Injury and deaths due to it have emerged as a major public health problem globally. In recent years, every day almost 16,000 people around the world die from all types of injuries. Injuries represent about 10% of deaths from all causes worldwide. In 2004, the World Health Organization reported that around 50% of deaths due to injury occurred in countries of the South-East Asia and Western Pacific Regions, which together have more than a third of the world’s population. As such, these two Regions account for the highest number of deaths from injuries worldwide. In 2004, injuries ranked fifth among all causes of death for the South-East Asia Region with 1.5 million deaths reported.

Injury surveillance is the process of systematically collecting, analysing, interpreting and disseminating data to those responsible for the prevention and control of injuries. Injury prevention and control is multisectoral, and collaboration among agencies and sectors can be facilitated by surveillance systems that keep partners appropriately informed.

This publication is the first-ever report on existing injury surveillance systems in the Member States of the two WHO regions in the Asia-Pacific.
Profile of Injury Surveillance Systems in selected Member States of the Asia-Pacific Region
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In recent years, injury has emerged as a major public health problem. Every day, almost 16,000 people around the world die from all types of injuries. Injuries represent about 10% of deaths from all causes. In 2004, the World Health Organization (WHO) reported that around 50% of all deaths due to injury occurred in the countries of the South-East Asia (SEA) and Western Pacific (WP) regions, which together have more than a third of the world’s population. These two regions account for the highest number of deaths from injuries worldwide. In 2004, injuries ranked fifth among all causes of death in the SEA Region, and an estimated 1.5 million deaths were reported.

Injury surveillance is the process of systematic collection, analysis, interpretation and timely dissemination of data to those responsible for the prevention and control of injuries. Surveillance provides information on the estimated burden and the characteristics of injuries. It not only identifies programme needs but also makes it possible to measure the effects of interventions. Injury surveillance, like any other disease surveillance, is essential and rational for policy development, planning and implementation of interventions, as well as for monitoring and evaluation.

Surveillance is one part of operational epidemiology that includes: (a) surveillance (to know what has happened to whom, and where and when); (b) investigation (to confirm the cluster of injury problems, to know or to get primary evidence about how and why certain injuries occur in specific risk groups); and (c) epidemiological and operational research studies (to gain evidence on the hypothesis derived from surveillance and investigation). This report is the first ever published outlining the profile of existing injury surveillance (IS) systems in the Member States of the Asia-Pacific Region.

The need for further information on injuries is constant. Moreover, the knowledge and skills required for dissemination of data lie not only in the realm of epidemiology and biostatistics but also in communicating surveillance information in the form and channels suitable to each target audience. Injury prevention and control is multisectoral,
and collaboration among agencies and sectors will be easier and faster if partners are already aware of the types and sources of information, such as injury surveillance system implemented mostly by the health sector.

It is hoped that the information in this report will be of use to low- and middle-income countries wishing to develop injury surveillance systems. The WHO Regional Office for South-East Asia pledges its continued support for collaborative efforts towards establishing an injury surveillance system in all Member States of the Region.
Executive summary

Introduction

Every day around the world, almost 16 000 people die from all types of injuries. Injuries represent about 10% of all deaths from all causes. According to the World Health Statistics 2009, the death rate due to injury in 2004 in the SEA Region—131 per 100 000 population—was the highest among all the regions of WHO. The first step in a public health approach to injury prevention and control is to have the information needed to ascertain the magnitude and characteristics of injuries as well as their basic causes. The process of data collection, analysis and dissemination of reports of injuries – in short, “injury surveillance” – is the best tool to enable policy-makers to understand the causes of injuries, when and where people are affected, and what the outcomes are. Injury surveillance can lead to informed decisions on how to plan and monitor ongoing injury prevention and control activities on a timely basis.

The purpose of injury surveillance is usually to monitor trends in particular types of injuries. Detailed data on the “who”, “when”, “where” and sometimes also “how” of injuries can be used to adapt and focus injury control measures to relevant circumstances and populations and increase the cost-effectiveness of resource allocation. Injury surveillance needs an exchange of practical experience more than just concepts about the system.

Objectives of this report

To review the situation of injury surveillance in countries of the SEA and WP Regions and present a compendium of experience, methods, lessons learned and related tools for injury surveillance from each country.

Methodology

This document is fundamentally based on country presentations in the Bi-Regional Workshop on Injury Surveillance held in Chiang Mai, Thailand in 2006. Eleven countries which have injury surveillance in place or have initiated the system were invited to
present the injury surveillance systems in their countries at the workshop. More updated and detailed information was obtained during the Regional Programme Managers’ Meeting in 2007, and follow-ups on missing data were done during the following years. The final draft was sent to the countries to review before publishing. Besides, relevant data from the participating countries were cited from the official website.

Results

There are wide gaps among countries in the SEA and WP Regions regarding the development of an injury surveillance system. In the SEA Region, Thailand has such a system since 1995 and is currently progressing to a second version to accommodate changes in injury prevention programmes and the health system. Maldives, Myanmar and Sri Lanka have initiated these systems. Bangladesh has been piloting a community-based active injury surveillance system since 2005. In the WP Region, Cambodia, China, the Republic of Korea and Viet Nam have developed and implemented the injury surveillance system. Australia has led both regions on injury surveillance. Other Member States in both Regions are seeking the most suitable designs and related tools for their systems.

Conclusion

A few countries in the South-East Asia and Western Pacific Regions have already established injury surveillance systems, while others are processing or piloting the same. Establishing an injury surveillance system in the SEA Region is very challenging due to lack of expertise at the country level and paucity of manpower.

Recommendations

The recommendations, based on the findings and discussion during meetings with Member States, are:

- Member States with an established injury surveillance system or any other appropriate information system on injuries should strengthen and sustain their systems to make effective use of the information. Regular report dissemination is a good indicator of a functional injury surveillance system.
- Member States that have not yet established a national injury surveillance system should identify an appropriate model of injury surveillance system for collection, analysis and dissemination of evidence-based information on injuries for policy and programmes.
Member States should organize wide-ranging consultations and engagement of stakeholders (government agencies, the private sector, civil society groups, national and international nongovernmental organizations, networks and alliances, and communities) in the development and coordination of policies and programmes for strengthening injury information systems within the framework of Comprehensive National Injury Prevention and Control.

Member States should allocate adequate financial and technical resources to support and sustain national injury surveillance and disseminate information to identify and monitor injury problems among the population and specific age groups, especially children, for appropriate prevention and control.

WHO should continue to advocate for renewed and sustained political commitment at the highest administrative levels in Member States to establish and strengthen injury information systems, as part of national injury prevention and control initiatives, through appropriate support.

WHO should facilitate and enhance partnerships, networks and alliances to harness additional technical and financial resources for injury prevention and control, including injury surveillance, among international development partners and United Nations specialized agencies.

WHO should provide technical support for the optimum use of International Classification of Diseases-10 (ICD-10) by Member States to classify the causes of injuries and code them, especially for severe cases.

WHO should support further collaboration in developing guidelines for sentinel injury surveillance between the SEA and WP Regions with the involvement of systems and tools from both.
Acknowledgements

This document was developed following the “Regional Meeting of National Programme Managers on Injury Prevention and Care” held on 26-28 September 2007 in Nonthaburi, Thailand. This meeting was a collaborative effort of the South-East Asia and Western Pacific Regions of WHO. The WHO Regional Office for South-East Asia would like to thank all participants of the meeting for presenting the injury surveillance profile of their respective countries as the baseline information document for this report.

Our sincere thanks go to Ms Siriwan Santijiarakul, an epidemiologist from Thailand, for developing this document. This report has also benefited from the contributions of several WHO staff, in particular Dr Chamaiparn Santikarn, Regional Adviser for Injury and Violence Prevention, Dr Salim Mahmud Chowdhury, former Temporary International Professional, Disability, Injury Prevention and Rehabilitation Unit, Dr Palitha Abeykoon, former Director, Department of Noncommunicable Diseases and Mental Health and Dr Than Sein, former Director, Department of Noncommunicable Diseases and Mental Health, from the WHO Regional Office for South-East Asia and Dr Hisashi Ogawa, former Regional Adviser from the WHO Regional Office for the Western Pacific.

Finally, WHO-SEARO gratefully thanks all the Member States of both Regions who presented national-level information and all contributors whose dedication, support and expertise made this report possible.
## List of abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
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<tr>
<td>AIS</td>
<td>abbreviated injury scale</td>
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<tr>
<td>CDC</td>
<td>Centre for Disease Control, Atlanta</td>
</tr>
<tr>
<td>CIPRB</td>
<td>Centre for Injury Prevention and Research, Bangladesh</td>
</tr>
<tr>
<td>DGHS</td>
<td>Directorate-General of Health Services</td>
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<tr>
<td>DSP</td>
<td>disease surveillance point</td>
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<tr>
<td>ED</td>
<td>emergency department</td>
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<tr>
<td>ER</td>
<td>emergency room</td>
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<tr>
<td>EDIS</td>
<td>emergency department information system</td>
</tr>
<tr>
<td>ICD</td>
<td>International Classification of Diseases</td>
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<tr>
<td>ICECI</td>
<td>International Classification of External Causes of Injuries</td>
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<tr>
<td>ICISS</td>
<td>International Classification of Injury Severity Score</td>
</tr>
<tr>
<td>IGMH</td>
<td>Indira Gandhi Memorial Hospital</td>
</tr>
<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
</tr>
<tr>
<td>KNHANES</td>
<td>Korean National Health and Nutritional Examination Survey</td>
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<tr>
<td>KYBRFS</td>
<td>Korean Youth Behaviour Risk Factor Surveillance</td>
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<tr>
<td>MoC</td>
<td>Ministry of Communications</td>
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<td>MoH</td>
<td>Ministry of Health</td>
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<td>MoPH</td>
<td>Ministry of Public Health</td>
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<td>MoPS</td>
<td>Ministry of Public Security</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>NCIS</td>
<td>National Coroners Information System (Australia)</td>
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<td>NCNCD</td>
<td>National Centre on Noncommunicable Diseases</td>
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<td>NDSIS</td>
<td>National Data Standards for Injury Surveillance</td>
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<tr>
<td>NGO</td>
<td>nongovernmental organization</td>
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<tr>
<td>NTORC</td>
<td>National Traumatology and Orthopaedic Research Centre</td>
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<tr>
<td>QISU</td>
<td>Queensland Injury Surveillance Unit</td>
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<tr>
<td>RTA</td>
<td>road traffic accident</td>
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<tr>
<td>RTAVIS</td>
<td>Road Traffic Accident and Victim Information System</td>
</tr>
<tr>
<td>RTCIP</td>
<td>Research and Training Centre on Injury Prevention</td>
</tr>
<tr>
<td>SEA</td>
<td>South-East Asia</td>
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<tr>
<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
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<tr>
<td>TASC</td>
<td>The Alliance for Safe Children</td>
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<tr>
<td>TSDC</td>
<td>Trauma System Development Committee</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<tr>
<td>UNICEF</td>
<td>the United Nations Children’s Fund</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<td>WP</td>
<td>Western Pacific</td>
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1. Introduction

Magnitude of the injury problem

Injuries have clearly emerged as a major public health problem. The most recent estimates indicate that injuries are among the leading causes of death and disability around the world. They affect all populations, regardless of age, sex, income, or geographical region.\(^1\)\(^2\) According to WHO data for 2000, published in 2002, an estimated 5.2 million injury-related deaths occurred worldwide in 2000, with a projected increase of 8.4 million by 2020,\(^3\) thereby constituting almost 9% of all deaths.\(^4\) In 2004, WHO published a “World Report on Road Traffic Injury and Prevention”, according to which 1.2 million people are known to die in road accidents worldwide each year. About 650,000 of these deaths occurred in Member States of the United Nations Economic and Social Commission for Asia and the Pacific.\(^5\) Road traffic injuries are the tenth leading cause of death and the ninth leading cause of burden of disease in the Asia-Pacific Region. Self-inflicted injuries, falls, drowning and interpersonal violence come next.

