g. by donating funds to purchase specialist police vehicles. Funds used in this way can help police reach road crash scenes more efficiently. In all countries, the private sector should be encouraged to support road safety interventions, and police activities can be singled out as worthy of support.
- Funds from international donor governments or development agencies.

Funds provided by governments should constitute the main source of revenue for all road safety activities, including data collection and analysis. Rarely are government funds adequate, however, and some of the approaches outlined above may be necessary to boost them.

2.3 Using the situational assessment to prioritize actions

Once the situation has been assessed, the process of prioritizing actions can begin. The results of the situational assessment should give you a clear understanding of the stakeholders involved, including potential partners and potential opponents; the content, processes and quality of existing data sources and systems; what data are needed by end-users; and the political environment and resource availability. This

will help you understand what is currently in place, what is needed, where the gaps are, and the level of interest in and commitment to addressing those gaps.

Although there is emerging consensus regarding some aspects of good practice in road safety data (e.g. definitions, some elements of a minimum data set), this consensus does not extend to processes. There are many different ways to build or improve a road crash data system, and what works well in one jurisdiction does not necessarily work well in another. You will need to consider the results of the situational assessment against the situation of your country and jurisdiction, and choose an appropriate course of action with your stakeholders. This should be done in the context of the working group described in Module 3.

Data systems that can accurately count injuries and fatalities, and provide information adequate for identifying road users at risk and hazardous locations, require investment funds, human resources and time. It may be years before this kind of system can be realized in some low- and middle-income countries. This does not mean, however, that such a system should be ignored. If it appears that the timeline for implementing a proper road crash data system will be long, intermediate measures should be adopted to strengthen existing national estimates of the scale of the problem to guide prioritization and road safety planning.

In some situations it will become apparent from the situational assessment that there are bits and pieces of data available, but no effective system, and yet political and/or financial support to implement a good road crash data system may be insufficient. In that case, consider working with existing data to improve estimates, for the purpose of raising awareness about the problem and increasing political will for data-led solutions. At the same time, convene a working group (see Module 3) and begin to lay the groundwork for a proper data system. Piecing data sources together to give a better picture of the problem is not a long-term solution.

To convince policy-makers of the need for greater investment in road safety data systems, you must find ways to show shortcomings of existing data systems. The methods used to assess under-reporting discussed in section 2.2 can be useful for this purpose, as are the results of the overall data quality audit. It may also be helpful to use various methods to combine multiple data sources to strengthen national estimates (see Box 2.8 for an example of how this can be done).

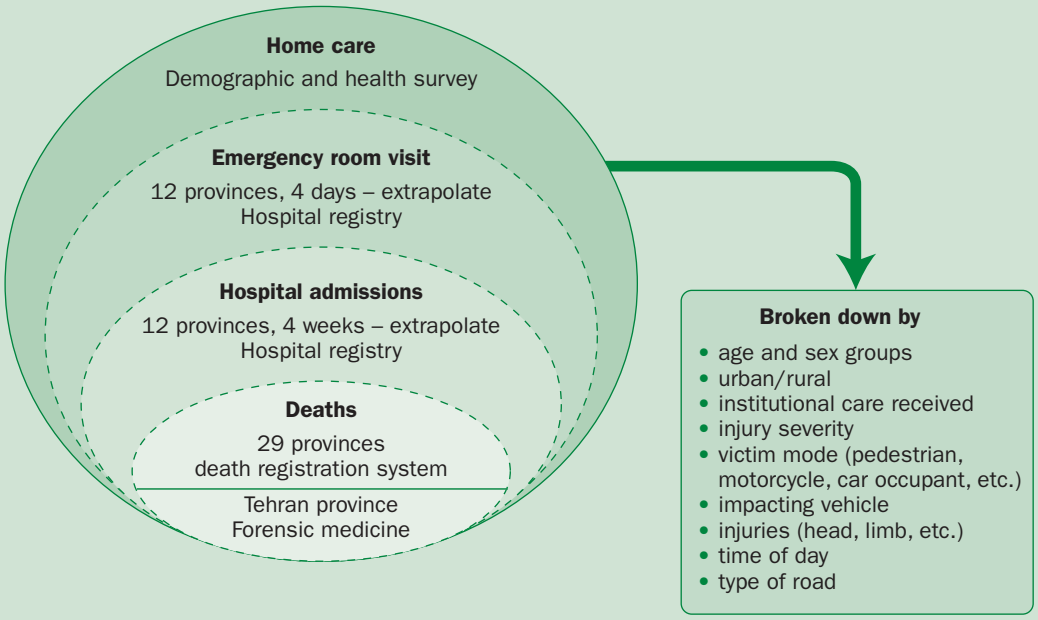
BOX 2.8: **Building national estimates from available data sources**

Road safety practitioners argue that effective road safety management over the long-term requires institutionalized, sustainable data systems covering the issues listed in Module 1. Some researchers believe that it could be decades before many low- and middle-income countries develop road safety data systems of sufficient quality to meet the requirements. Few countries, however, can afford to wait until these systems are functioning smoothly to take action. In the meantime, there is an urgent need for accurate national estimates to facilitate appropriate planning and resource allocation.