The SEA and WP regions account for the highest number of deaths from injuries worldwide. In 2004 injuries ranked fifth among all causes of death for the SEA Region. Approximately 150 people died every hour from injuries in the Region’s Member States annually;\(^5\) in addition, an estimated 1.5 million deaths were reported as a result of injuries. Of these, road traffic injuries were the leading cause, while drowning ranked first for children under 15 years of age. The current epidemic of injuries, particularly road traffic injuries, is expected to increase by 144% in the Region by 2020 due to rapid motorization, increased morbidity, and inadequate attention paid to road safety.\(^6\)

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What is an injury surveillance system?

Injury surveillance is the ongoing systematic collection, analysis, interpretation and dissemination of data on injury-related events for use in public health actions to reduce morbidity and mortality and to improve health.² ⁷ The epidemiological use of the term refers to collection of data on those who sustain injuries and the “when”, “where” and sometimes “how” of occurrence. The purpose of injury surveillance is usually to monitor trends in particular types of injuries. Detailed data on the “who”, “when”, “where” and “how” of injuries can be used to target injury control measures to relevant circumstances and populations and increase the cost-effectiveness of resource allocation.⁸

Surveillance data are needed at the national, state and local levels.⁹ Major sources of health-related information are individuals, health-care providers and other entities. All these sources make important contributions to injury surveillance. Individuals are the major source of data on injury incidence, risk-taking behaviours and use of preventive measures. Health-care providers at different levels of the medical care system are another source of data on outcomes of injury events, including injury-related mortality. Additionally, a variety of agencies and institutions that collect data for other purposes, such as death registration office, the police for reports on traffic crashes and crimes, fire department records, insurance claims and workers’ compensation files, are sources of important information on the circumstances and sequel of injury events.⁷

Injury surveillance requires the exchange of practical experience, and not just of concepts. The SEA and WP Regions’ Bi-regional Workshop, held on 18-21 December 2006 in Chiang Mai, Thailand, provided a constructive opportunity for injury surveillance managers, coordinators and data providers to exchange first-hand experience regarding hospital-based surveillance systems, reporting criteria, record forms, manuals, software, report generation and advocacy for preventive actions. The benefits of using combined data sources on injury surveillance are presented in this report, for which the workshop was the main source of information.

Since the workshop, a few Member States had also provided additional information to SEARO during the Regional Programme Managers’ Meeting held in 2007.

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Objectives of the document

This document aims to provide necessary information on various injury surveillance systems in the SEA and WP regions which can be used by developing countries in setting up their own systems, while also providing a programmatic reference with real-life experiences and lessons learned. Hence, the main objectives of this document are:

- to review the situation of injury surveillance in countries of the SEA and WP regions; and
- to prepare a compendium of experiences, methods, lessons learnt and related tools on injury surveillance from each Member State.
2. Methodology

This report is based primarily on country presentations made at the Bi-regional Workshop on Injury Surveillance held in Chiang Mai, Thailand, on 18-21 December 2006. Eleven countries which have injury surveillance systems in place or have initiated such systems were invited to present them at the workshop. A few countries had provided additional information to SEARO during the Regional Programme Managers’ Meeting held in 2007. Follow-up on gaps in the data was done during the following years, and the final draft of this report was sent to participating countries for review prior to publication. Relevant data were cited from the official websites of the participating countries.
3. Country profile

Nineteen countries (Annex 1) in the Asia-Pacific Region participated in the Workshop (nine countries from the SEA Region and ten from the WP Region). Eleven countries made presentations on their injury surveillance systems. These were Australia, Bangladesh, Cambodia, China, Republic of Korea, Maldives, Mongolia, Myanmar, Sri Lanka, Thailand and Viet Nam.
1. **Situation before establishing injury surveillance system**

A report of the Better Health Commission in 1985 described injury prevention as a priority and advocated establishing injury surveillance. It’s main achievement was to have ensured that injury is recognized as a public health priority along with issues such as cancer and heart disease. The report advocated injury surveillance in hospital emergency departments to supplement other sources. Some national project funding was provided and systems were developed in several parts of Australia with a national coordinating group.

The emergency department (ED)-based injury surveillance system flourished for a few years, but did not persist as an ongoing national system mainly due to the high cost of maintaining a special-purpose system capable of providing data with good enough quality to monitor trends. However, ED-based surveillance continues in some parts of Australia, especially the states of Victoria (as part of a general-purpose ED data system) and Queensland (injury-specific data collection at selected hospitals).

The current national injury prevention policy does not talk about injury surveillance directly. It assumes that key information systems such as deaths data and hospital morbidity data will continue to be available for injury surveillance and research.

The systematic collection and coding of deaths data began in the last quarter of the 19th century in most of Australia. National data have been produced for every year since 1907.

2. **Injury data sources (injury information) before establishing the injury surveillance system**

Deaths data was one that generated public and political concern about road safety when the numbers and rates of road deaths were rising year after year during the 1950s and 1960s. This resulted in strong road safety programmes from about 1970 (Figure 1).
Figure 1 (above) shows trends in death for all external causes of injury and poisoning in Australia during the 20th century, including prior to establishment of the injury surveillance system.

Even now, deaths data is extremely important for injury surveillance. The next important era began in the 1980s. This is when injury as a whole (as distinct from road deaths or industrial injuries, etc.) began to be seen as a topic for public health policy and action. Conscious and active surveillance of injury dates from about this time, using existing data (initially mainly deaths, also hospital admissions data and some other sources), and developing additional or modified sources specifically for injury surveillance.

3. Components of the National Injury Surveillance System

Australia does not have a single, special purpose data collection analysis and reporting system that can be called “the Australian Injury Surveillance System”. Instead, the Function or Activity of injury surveillance operates on the basis of a variety of data sources, most of which also serve other purposes as well.
Also, while activities labelled “injury surveillance” mostly occur in the health sector, most injury prevention activities and a lot of surveillance, research, policy development, etc. occur in other sectors, which have responsibility and authority for settings in which many injuries occur. The most obvious example of this is road safety.

Hence, the Australian approach can best be described as a “patchwork quilt”. There is some level of coordination: systems sometimes use the same sources and sometimes the same analysts.

Data sources include:

- Health sector: responsible for overall injury surveillance
- Other sectors: have specialized surveillance, e.g. road traffic injury and other transport injury, homicide, workers’ injury, etc.

**Federal structure**

- National level
  - Australian Institute of Health and Welfare (AIHW) National Injury Surveillance Unit
  - Surveillance and research groups in different health issues, e.g. transport, occupational health and safety, crime, etc.

- State/territory
  - Structure at state/territory level varies as per their priorities. While only some have strong injury surveillance programmes, all have data collection systems and research in place on specific areas such as road safety and crime.

**General purpose health/welfare information systems**

Data sources under this category include:

- National Hospital Morbidity Database (admitted patients).
- Mortality Data System (deaths).
- National Coroners’ Information System (NCIS) (deaths).
- National Health Survey (general population survey).
Injury-specific information systems

These include:

- Regional emergency department (ED)-based injury surveillance (Queensland).
- Trauma registers.
- Spinal Cord Injury Register.

Injury surveillance system also uses data and systems that exist for other reasons, e.g. data on deaths

Injury surveillance and research centres

Throughout Australia there are several research centres implementing the injury surveillance system. These are:

1. Australian Institute of Health and Welfare (AIHW):

   AIHW is Australia’s national agency for statistics and information on health and welfare. It is an Australian Government statutory authority accountable to Parliament and operates under the provisions of the Australian Institute of Health and Welfare Act, 1987. The Act ensures that data are collected and documented under the strictest conditions with respect to privacy and confidentiality. The institute is governed by a Board, as specified in Section 8(1) of the AIHW Act. The institute is defined as a body corporate subject to the Commonwealth Authorities and Companies Act, 1997. The institute works closely with all state, territory and Federal government health, housing and community services agencies in collecting, analysing and disseminating data.

2. Australian Spinal Cord injury surveillance system

   Information on this system is available at the following website: http://www.aihw.gov.au/publications/index.cfm/title/19.

3. Research Centre for Injury Studies (incorporating the AIHW National Injury Surveillance Unit).

4. Queensland Injury Surveillance Unit (QISU).

5. Monash University Accident Research Centre.
3.1 Objectives of the established injury surveillance system

The objectives of the injury surveillance system differ between systems in Australia, but the major focus of all systems is prevention and treatment. The objective of the AIHW National Injury Surveillance Unit is to facilitate community discussion and support policy-making on the prevention and control of injury in Australia by developing, coordinating, interpreting and disseminating relevant information, and conducting research and analysis.

3.2 Data sources and collection methods

Data sources and collection methods are:

**Deaths-based data on death registration system**

The data system contains data from 1907 and forms the basis for official statistics.

**National Coroners Information System (NCIS):**

The system was developed to enable hazard identification and death prevention by coroners and researchers. Cases have been reported to coroners since 2000 (2001 in Queensland).

**Reporting criteria/case definition:**

- All deaths reported to a coroner (this includes nearly all injury deaths).
- “Sudden or unexpected”.
- Certain others (e.g. deaths in custody).

Nearly 20,000 cases are recorded per year.
Sources and collection method:

Data are collected from the police, coroners' investigations and forensic pathologists.

Data entry and transfer:

- Data are entered by officers of each State/Territory coroner.
- Entry should occur as information becomes available.
- Coroners’ findings come last, often months and sometimes years after death.
- Software system for data entry and management has been developed by NCIS and is used by some jurisdictions.
- Electronic transfer from coroners’ offices to NCIS.
- Various quality assurance measures apply (including coding samples of records).

Classification and coding:

Data are classified and coded as follows:

- International Classification of External Causes of Injuries (ICECI) and also other items specific to the coroners’ role.
- ICD-10 (imported from national statistical agency mortality data files).

Analysis:

Analysis is done partly by the host agency and mostly by agencies and researchers who are granted permission to access the collection (mostly via Web interface) to use it in the course of the coroners’ work.

Reporting:

- As implied by analysis, preliminary reporting is made by the host agency, and largely by agencies and researchers who have access to the data.
- Also used with other sources (e.g. as complementary statistic to the Australian Bureau of Statistics mortality data).
**National Hospital Morbidity Database**

**Objectives:**
- Primary purpose is to provide data on hospital activity for administrative reasons, including funding.
- Also serves other purposes, including public health surveillance.

**Dates:**
- Useable national data from 1993-1994. Some states have data going back several decades.

**Reporting criteria/case definition:**
- All episodes of admitted patients in public and private hospitals. Almost 10 000 000 cases are recorded per year (injury ≈ 300 000 records)

**Sources and collection method:**
Professional clinical coders extract information from hospital records soon after a patient has been released and code it. The coded data is transferred to state/territory health departments. A nationally agreed minimum data set is transferred to the AIHW.

**Data entry and transfer:**
- Data are entered into specialized software, generally commercial, from several providers.
- Data transfer from hospital to state health department typically occurs within weeks.
- Transfer to AIHW is slower. Annual files are available after the end of each year containing data for the year.

**Classification:**
- Australian clinical modification of ICD-10 (ICD-10-AM).
- Revised biannually and includes chapter on enhancements to injury and external causes.
Important variables:
- Diagnosis (principal and up to 50 additional).
- External causes (including place and activity).
- Demographics (age, sex, place of residence, etc.).

Analysis:
- AIHW National Injury Surveillance Unit mainly does the analysis for a variety of purposes.

Reporting:
- Overview reports published every one or two years.
- Thematic reports on sub-sets (e.g. falls, fractures, poisoning, burns, injury of indigenous people, transport injury, brain injury) are also published on a regular basis as supplements to the main report.

Queensland Injury Surveillance Unit emergency department system
Queensland is a state in northern Australia. The Queensland Injury Surveillance Unit collects data for injury surveillance at the emergency departments (ED) of 16 hospitals to develop a compendium of injury prevention information.

Reporting criteria/case definition:
- All cases presenting to a participating ED with injury.

Sources and collection method:
- Patients with assistance of ED nurse.
- Live entry to emergency department information system (EDIS) software by ED nurse.

Data entry and transfer:
- Paper record forms are transferred by post, then coded and entered at the QISU.
- EDIS data are transferred electronically by e-mail.

Classification:
- Currently based on National Data Standards for Injury Surveillance (NDSIS); considering transition to ICECI.
Important variables:
- Circumstances of occurrence (NDSIS).
- Social and demographic features.
- Dates of occurrence.

Analysis:
- Mainly performed by the QISU.

Reporting:
- QISU has published injury surveillance reports on many topics in the Injury Bulletin.
- Provides reports to the Queensland Health Department.

Australian Spinal Cord Injury Register (special source on any uncommon but serious injury type)

The major focus of the Australian Spinal Cord Injury Register is to develop a compendium to support prevention and treatment. This system has been in place since 1995 (an earlier system was established in 1986).

Reporting criteria/case definition:
- Cases admitted to any of the six specialist spinal units in Australia; almost 300 cases are recorded annually.

Sources and collection method:
- Data are collected by spinal unit personnel during inpatient stay.

Data entry and transfer:
- Most units enter data into local databases via software. Some use paper forms.
- Data transferred as available with quarterly audits.

Classification:
- Currently based on NDSIS.
- Considering transition to ICECI.
Important variables:
- Clinical variables (e.g. degree or completeness of spinal cord injury).
- Circumstances of occurrence (NDSIS).
- Social and demographic features.
- Dates.

Analysis:
- Mainly by the AIHW National Injury Surveillance Unit.

Reporting:
- An annual report is published and research papers are published as supplements.

3.3 Reporting criteria and important variables

Reporting criteria and important variables differ between systems. In order to use data from multiple systems it is, therefore, necessary to have and understand the criteria of these systems and the quality of the data. Accordingly data is selected and interpreted, and system changes necessary to fill gaps, fix system errors, etc. are advocated.

The routine surveillance data by Flindu University depends mostly on two sources, i.e. deaths and hospital inpatient data, which meets the system’s operational definition of “injury”. The incidence of “community injury” are from deaths {cause of death code = S00-T75 or T79 (ICD-10)} and severe injuries {cases admitted to a hospital, principal diagnosis code = S00-T75 or T79 (ICD-10-AM); this excludes inward transfers from other hospitals}.

Remark: Other criteria are used for other purposes (e.g. burden of injury, complications of care. etc.).
- For some purposes the system focuses on any high threat to life (hospital cases using the International Classification Injury Severity Score (ICISS)).
- Records of fatal hospital cases are sometimes excluded to avoid double-counting.
- The criteria have changed on the basis of research, and further changes will be made.
3.4 **Classification and coding of injured cases (injury severity)**

- Hospital inpatient injury cases:
  - ICD-based Injury Severity (ICISS).
  - Makes use of diagnosis codes (ICD-10-AM).
  - Similar predictive properties to Abbreviated Injury Scale (AIS).
  - Much less expensive if data are already coded to ICD.
- Diagnosis codes (ICD-10-AM): similar predictive properties to AIS, and much less expensive if data are already coded to ICD.
- Trauma registers: generally use AIS.

3.5 **Data entering and transferring**

Since multiple injury surveillance systems exist there is no single blueprint on how data are entered and transferred to generate the report.

3.6 **Data analysis and reporting**

Each system has its own mechanism for data analysis and reporting.

3.7 **Quality control of injury data**

Since quality control of data is a vital issue, each system has developed its own mechanism for controlling the quality of data.

3.8 **Evaluation of the system**

In Australia, there is no single system for evaluating the existing IS system. Each system has an in-built mechanism for evaluating the total system.

4. **Organizational support and sustainability**

- Although several injury surveillance systems have been in place for almost 20 years, injury surveillance has never been funded well enough to initiate substantial surveillance and prevention programmes. It is, therefore, difficult to strengthen injury surveillance and prevention efforts at the national level in Australia.
- The most effective role, given limited resources, has been seen to be one that focuses on policy formulation, developing coalitions and provision of surveillance information.
Particular topics relevant to injury have been funded within the health sector:

- Falls by older people.
- Suicide and self harm.
- Aboriginal and Torres Strait Islander health.
- Harm due to alcohol and other drugs.

5. **Total expenditure in setting up the injury surveillance system**

There are several injury surveillance systems in Australia. The total cost for establishing each injury surveillance system varies according to the infrastructure. However, no data on expenditure in establishing any injury surveillance system were provided.

6. **Conclusion**

- Injury surveillance in Australia is mainly *function-based* from a variety of sources, rather than being a discrete data collection and reporting system.
- Quite competent national information is available on deaths and hospitalized injuries (i.e. the most severe cases). Some information is available on other cases.
- There is room for innovation and improvement.
- Mortality:
  - NCIS: more quality assurance and more coordination needed.
- Morbidity:
  - Enhancements of ICD-10-AM and evaluation of quality of external cause coding is essential.
- Techniques:
  - Data linkage: more sophisticated statistical analysis and reporting (these blur the distinction between surveillance and research) is needed.
- Sources:
  - Better risk factors/exposure data and national ambulatory case data system should be recorded.
7. Lessons learned

- Injury surveillance is an *activity*, not simply a particular type of data or data source.

- It must be noted to make the most use of whatever sources are available and efforts must be made to improve them.

- The value of basic health information (e.g. death registration information and its usefulness) must be recognized.

- Injury surveillance expertise must be located and cultivated (smart use of basic data can be more effective than the poor use of elaborate data).
Bangladesh

1. Situation before establishing injury surveillance system
   - No death registration system.
   - Birth registration system in its infancy.
   - Inadequate hospital Information.
   - No organized Management Information System (MIS).

2. Injury data sources (injury information) before establishing injury surveillance system
   There were surveys, statistics from specialized hospitals, police reports, postmortem reports and newspaper clippings.

3. Components of the National Injury Surveillance System

   3.1 Pilot project on community-based active injury surveillance system

   A community-based active injury surveillance system has been piloted since 2005 by the Centre for Injury Prevention and Research, Bangladesh (CIPRB), covering almost 800,000 people under a project titled “PRECISE – Prevention of Child Injuries through Social Intervention and Education”.

   PRECISE is a comprehensive community-based child injury programme. The goal of the PRECISE project is to reduce child mortality and morbidity due to injuries by developing and implementing comprehensive prevention programmes that can be scaled up throughout the country. The objectives of the PRECISE project are to:

   - Develop and implement various injury intervention packages (e.g. safe home, safe school and safe community); and
   - Evaluate the efficacy of the packages and the effectiveness of its implementation.
Sentinel surveillance

Covered 130,000 households from three districts of Bangladesh.

Community-based active surveillance

Surveillance data collectors gather data from mothers during monthly household visits.

Scope

Recording information on births, deaths, illnesses, marriages and migrations.

3.3 Objectives of the injury surveillance system under PRECISE project

- To monitor the project in terms of:
  - changes in birth, death, marriage and migration.
  - changing patterns of injury occurrence.
  - prevailing knowledge, attitudes and practices regarding injury prevention.
- To monitor the project activities.
- To evaluate the effectiveness of the project.

3.4 Establishment process

(I) Strategies, guidelines and instruments developed through a series of technical workshops:

- WHO guidelines and strategies of injury surveillance systems of other countries were reviewed.
- Sample Vital Registration System of the Bangladesh Bureau of Statistics and Demographic Health Survey of the International Centre for Diarrhoeal Disease Research, Bangladesh, were reviewed.
(II) Pre-testing of methods and instruments:

*Surveillance instruments:*

- Household Information form: demographic and socioeconomic information used during first visit only.
- IS system screening form.
- Birth registration form.
- Death registration form.
- Marriage registration form.
- Migration form.
- Injury death registration form.
- Injury illness registration form.
- Knowledge and practise form (once a year).