Researchers at the Harvard School of Public Health, in collaboration with the World Bank Global Road Safety Facility, have developed a methodology for collating multiple data sources and extrapolating information to generate national estimates of the burden of road traffic injuries. This methodology has been used in 18 low- and middle-income countries. The methods are now being extended for application in sub-Saharan Africa and other settings that are particularly information-poor. (For more information about methods and examples, visit www.globalburdenofinjuries.org).

The figure below shows the data sources used to estimate the burden of road traffic injuries in Iran (2005): vital registration data, forensic medicine data (Tehran province), hospital discharge data and emergency department data for 12 provinces, and the nationally representative Demographic and Health Survey *(32)*.

Sources of data on deaths and non-fatal cases in Iran



Source: *(32)*

Results estimate that in 2005, road traffic crashes resulted in 30 721 deaths in Iran (compared to official police statistics that report 4 441 deaths for the same year), amounting to an annual road traffic death rate of 44 per 100 000 people. About half (52%) of all deaths among males aged 15 to 24 years were due to road traffic crashes. In addition to these deaths, approximately 740 000 people received hospital care (inpatient or outpatient) for a road traffic injury.

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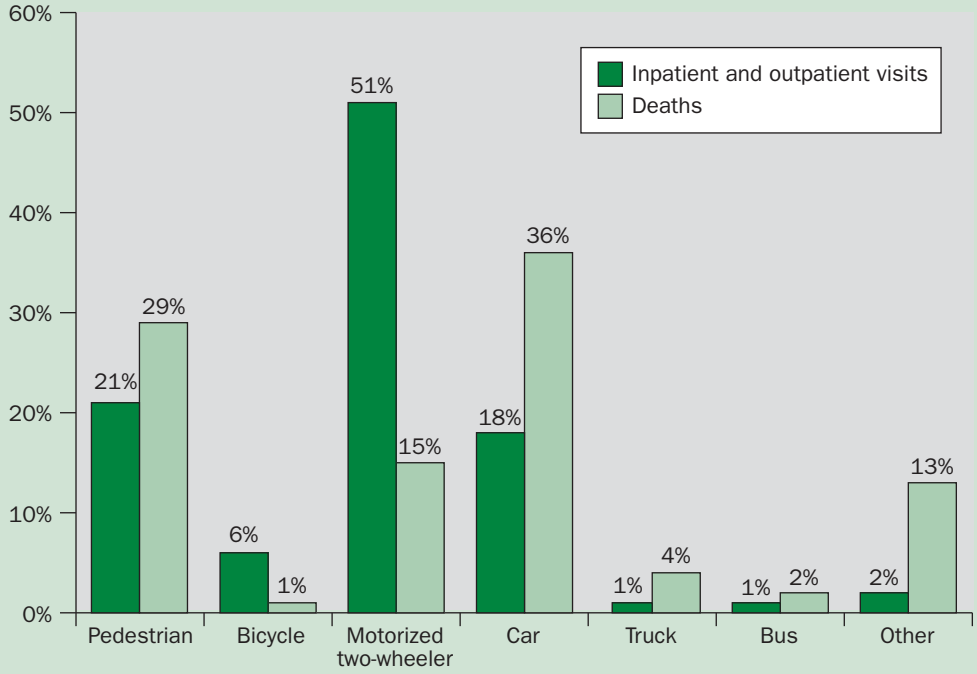
Nearly two-thirds of the road traffic deaths are car occupants or pedestrians. Half of all non-fatal hospital admissions and outpatient visits for non-fatal road traffic injuries are riders of motorized two-wheelers, as can be seen in the figure below. The marked difference in the patterns of fatal and non-fatal injury show that estimates of non-fatal injuries are needed alongside estimates of deaths, in order to appropriately measure the impact and identify priority issues for action.

Distribution of road traffic injuries by victim's mode of transport in Iran



Source: *(32)*

The researchers recommend that for all countries that do not have a reliable mechanism for estimating the full burden of road traffic injuries, existing data sources should be used to create a national snapshot, taking care to understand and correct for biases and limitations of the sources.

The estimates resulting from this methodology do not include specific location data that traffic engineers can use to identify and treat hazardous locations, but they do provide reliable information on patterns of injury severity, road user involvement and road type to suggest evidence-based strategies and interventions that can effectively reduce the national burden of road traffic injuries.

Building national estimates of the road traffic injury burden from multiple data sources is something that should be done alongside – not instead of – the development of road safety data systems.

Summary

This module has provided an overview of how to assess the current status of road safety data collection. Four major components of the situational assessment are:

Step 1: Identify people and agencies involved in collection, management and use of road safety data. Describe their roles, responsibilities and relationships. Begin a dialogue with key stakeholders.

Step 2: Identify existing data sources and systems. Describe their characteristics and assess data quality, with a focus on definitions, accuracy, completeness and under-reporting.

Step 3: Describe the needs and expectations of end-users of road safety data.

Step 4: Identify factors in the political environment that will facilitate or hinder proposals for improvements to road safety data systems.

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