### 3.5 Data sources and collection methods

To collect data from households several steps were followed:

- Contacting local authorities.
- Setting up a project office.
- Recruitment and training of surveillance staff (90 data collectors, six supervisors and one statistician).
- Block formation (30 blocks formed in each area).
- Household numbering.
- Scheduling household visits.

### 3.6 Reporting criteria and important variables

*Deaths:* Deaths occurring in the preceding one month (time interval between visits by the data collector) are considered. These include death due to:

- injury (with detailed information).
- non-injury.

*Morbidity:* Data on all who sought medical care or had suffered at least a three-day loss of work or absence from school or were unable to perform normal daily activities. Major categories of morbidity recorded are injury, disability, hospitalization (duration), non-hospitalized injury, and non-injury.
3.7 **Classification and coding of injured cases (Injury severity)**

Injuries are not coded as per ICD-10 but are classified in such a way that international comparison is possible.

3.8 **Data entering and transfer**

- The central office of CIPRB is responsible for data entry and analysis.
- Six data entry staff and one statistician involved.
- Surveillance manager supervises the work.
- Software has been developed for longitudinal data entry.
- Strong data security system developed.

3.9 **Analysis**

After validating and cleaning the data, preliminary analysis is conducted by the surveillance manager.

3.10 **Surveillance report**

- Monthly surveillance reports are produced.
- Reports shared locally with the Directorate-General of Health Services (DGHS) and the United Nations Children’s Fund (UNICEF).

3.11 **Quality control of injury surveillance data**

Several steps have been taken to control the quality of data:

(a) Establishing a central quality control body. These may involve:


(b) Local quality control body (field basis), including:

- one epidemiologist from central office.
- local project coordinator.
- one field manager.
- surveillance supervisors.

(c) Refresher training of surveillance staff.

(d) Periodic evaluation.
3.12 Evaluation of the system

Evaluation of the surveillance system is being done following standard criteria:

- Simplicity: among users of the system (data collectors, supervisors, data entry staff, statistician).
- Flexibility: adaptable to changes in the ICD code.
- Acceptability: mainly to data collectors and respondents.
- Sensitivity.
- Predictive value positive.
- Representativeness.
- Timeliness.

4. Organizational support and sustainability

UNICEF Bangladesh is providing financial and technical support to implement the project. The DGHS, Bangladesh and TASC are the technical partners of the project.

5. Total expenditure in setting up the injury surveillance system

Since the injury surveillance system is a community-based surveillance system, the total monetary commitment in establishing it is significant.
Cambodia

1. Situation before establishing injury surveillance system
   - In Cambodia, an injury surveillance system is in the process of being developed.
   - As a first step, a road traffic accident and victim information system (RTAVIS) was developed in 2004.
   - Three ministries are involved in road traffic accident (RTA) data collection.

2. Injury data source (injury information) before establishing injury surveillance system
   The RTAVIS is the main source for injury information.

3. Components of the National Injury Surveillance System

3.1 Objectives
   The major objectives of the existing injury surveillance system are:
   - To provide government and development stakeholders in Cambodia with accurate, continuous and comprehensive information on road traffic accidents and victims; and,
   - To provide a better understanding of the current road safety situation in order to plan appropriate responses and evaluate the impact of initiatives.

3.2 Data sources and collection methods
   Data sources for the injury surveillance system are hospitals, clinics and police. Traffic police officers are not present at the scene of all accidents and naturally do not report all accidents they witness. Public health facilities data are, therefore, needed to complement traffic police data. On account of the multiplication of private clinics in Cambodia, these too are integrated into the system.
3.3 Reporting criteria and important variables

Case definition:
A collision involving at least one vehicle in motion on a public or private road that results in at least one person being injured or killed.

Causes of injuries:
- Human error (speed, drunk-driving, dangerously overtaking, etc.).
- Road condition (potholes, object on the road, dirt/sand/gravel, etc.).
- Weather condition (rain, cloudy/mist, wet road, etc.).
- Mechanical defect (brake failure, tyre blow-out, steering wheel failure, etc.).

Important variables for data collection:
(I) Hospital form:
- Interview information: hospital name, interviewer’s name, date.
- Crash information: date of accident, time, place, road type, cause of crash, circumstance, whether pedestrian was hit by vehicle or whether vehicle collided with another vehicle, type of vehicle involved, whether police were in attendance at site of crash.
- Casualty information: name, gender, age, date of arrival at hospital, time of arrival, type of road, type of transport, helmet/seat-belt use, substance use, if any, nature of injury, severity of injury, hospital discharge, transportation to hospital.

(II) Traffic police form:
- Interview information: province, traffic police unit, interviewer’s name, date.
- Accident information: date of accident, time, place, road type, cause of accident, collision type, description of vehicles involved, estimated cost of vehicular damage.
- Casualty information: name, gender, age, residence, occupation, type of road, type of transport, helmet/seat-belt use, substance use, if any, nature of injury, severity of injury, hospital discharge, transportation to hospital.
Characterization of injury severity:

- No injury.
- Superficial (minor cuts, bruises).
- Moderate (fracture, sutures).
- Severe (required surgery or admission to intensive care unit).

3.4 Data classification

Data are classified as per international standards.

3.5 Data transferring, coding and entering

The following flow-chart describes data transferral from the periphery to the central level:

Data are coded and entered centrally. There are two main user interfaces: for traffic police form and for hospital form.

- Coding: working in Visual basic programme to develop the user interface; database is developed and stored in Microsoft Access.
- Data entry: encoders enter data into the user interface according to the forms.

Figure 4: Data flow-chart in Cambodia
3.6 Analysis

Data is transferred from the database (Microsoft Access) to the Statistical Package for the Social Sciences (SPSS) with special syntax, and graphs/charts are then produced in SPSS. Additional analysis sometimes is conducted on Microsoft Excel.

3.7 Surveillance Report

A surveillance report is generated every month. The target audience is the National Road Safety Committee (NRSC), the Ministry of Health (MoH), the Ministry of Information, the Ministry of Education, Youth and Sport, the electronic and print media, radio, local and international NGOs, the National Assembly, and other individuals and organizations requesting information. Reports are disseminated mainly via e-mail and through hard copy print-outs. An annual report is also generated and disseminated among these stakeholders.

3.8 Quality control of injury surveillance data

- Each form is checked and rechecked before data entry to ensure that it has been filled in completely and correctly; if not, telephonic contact is made to procure information, and mistakes are recorded for next training assessment.
- Cross-checking between data from hospital and the traffic police is carried out to avoid duplicate recording and to secure additional information.
- Cross-checking with media (major accidents are usually reported in the main newspapers and on the radio).

3.9 Evaluation of the system

No information on evaluation of the system was provided.

4. Organizational support and sustainability

Extending RTAVIS into a national injury surveillance system: The extension of the RTAVIS into a national injury surveillance system began in 2006 through the development of the National Injury Policy, and the system is due to be integrated into the work of the Ministry of Health.
5. Total expenditure in setting up the injury surveillance system

Total costs in establishing the injury surveillance system in less than three years were as follows:

- Human resources - US$ 15 000/-
- Operational costs - US$ 25 000/-
- Equipment - US$ 5 000/-

Total US$ 45 000/-

6. Conclusion

- The injury surveillance system in Cambodia is in a very early stage.
- Total cost for developing the injury surveillance system was low.
China

1. Situation before establishing injury surveillance system

Before 2003, injury data mainly came from the death registry system and government sources such as the Ministry of Communications (MoC) and the Ministry of Public Security (MoPS).

A pilot study of injury surveillance was conducted during 2003 and 2004 (70 hospitals in 11 provinces involved, more than 90,000 injury cases recorded). In August 2005, the Ministry of Health (MoH) issued a formal document to establish the national injury surveillance system.

2. Existing injury data source (injury information)

Data are collected from several sources:

- Hospital-based surveillance.
- Death register system.
- Community-base surveillance (selected areas).
- Branches of government:
  - MoC
  - MoPS
  - Ministry of Civil Affairs (MoCA).

3. Components of National Injury Surveillance System

3.1 Objectives of hospital-based Injury Surveillance System

The major objectives of the hospital-based IS system are:

- to ascertain the distribution and the trend of injuries in China;
- to provide evidence to decision-makers and stakeholders; and
- to provide comparable data for evaluation of injury prevention measures.
3.2 Data sources and collection methods

Selecting the surveillance hospitals:

- Based on the national Disease Surveillance Point (DSP) system, the demographic profile of the region, socioeconomic status, and the population were considered.
- Forty-three DSPs involved: 23 counties in rural areas and 20 districts in urban areas.
- Three hospitals selected as per DSP.

Principles of selecting sites:

- Urban/rural.
- Geographical distribution.
- Basis of injury work experience.

![Figure 5: Sentinel sites (injury surveillance sites)](image)

3.3 Reporting criteria and important variables

Case definition:

- Person paying first visit to the surveillance hospital because of injury.
- Severity and classification of injury cases: according to WHO Injury Surveillance Guidelines.
**Important variables**

General information: name, sex, age, ID number, region, education, occupation.

Basic information on injury:
- Date and time of injury occurrence.
- Date and time of seeing a doctor.
- Mechanism of injury, place of occurrence, activity.
- Clinical information on injury.
- Nature of injury, severity, parts of body injured.
- Clinical diagnosis, disposition.

### 3.4 Classification and coding of injured cases of injury (injury severity)

Classification and coding of cases of injury are done as per WHO guidelines.

#### Figure 6: Information collection procedure of hospital-based injury surveillance system in China
3.5 **Data entry and transfer**

A uniform software for data entry was developed by NCNCD. Steps followed in entering and transferring the data are:

- The county/district Centre for Disease Control (CDC) checks, enters and reports data by the middle of every month by e-mail.
- The provincial CDC checks and summarizes the data and reports to the National Centre on Noncommunicable Diseases (NCNCD) every three months by e-mail.
- Hospitals collect and enter the data and report to the county/district CDC by the fifth of each month.

3.6 **Analysis**

Simple analysis is carried out by the data entry software. These data can be exported for advanced analysis.

3.7 **Surveillance report**

The target audience for the surveillance reports which are developed on a regular basis include:

- MoH—factsheets.
- Academia/researcher—full report.
- Media—newsletter.
- Public—brochure.

3.8 **Quality control of injury surveillance data**

Quality control of data is done by considering the following issues:

- Field supervision and technical support
  Standard procedures included in software for:
  - Data entry.
  - Data cleaning.
  - Data management.

Data presentation:
- Standard data utilization guidelines have been developed.

Assessment of the quality:
3. Qualitative assessment
   - Informal discussions with persons involved in injury surveillance work at the county/district level CDC, and doctor/nurse in sentinel hospital.

4. Quantitative assessment
   - Rate of under reporting.
   - Rate of misrecording.
   - Rate of input error.

3.9 Evaluation of the system

No information on evaluation of the system was provided.

4. National Hospital-Based Injury Surveillance Guidelines

National Hospital-Based Injury Surveillance Guidelines describe:
- General plan for national hospital-based injury surveillance.
- Surveillance questionnaire (recording form).
- Data collection procedures.
- Plan for training.
- Plan for quality control.
- Plan for analysis, presentation and dissemination of data.

Strengthening the construction of current national injury surveillance network focuses on:
- Capacity-building.
- Cooperation and communication.
- Conduct of population-based injury surveillance.
- Community-based injury surveillance was conducted in 2007.

5. Organizational support and sustainability

The following institutions provide technical and financial support to sustain the injury surveillance system:
- Ministry of Health (MoH)
- National Centre for NCD and Injury Control and Prevention (NCNCD).
National CDC.  
Provincial CDC.  
County/district CDC.  
Injury surveillance hospital.  
Ministry of Health: Provides policy support and leadership.

Responsibilities of NCNCD, China CDC:
- Training, field supervision and technical support.  
- Data collection, data processing.  
- Data interpretation and dissemination.

Responsibilities of Provincial CDC:
- Training, field supervision and technical support.  
- Data collection.  
- Data transfer to NCNCD.

Responsibilities of county/district - level CDC:
- Training, field supervision and technical support.  
- Data collection and data entry.  
- Data transfer to provincial CDC and NCNCD.

Responsibilities of injury surveillance hospital:
- Completing injury surveillance questionnaire.  
- Questionnaire collection.

For the sustainability of the system and to develop human resources, training programmes are conducted at three levels:

First level
- NCNCD develops standard training materials.  
- NCNCD organizes and trains provincial and county/district-level participants who are in charge of injury surveillance work.
Second level

- Using the standard training materials developed by NCNCD.
- Provincial and county/district-level trainers who have participated in training programmes for the provincial and county/district-level officials train hospital managers in charge of injury surveillance.

Third level

- Using the standard training materials developed by NCNCD.
- Hospital managers who are in charge of injury surveillance work train all the doctors in relevant departments, such as the emergency room (ER).

6. Total expenditure in setting up the injury surveillance system

The information on the total expenditure in setting up the injury surveillance system was not available.

7. Conclusion

- China has developed a well-structured injury surveillance system in coordination with several institutions at various levels.
- MoH is the lead institute for the injury surveillance system.
1. Situation before establishing injury surveillance system

Information on the situation before establishing injury surveillance system was not provided.

2. Components of the National Injury Surveillance System

2.1 Objectives

The main objective of the injury surveillance system is to monitor trends of injuries and target injury control measures to relevant circumstances and populations.

2.2 Injury data source and collection methods

Data source for the national injury surveillance system is the Emergency Department Information System (EDIS). Data sources for other sectors are interconnected and integrated.

Hospital-based injury surveillance

- ED-based injury surveillance.
- Emergency Department Information System (EDIS).
- National Hospital Discharge Survey:
  - Collected data on hospitalizations since 2005.
  - National probability sample of 150 hospitals.
- ED-based injury in-depth surveillance.
- Korean National Health and Nutrition Examination Survey.
- Korean Youth Behaviour Risk Factor Surveillance:
  - Subject: 800 schools, 70 000 students.
  - Method: online survey.
Integration
- Mortality (Korean National Statistical Office - KNSO).
- Accident in nursery (Ministry of Gender Equity and Family - MoGEF).
- Accident in teenagers' training institution (New York City Korean Chamber - NYC).
- Accident in child welfare institution (Ministry of Health and Welfare - MOHW).

Linkage
- Traffic accident with National Police Agency (NPA).
- Fire/drowning with National Emergency Management Agency (NEMA).
- Food poisoning with Korea Food and Drug Administration (KFDA).
- Product safety with Consumer Protection Board (CPB).
- Accident in pleasure dome with Ministry of Culture, Sport and Tourism (MoCST).
Figure 8: Injury surveillance system in Korea

2.3 Reporting criteria and important variables

Data are collected from:

- Injury patients visiting regional or local medical centres.

Variables

- Hospital information.
- Patient demographic data and admission information.
- Contents and results of emergency care.
- Result of final diagnosis.
- Target injury.

Source: Division of Chronic Diseases Surveillance
3.4 **Classification and coding of injured cases (injury severity)**

Data are classified and coded according to WHO guidelines.

3.5 **Data entry and transfer**

Figure 10: **Process of data transfer and report generation for emergency department-based surveillance system**
2.7 Analysis and reporting (surveillance report, Korean CDC)
Data are analyzed on a monthly basis and monthly surveillance reports have been developed to target policy-makers and academics.

2.8 Quality control of injury surveillance data
Korean CDC has developed a special system for quality control during data processing.

2.9 Evaluation of injury surveillance system
An in-built mechanism developed by Korean CDC evaluates the surveillance system.

3. Organizational support and sustainability
Korean Centre for Disease Control and Prevention.

4. Total expenditure in setting up the injury surveillance system
The information on total expenditure of setting up the injury surveillance system was not available.

5. Conclusion
In the Republic of Korea, injury surveillance is at an early stage; therefore, it is necessary to establish mechanisms to assess quality of data and efficiency of implementation. Efforts were made to construct a qualitative surveillance system aiming for policy response to injury and violence prevention.
Maldives

1. **Situation before establishing the injury surveillance system**

No injury surveillance system existed in the country and there was no national policy for injury surveillance and prevention. Problem identification was not possible due to lack of data. Death certificates specifying the cause of death along with demographic data were available but the quality of reporting needed improvement. Hospital reports on noncommunicable diseases were also available. However, injuries were not included in this report.

2. **Injury data source before establishing the injury surveillance system**

Death certificate and hospital reports.

3. **Components of the National Injury Surveillance System**

3.1 **Objectives**

The main objectives of the injury surveillance system are to:

- estimate the magnitude of the problem;
- set priorities;
- develop policy;
- implement programmes; and
- monitor and evaluate prevention strategies.

3.2 **Data sources and collection methods**

Indira Gandhi Memorial Hospital (IGMH):

- Data collection started since August 2006 at the department and the General Practice outpatient department.
- Data are collected when patients arrive at the accident and emergency department.
3.3 **Reporting criteria and important variables**

*Case inclusion:* All injuries are included irrespective of severity. These include transport accidents, assault and intentional self-harm.

*Exclusion:* Injury caused during medical interventions and adverse effects of medical treatment, psychological injuries, repeat visits to the hospital for a previous injury.

Existing ISS records the following data:
- Demographic information.
- Nature and mechanism of injury.
- Circumstance of injury.
- Intention of injury.
- Place of occurrence.
- Date and time of injury.

3.4 **Classification and coding of injured cases (injury severity)**

- Injuries are classified and coded as per ICD-10.
- Coding manual as well as coding software are readily available in the record section.

3.5 **Data entry and transfer**

System has not yet been developed.

3.6 **Analysis**

Data are not yet fully analysed.

3.7 **Surveillance report**

Surveillance reports are not yet available.

3.8 **Quality control of injury surveillance data**

The following systems are in place to control the quality of data:
- Files of injury surveillance data are edited and sent to the Health Promotion Unit on a quarterly basis for monitoring and planning.
At the end of the first month, a review was conducted on the completion of forms and the data processing system.

At the end of the third month, in addition to the above, forms were compared with daily sheets and outpatient data to assess whether each injury case was detected by the system.

A fully detailed evaluation of the system is to be conducted at the end of the sixth month.

3.9 Evaluation of injury surveillance system

Not available.

4. Organizational support and sustainability

The following institutions are providing support for the establishment as well as sustainability of the injury surveillance system:

- Ministry of Home Affairs.
- Ministry of Construction and Infrastructure.
- Maldives Police Services.
- Ministry of Transport.
- Municipality.

5. Total expenditure in setting up the injury surveillance system

Information on total expenditure for setting up the injury surveillance system was not available.

6. Conclusion

The injury surveillance system in Maldives is at an early stage and more technical and management support is needed.
Mongolia

1. **Situation before establishing injury surveillance system**

No information about the situation before establishing injury surveillance system is available.

2. **Components of the National Injury Surveillance System**

A pilot project on injury surveillance is under development at the National Traumatology and Orthopaedic Research Centre (NTORC) in Mongolia. The Ministry of Health (MoH) is the lead agency and also coordinates the multisectoral action plan on injury prevention. The Minister of Health is responsible for reporting quarterly to the Government of Mongolia on the progress of implementation and results achieved.

In 2003 the Research and Training Centre on Injury Prevention (RTCIP) was established at the NTORC with financial and technical support from WHO. The RTCIP is responsible for developing a National Action Plan based on the National Programme on Injury Prevention, and for establishing a national injury surveillance system.

2.1 **Objectives**

The main objectives of the injury surveillance system are to:

- determine the incidence or characteristics of common types of injuries;
- identify populations at high risk from particular injuries;
- identify areas where intervention is needed and provide data on which to make good decisions; and
- monitor and evaluate injury prevention programmes and interventions over time.

2.2 **Data sources and collection methods**

The NTORC is the only centralized hospital for injuries and violence in the whole country. Data collection at the NTORC is the first emergency department surveillance
system in Mongolia. The system is implemented at two campuses: the National Traumatology and Orthopaedic Training Hospital and the Burns and Scalds Centre. Data from patients of all age-groups presenting at these two sites for treatment of any injury (unintentional or intentional) are recorded.

One full-time staff at the RTCIP is responsible for implementation of the injury surveillance system at the Trauma Hospital, Burns and Scalds Centre, and the Darkhun-Uul aimags (sub-national unit), as well as for data collection, data entry, data analysis and reporting.

There are a number of government agencies and institutions involved in the injury surveillance system in Mongolia. These include:

- Ministry of Health
  - NTORC.
  - Burns and Scalds Centre (deals with burns and bites by animals and insects).
  - National Centre of Poisoning (deals with adult poisoning).
  - Directorate Medical Centre.
  - Child and Mother Research Centre (deals with child poisoning and other injuries).
  - Forensic Hospital
  - Rural area (21 aimags and 343 sub-divisions of aimags).
  - All general hospitals.
  - District hospitals (8).
  - Family group practice doctors (330).
  - Regional Treatment and Diagnostic Centres (3).

- Ministry of Social Welfare and Labour

- State Professional Inspection Agency (occupational injury).

- Ministry of Justice
  - General Police Department (deals with violence and crime data).
  - Traffic Police Department (deals with road traffic injury).
  - Other agencies such as Fire-Fighting Centre (deals with fire-related burns) and NGOs.
1. Budget requirement:
The government (MoH) and WHO provide the funding for injury prevention activities.

2. Time frame:
The injury surveillance pilot project was implemented:
- in NTORC from 1 January 2006 to 8 June 2006;
- at the Burns and Scalds Centre from 1 February 2006 to 20 August 2006;
- in Darkhan-Uul aimag (include three sums) from 9 December 2006 to 9 February 2007

The major focus in the establishment of an injury surveillance system in Mongolia are:
(I) to develop national guidelines on injury surveillance system; and
(II) to establish an injury surveillance system at the NTORC and Burns and Scalds Centre, aiming at:
- strengthening the injury surveillance system in Darkhan-Uul aimag, and
- developing injury surveillance system involving all health institutes.

2.3 Reporting criteria and important variables
Major demographic variables and variables for detailing injury events have been included in the injury surveillance system. Emergency department cases are also included.

2.4 Classification and coding of injured cases (injury severity)
Classification and coding are done following WHO guidelines for injury surveillance.

2.5 Data entry, transfer and analysis
Data are analysed regularly, i.e. on a monthly basis at first and then quarterly, for several purposes:
(1) To check data inconsistencies or problems (for feedback to the collection site along with advice for rectifying the problem) as soon as any inconsistency or problem is identified.
(2) To monitor and report on any changes in injury patterns and profiles and emerging issues.

(3) To provide feedback regularly to data collection sites and to stakeholders.

Statisticians/doctors at the NTORC make a preliminary analysis of the data and provide feedback to the Injury Prevention Centre for monitoring and dissemination purposes. The form for the summary analysis is determined following consultation with these parties.

It has been planned that data analysis should be done using a working version of the main database file and not the main database itself, in order to overcome the problem of data loss.

2.6 Surveillance report

Staff at the Centre for Injury Prevention (CIP) based at the NTORC are responsible for generation of reports. These reports are regular and tailored to the following groups and organizations as well as needs:

- Regular feedback, e.g. quarterly, on data quality and injury profiles for staff involved in all aspects of collecting injury data at all collection sites. This feedback could be in the form of lectures/presentations for more direct interaction and further improvement. Feedback should be provided in written form or in the form of a powerpoint presentation to the local counterpart about the injury status, including all aspects of the surveillance system.
- Regular feedback on injury profiles to key agencies having an interest in the surveillance, the NTORC administration, the MoH and WHO.
- Yearly reports provided to all stakeholders.
- Regular reports (quarterly, half-yearly or yearly) to other agencies involved in particular areas of injury prevention, e.g. traffic injury data to the Traffic Police.
- Simple reports and figures should be provided on request to agencies, e.g. the MoH, the National Centre Against Violence, etc. to support the development of proposals for the funding of research, implementation strategies and evaluation of programmes.
2.8 **Quality control of injury surveillance data**
No information is available on quality control of injury surveillance data.

2.9 **Evaluation of injury surveillance system**
No information is available on evaluation of the injury surveillance system.

3. **Organizational support and sustainability**
The system can be sustained by the MoH by:

- establishing a centre or body responsible for injury surveillance at the national level;
- continuing the training of doctors and staff of the statistics departments of health institutes and other organizations;
- developing human resources and institutional capacity.

4. **Total expenditure in setting up the injury surveillance system**
The information on the total expenditure for setting up the injury surveillance system was not available.
Myanmar

1. **Situation before establishing injury surveillance system**

Before 2004 there was no surveillance system and injuries were recorded only by the hospital departments. In November 2004, a workshop was held on establishing injury surveillance in Myanmar. In January 2005 an injury surveillance system and the WHO injury surveillance record form was piloted in Yangon General Hospital (for one month) for the first time. In August 2006, a hospital-based injury survey was conducted in 27 townships in all states and divisions in Myanmar using the WHO injury surveillance form.

*Figure 11: Injury surveillance areas in Myanmar (2006)*

Source: A study on injury surveillance held in 27 townships of all States & Divisions in Myanmar, August 2006.
2. Components of the National Injury Surveillance System

2.1 Objectives

The main objectives of the injury surveillance system are to:

- set up a database for assessing the quality of injury care provided by hospitals in different states and divisions;
- analyse the results and utilize them for promotion of injury care in respective hospitals involved in injury surveillance; and
- facilitate injury prevention and control activities at the local and national levels.

2.2 Existing injury data source and collection methods

Data are collected from the following sources:

- Hospital data (Yangon General Hospital yearly report).
- National Health Management Information System, MoH.
- Yearly report by MoH.
- Yearly report by different agencies, e.g. traffic police, national statistics, road transport, labour, industries and agriculture, etc.
- Research papers by medical and non-medical personnel.
- Data collection by injury surveillance system.

2.3 Reporting criteria and important variables

No information on reporting criteria and important variables was available.

2.4 Classification and coding of cases of injury (injury severity)

No information on classification and coding of cases of injury was available.

2.5 Data entry and transfer

No information on data entry and transfer was available.

2.6 Analysis

No information on analysis was available.
2.7 **Surveillance report**
Information was presented but documents are not yet disseminated.

2.8 **Quality control of injury surveillance data**
No information on quality control of injury surveillance data was available.

2.9 **Evaluation of injury surveillance system**
No information on evaluation of injury surveillance system was available.

3. **Organizational support and sustainability**
No information on the organizational support and sustainability was available.

4. **Total expenditure in setting up the injury surveillance system**
The information on the total expenditure for setting up the injury surveillance system was not available.
1. Situation before establishing the injury surveillance system

Burden of injuries in Sri Lanka

- Injuries have been the leading cause of hospitalization since 1995.
- Survey on injuries completed in 2002.
- Hospital admission records available at the national level.
- Death certificates.
- Studies from individual hospitals.
- Independent studies:
  - Road Traffic Injury Research Network.
  - South Asian Clinical Toxicology Research Centre.
- Poisoning Unit, MoH.
- Individual researchers.
- Hospital admission for injuries and poisoning has increased from 1 732 cases per 100 000 population in 1980 to 3 372 per 100 000 population in 2003.
- Injuries are a leading contributor to the burden of disease (calculated using disability-adjusted life years or DALYs).
- One person dies every four hours from road traffic accidents in the country.

2. Components of the National Injury Surveillance System

2.1 Current Injury Surveillance Project

Once the Ministry of Health recognized the need for improved injury surveillance, the Japan International Cooperation Agency (JICA) and AmeriCares agreed to support the development of an injury surveillance pilot project. A background analysis of existing
systems was completed in April, 2006, and workshops were held with stakeholders in July of that year to develop a case definition and minimum dataset. Technical support was provided by WHO-SEARO.

**Figure 12: Injury surveillance system piloting areas in Sri Lanka**

- Four hospitals selected for pilot project, 2006:
  - All near Colombo
  - Different levels of facilities
- Injury surveillance initiated as first project in pilot hospitals

A pilot survey instrument was developed, and training was conducted for nurses, doctors and medical records officers at pilot sites. Data collection for pre-testing was initiated at four pilot hospitals in November 2006. Forums were organized to evaluate the survey tool and process, and the tool was revised in response to user feedback and first pilot results. The revised form was tested for six months in four pilot facilities and at the National Hospital.

### 2.2 Objectives of establishing the injury surveillance system

The main objectives of the injury surveillance system are to:

- establish a database on causes of injuries and outcomes from injuries in Sri Lanka;
- set up an evidence-based injury surveillance project which will be used for:
  - injury prevention,
  - research,
  - policy development guidance,
– training development,
– trauma system development, and
– clinical quality improvement.

### 2.3 Methods of injury data collection

Data are collected by the doctors and nurses using a two-page survey form:

- **The Nurse’s Section includes**:
  - demographic information.
  - events surrounding injury.
  - method of transport to hospital.

- **The Doctor’s Section includes**:
  - vital signs/Glasgow Coma Scale at arrival.
  - final diagnoses.
  - final disposition.

### 2.4 Reporting criteria and important variables

#### Case definition

(I) **Original case definition**:

All patients with acute injuries from non-iatrogenic causes who are admitted as indoor patients within seven days of the date of injury or who are brought dead on arrival at the hospital due to acute injuries.

(II) **Revised case definition**:

All patients with acute injuries from non-iatrogenic causes who are admitted as indoor patients within 48 hours of the time of injury or who are brought dead on arrival at the hospital due to acute injuries, and all patients transferred to the participating hospital for care of acute injuries.

### 2.5 Classification and coding of cases of injury (injury severity)

- No standard coding system is used in Sri Lanka.
- Revised survey instrument considers categories used in ICD-10.
- Currently considering options for severity adjustment of traumatic injuries.
2.6 **Data entry, transfer and analysis**
- Completed forms are sent to the Medical Record Department after discharge.
- Data entry operators enter relevant data into the database.
- Copy of hospital database is sent to the central database.
- Currently analysis is done centrally, but this will eventually happen at the local level as well.

2.7 **Surveillance report**
- Monthly reports are generated at the national and local levels.
- Reports primarily target the health sector.
- Summary reports are disseminated to other relevant sectors.

2.8 **Quality control of injury surveillance data**
- Medical Records Officers of pilot hospitals conduct quality audits by comparing the data form with information in the patient’s record.
- MoH representative conducts additional periodic quality audits.

2.9 **Evaluation of the injury surveillance system**
No information on the evaluation of the injury surveillance system was available.

3. **Organizational support and sustainability**

**Trauma system development**
A national initiative for trauma system development was launched in June 2006. A new unit called the Trauma Secretariat was established within the MoH to oversee this effort, and a Trauma System Development Committee (TSDC) was appointed by the MoH to advise during this process. The TSDC includes representatives from the MoH, professional organizations and other stakeholders. Six subcommittees work on different components of trauma system development, one being on injury surveillance.

- Coordination and oversight is provided by the Trauma Secretariat of the MoH.
- The following departments of MoH also provide technical support:
  - Epidemiology Unit.
  - Health Information Unit.
The system is designed to require minimal human resources and financial inputs to promote sustainability.

The process design has been made in such a fashion to work within the existing resources as much as possible.

4. **Total expenditure in setting up the injury surveillance system**

- Start-up funding and additional technical support provided by JICA and AmeriCares.
- Total expenditure for project design, implementation and nine months’ operation will be around US$ 35 000.
Thailand

1. Situation before establishing the injury surveillance system

Background on the establishment of the Provincial Injury Surveillance

The death rate from accidents in Thailand had increased rapidly since 1987, and accident prevention became part of the policy of the Ministry of Public Health (MoPH) in 1992. Death certificates could not provide sufficient epidemiological data and were found to be not timely enough for response. The Epidemiology Division of the MoPH was assigned to establish a surveillance system. It also conducted a situation analysis which revealed that several new information systems related to injuries had already been constructed by large hospitals or provincial health offices. However, most of them collected data for preventive actions only, which were useful for the police but not for the data providers (physicians and nurses in hospitals). Hence, data quality was not well attained.

Those systems also faced problems in data processing and analysis due to lack of expertise in designing and managing the information system (including application of computer technologies). In addition, the difference between the systems in terms of variables collected, operational definition, sources of data, and methods of collection had made the collected information non-comparable and not feasible for problem assessing at the regional or national level.

2. Injury data source before establishing the injury surveillance system

Before establishing the injury surveillance system, injury-related data were available from the following sources:

- Mortality Notification System.
- Report on 19 external causes of injuries from all government hospitals (by number, age, sex, district and provinces, and month) by the Prime Minister’s Office.
- Cause of admission report (government hospital).
Hospital discharge data.
Police report.
Road accident report from the Department of Highways.

3. Components of the National Injury Surveillance System

The national injury surveillance system started data collection in January 1995.

3.1 Objectives

The main objectives of the national injury surveillance system are to:

- establish a database for assessing the quality of acute care and inter-facility transfer provided by hospitals at the provincial level to the injured; and
- facilitate injury prevention and control at both local and national levels.
3.2 Data sources and collection methods

The data source for the national injury surveillance system are 29 sentinel hospitals. Data are collected as shown in Figure 14. Death registries are also used.

3.3 Reporting criteria and important variables

The population surveyed includes all acutely injured and dead from external causes (ICD-10 code V01 – Y36) presented within seven days after occurrence at ERs of the sentinel hospitals. The external causes are as follows:

(I) Transport accidents (V01-V99):
   - Land transport accidents.
   - Water transport accidents.
   - Air and space transport accidents.

Figure 14: Flow chart of the Injury Surveillance Record Form

Source: Epidemiology Division, MoPH, Thailand
(II) Other external causes of accidental injury (W00-X59):

- Falls (W00-W19).
- Exposure to inanimate mechanical forces (W20-W49).
- Exposure to animate mechanical forces (W50-W64).
- Accidental drowning and submersion (W65-W74).
- Other accidental threats to breathing (W75-W84).
- Exposure to electric current, radiation and extreme ambient air temperature and pressure (W85-W99).
- Exposure to smoke, fire and flames (X00-X09).
- Contact with heat and hot substances (X10-X19).
- Contact with venomous animals and plants (X20-X29).
- Exposure to forces of nature (X30-X39).
- Accidental poisoning by and exposure to noxious substances (X40-X49).
- Overexertion, travel and privation (X50-X57).
- Accidental exposure to other and unspecified factors (X58-X59).

(III) Suicide, intentional self-harm, assaults, events of undetermined intent and legal intervention, and operations of war (X60-Y36).

**Reporting criteria**

National sentinel hospitals (29 selected regional and hospitals of 500-1000 bed capacity) report to the Bureau of Epidemiology about the severe injury cases of the above categories, which include:

- Deaths before arrival.
- Deaths in the ED and later in hospital.
- Observed or admitted injury cases.

**Variables for data collection.**

Variables used in the injury surveillance form for data collection are:

*Patient demographics,* i.e. patient’s name and surname, hospital number, present address (only to specify whether present address lies inside or outside the surveillance province), sex, age and occupation.
**General information** on the injury:

- Date and time of occurrence.
- Date and time of arrival at hospital.
- Location of occurrence (district and province).
- Place of occurrence.
- Intention related to the cause of injury.
- Relation of the injury to occupation.
- External causes of injury; divided into transport accidents, other accidents and other injuries.
- Risk behaviours.
- Details of how the injured came or was brought to the hospital.
- First aid/care while transported or transferred.
- Patient conditions (assessed upon first arrival to the hospital).
- Mechanism of injury.
- Status on disposition from ER.
- Time of disposition from ER.
- Diagnosis.
- Date of discharge from ward/hospital.
- Condition of the patient at the time of discharge.

### 3.4 Classification and injury severity

Injuries are classified and recorded as per national guidelines, which were issued in 1994:

- ICD-10 Chapter 19 for nature of injury and Chapter 20 for external causes of injury.
- AIS 85 for injury severity and for calculation of probability of survival of trauma patient.
- Provincial codes and hospital codes from the authority concerned.

*The recorded injury surveillance forms are kept in the respective hospitals for at least one to two years for evaluation of accuracy, completeness and timeliness.*
3.5 Data entry, transfer and analysis

The provincial/regional hospitals collect and make use of the data on their own without submitting it to the Bureau of Epidemiology, MoPH, unless they are requested to by the data source (sentinel hospital) for the surveillance network. However, the Division may request that a particular hospital provide a data diskette or send a data file via e-mail every six months. Only sentinel hospitals have to submit injury data to the Bureau of Epidemiology.

All data:
- Submit the first six months’ data (first half of the year) by 31 August of that year.
- Submit the one-year data (12 months) by 28 February of the following year.

Transport injuries data (only when requested by the National Road Safety Committee):
- Submit the three months’ data by the 15th of the following month.
- Submit everyday during New Year and Songkran festival by 9 a.m. of the following day.

The medical statisticians in the Medical Records Department are responsible for coding, supervising data entry and editing data with the appropriate software. Data are edited each month. The data verification with medical records may be needed from time to time. Data analysis, information dissemination and distribution of outcome tables (44 tables) from injury surveillance software within the hospital and to related organizations takes place every one to four months, according to the agreements within the province.

3.6 Surveillance report

Local level

1. The Medical Record Sections of the sentinel hospitals are in charge of printing all the tables in the menu of the injury surveillance programme (44 tables) for distribution.

2. The report recipients or data users include hospital executives, orthopaedic surgeons, head nurses, the hospital trauma team, executives at the provincial health offices and other related offices.
### National level

Surveillance information was disseminated to all ministries within the year of the system starting data collection (1995). The target audience was expanded to include the Prime Minister, the Chairman of Parliamentarians, ministers concerned and organizations (including Finance, the Government Civil Service Committee and the National Council on Economic and Social Development), political parties and the media.

### Data utilization at the policy level

Data generated from the injury surveillance system are being used to formulate policy decisions. A few achievements are:

- Warning on the label of Alcohol bottles, 1996.
- Helmet Policy, 1996.
- Seatbelt Policy, 1996.
- Campaign on “No alcohol in Khao Panxa” (Buddhist Lent) period, 2002.
- Control imposed strictly on alcohol consumptions since 2002.

### 3.7 Quality control of injury surveillance data

The following activities for quality control of the injury surveillance data have been set as system protocol. Technical supervision is being carried out in the following manner:

- Seven injury surveillance model hospitals and specially assigned hospitals under the Office of the Permanent Secretary are supervised by the Bureau of Epidemiology, and the Regional Epidemiology Centres (Disease Control and Prevention Centre).
- Two injury surveillance model hospitals under the Department of Medical Service are supervised by the Bureau of Epidemiology, sentinel hospitals and the medical institutes for accidents and disasters.
- Other hospitals in the injury surveillance network are supervised by the Regional Epidemiology Centres and the team from the seven injury surveillance model hospitals.

Technical supervising procedures include random sampling of injury surveillance recording forms for verification of correctness in filling in information and coding; and interviewing to identify other problems, give explanations and answer questions, as
well as giving suggestions for quality improvement. A supervision report is written and submitted to the Hospital Director and the Director of the Epidemiology Division for acknowledgement and further action.

3.8 Evaluation of injury surveillance system

Evaluation of the system and the quality of data is carried out by the Injury Surveillance Data System Evaluation Committee. The Committee consists of academic personnel from the Noncommunicable Diseases Section (Bureau of Epidemiology), Disease Control and Prevention Centre, medical institutes for accidents and disasters, Division of Provincial Hospitals, Bureau of Nursing and one representative from each of the prototype hospitals. To evaluate the data quality, a statistical sample of the records is used for assessment within a suitable timeframe and budget.

The evaluation process requires six to ten evaluators to work for five days in each hospital. The evaluators verify the following aspects of the system:

- the completion of the report;
- the correctness of filling out the card;
- coding completeness and quality of ICD-10, BR (body region/parts), Abbreviated Injury Scale (AIS) and general codes;
- correctness of data entry;
- the preparation and distribution of data tables, application of the data in the development of hospital service system and prevention and control of injury in the province.

Information on problems and obstacles in using the data are also collected to evaluate the system. The evaluation results are analysed in order to correct problems and develop the system as a whole at the national level. Each hospital is evaluated every two to five years.

4. Total expenditure in setting up the injury surveillance system

The expenditure on developing the tools, establishing the model and operating the system, including workshops, training and other payments for the first two years of operation in the hospitals was 3.8 million Baht (approximately US$ 152 000 according to the exchange rate at that time). This sum does not include salaries of personnel. The WHO country programme contributed seed money to the project totalling approximately 25% of the expenditure. The balance and the operational cost came from the MoH, mainly from the budget of the sentinel hospital and the Epidemiology Bureau.
1. **Situation before establishing the injury surveillance system**
   - An increasing trend of injuries was observed during 1990-2000 and injury was the leading cause of mortality.
   - Road traffic injuries were the single most common form of injury.

2. **Injury data source before establishing injury surveillance system**
   
   (I) *Ministry of Health:*
   - Health reporting system: *Health Statistic Year Book*
   - Household survey on injury – national and provincial scale, or National Health Survey,
   - National Youth Health Survey.
   
   (II) *Ministry of Transportation (NTST)*
   - Traffic accidents including deaths, injuries, involving motor vehicles.
   
   (III) *Ministry of Labour, War Invalids and Social Affairs (MOLISA):* Occupational accidents.

3. **Components of the National Injury Surveillance System**

3.1 **Objectives**

The major objectives of the pilot hospital-based injury surveillance are to:

- identify injury risks for prevention; and
- improve the quality of pre-hospital trauma care and trauma care at hospital.
3.2 **Injury data source and methodology**

- Seven hospitals in Hanoi, Ninh Binh, Ho Chi Minh City (one central trauma centre, one provincial trauma centre, two provincial hospitals and three district hospitals).
- Data from the community are collected also under the surveillance system.
- In 2003–2006, 40 out of 64 provinces were covered, and a national-level scale was due to be achieved by 2007.
- Responsible personnel are the existing network of health staff, who were trained with a training-of-trainers approach.

3.3 **Reporting criteria and important variables**

**Cases:** Injury visits to pilot hospitals.

**Cause of injuries:** Grouped as ICD-10 (Chapter 20 with 10 common causes).

There are 37 items for data collection.

3.4 **Classification and coding of injured cases (Injury severity)**

Standard international system (ICD-10) is used to classify and code 10 most common causes of injuries.

Injury severity – Abbreviated Injury Scale (AIS) and injury surveillance system

3.5 **Data entry and transfer**

- Data are transferred by post or email.
- Data are transferred every month.
- Data from district to provincial and central level are transferred quarterly.

3.6 **Analysis**

A special software has been developed to enter and analyse the data.
3.7 **Surveillance report**

A quarterly report is generated by the MoH targeting the media to:

- strengthen the annual system for collecting and reporting injury data (data is reported annually in health statistics yearbooks by ICD-10);
- reinforce other ministries’ systems for injury reporting and strengthened information sharing.

3.8 **Quality control of injury surveillance data**

No information was available.

3.9 **Evaluation of injury surveillance system**

No information was available.

4. **Organizational support and sustainability**

The organizations involved in setting up the injury surveillance system in Viet Nam are illustrated in Figure 15:

**Figure 15: Organization of injury surveillance in the health sector**

```
National Steering committee on AIP
  ↓
Ministry of Health
  ↓
Viet Nam Administration of Preventive Medicine (VAPM)
  Dept. of Planning and Finance
  Dept. of Therapy
  Medical School and Public Health School
```
5. Total expenditure in setting up the injury surveillance system

The information on the total expenditure for setting up the injury surveillance system was not available.

Advantages and challenges

Advantages:
- Strong commitment of the government and leaders of the MoH.
- National Policy on Injury Prevention is in place.
- Many provinces have allocated funds for annual activities on road traffic injury prevention.
- Strong support from donors.

Challenges:
- Injury data do not reflect the true nature of the injury problem.
- Lack of adequate human resources possessing practical knowledge and experience.
- The budget is limited to meet the requirements of the work.

Plan for 2007–2010

A special plan for injury prevention has been developed for the period 2007–2010 with the following specific objectives:
- Establish injury surveillance system in 100% of provinces and cities by using the existing health surveillance system combined with relevant ministerial and sectorial injury reporting systems.
- Develop hospital-based injury surveillance system in high-risk locations.
- Develop injury data from household surveys that is representative for geographical areas as well as on a national scale.
- Develop an effective mechanism for dissemination and use of injury data for injury prevention planning work.
4. Conclusion and recommendations

**Conclusion**

- A few countries of the WHO South-East Asia and Western Pacific regions have already established injury surveillance systems, while others are processing or piloting the same.
- The practical experiences, methods, models and tools in injury surveillance (record forms, manual, software, etc.) are very useful for establishing and improving the system in Member States. A sentinel injury surveillance system using selected hospital data works in low- and middle-income countries.
- A trauma registry is needed for major hospitals in the regions to improve trauma care. Hence there is an opportunity to establish Trauma Registry-cum-Injury Surveillance in each Member State to achieve the dual objectives of acute care quality monitoring and improvement and injury prevention.
- Collaboration between WHO and other UN agencies or NGOs for the establishment and maintenance of an injury surveillance system has become an important issue to explore for each agency to play its appropriate role.

**Recommendations**

**For Member States**

- Member States with established injury surveillance systems or any other appropriate information system on injuries should strengthen and sustain them to make effective use of information.
- Member States that have not yet established a national injury surveillance system should adopt the necessary step-by-step development approaches
for collection, analysis and dissemination of evidence-based information on injuries for policy and programmes.

- Member States should organize wider consultations and ensure greater engagement of stakeholders (government agencies, private sector, civil society groups, national and international NGOs, networks and alliances, and communities) for further development and coordination of policies and programmes for strengthening injury information systems within the framework of comprehensive national injury prevention and control.

- Member States should allocate adequate financial and technical resources to support and sustain national injury surveillance and secure information to identify and monitor injury problems among the population and specific age-groups, especially children, for appropriate prevention and control.

For WHO

- WHO should continue to advocate for renewed and sustained political commitment at the highest administrative levels in Member States to establish and strengthen the injury information system as part of national injury prevention and control through appropriate support.

- WHO should facilitate and enhance partnerships, networks and alliances for harnessing additional technical and financial resources for injury prevention and control, including injury surveillance, among international development partners and UN agencies.

- WHO should provide technical support for using ICD-10 by Member States for classifying and coding of injuries, especially severe cases.

- WHO should support further collaboration in developing guidelines for sentinel injury surveillance between the SEA and WP Regions, with the involvement of systems and tools from both.
## Annex 1

### Country Information

**Table 1: General information from countries participating in the Asia-Pacific Injury Surveillance Workshop, Thailand, 2006**

<table>
<thead>
<tr>
<th>Country</th>
<th>Area (sq. km.)</th>
<th>Population (millions)</th>
<th>Religion Majority</th>
<th>Life expectancy</th>
<th>% of children &lt;15 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>1. Australia</td>
<td>7 700 000</td>
<td>20.6</td>
<td>Christianity <em>(67.9%)</em></td>
<td>78</td>
<td>83</td>
</tr>
<tr>
<td>2. Bangladesh</td>
<td>*147 570</td>
<td>*140</td>
<td>Islam</td>
<td>62</td>
<td>63</td>
</tr>
<tr>
<td>3. Bhutan</td>
<td>38 364</td>
<td>0.67</td>
<td>Buddhism</td>
<td>61</td>
<td>64</td>
</tr>
<tr>
<td>4. Cambodia</td>
<td>181 035</td>
<td>*13.5</td>
<td>Buddhism</td>
<td>*60</td>
<td>*65</td>
</tr>
<tr>
<td>5. China</td>
<td>9 600 000</td>
<td>*1,315</td>
<td>Buddhism</td>
<td>70</td>
<td>73</td>
</tr>
<tr>
<td>6. India</td>
<td>3 100 000</td>
<td>*1,136</td>
<td>Hinduism <em>(80.5%)</em></td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>7. Indonesia</td>
<td>1 900 000</td>
<td>225.3</td>
<td>Islam</td>
<td>65</td>
<td>69</td>
</tr>
<tr>
<td>8. Japan</td>
<td>377 864</td>
<td>127.7</td>
<td>Shintoism</td>
<td>78</td>
<td>85</td>
</tr>
<tr>
<td>9. Republic of Korea</td>
<td>99 313</td>
<td>48.2</td>
<td>Buddhism</td>
<td>73</td>
<td>80</td>
</tr>
<tr>
<td>10. Lao PDR</td>
<td>236 800</td>
<td>5.8</td>
<td>Buddhism</td>
<td>53</td>
<td>56</td>
</tr>
<tr>
<td>11. Malaysia</td>
<td>329 847</td>
<td>25.3</td>
<td>Islam</td>
<td>71</td>
<td>75</td>
</tr>
<tr>
<td>12. Maldives</td>
<td>298</td>
<td>0.29</td>
<td>Islam</td>
<td>67</td>
<td>66</td>
</tr>
<tr>
<td>13. Mongolia</td>
<td>1 560 000</td>
<td>2.6</td>
<td>Buddhism</td>
<td>62</td>
<td>66</td>
</tr>
<tr>
<td>14. Myanmar</td>
<td>676 552</td>
<td>*52.3</td>
<td>Buddhism <em>(89.4%)</em></td>
<td>56</td>
<td>63</td>
</tr>
<tr>
<td>15. Nepal</td>
<td>147 181</td>
<td>26.3</td>
<td>Hinduism</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>16. Philippines</td>
<td>300 000</td>
<td>*85.2</td>
<td>Christianity <em>(92.6%)</em></td>
<td>68</td>
<td>72</td>
</tr>
<tr>
<td>17. Sri Lanka</td>
<td>65 610</td>
<td>*20</td>
<td>Buddhism <em>(76.7%)</em></td>
<td>71</td>
<td>77</td>
</tr>
<tr>
<td>18. Thailand</td>
<td>513 115</td>
<td>64.9</td>
<td>Buddhism <em>(94.2%)</em></td>
<td>66</td>
<td>74</td>
</tr>
<tr>
<td>19. Viet Nam</td>
<td>329 247</td>
<td>83.6</td>
<td>Buddhism <em>(90.0%)</em></td>
<td>68</td>
<td>72</td>
</tr>
</tbody>
</table>


### Table 2: Leading causes of death in countries in the Asia-Pacific Region

<table>
<thead>
<tr>
<th>Country and sources</th>
<th>5 Leading causes of death</th>
<th>Mortality rates/100 000 pop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>1. Noncommunicable diseases 2. Infectious diseases 3. Injury and poisoning</td>
<td>NA</td>
</tr>
<tr>
<td>Bhutan</td>
<td>1. Neoplasm 2. Injury and poisoning</td>
<td>NA</td>
</tr>
<tr>
<td>Mongolia</td>
<td>1. Cardiovascular disease 2. Disease of genitourinary system 3. External causes, injury</td>
<td>38.3 19.9 18.9</td>
</tr>
</tbody>
</table>
### Country and sources 5 Leading causes of death Mortality rates/100 000 pop

<table>
<thead>
<tr>
<th>Country and sources</th>
<th>5 Leading causes of death</th>
<th>Mortality rates/100 000 pop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philippines Health Statistics, 1998</td>
<td>1. Diseases of the heart  2. Diseases of the vascular system  3. Pneumonias  4. Malignant neoplasm  5. Accidents</td>
<td>76.3  56.6  46.1  43.9  40.8</td>
</tr>
<tr>
<td>Thailand Death certificate 2005</td>
<td>1. Neoplasm  2. Infectious and parasitic diseases  3. External causes, injury  4. Circulatory system  5. Respiratory system</td>
<td>97.3  71.8  70.7  63.3  36.9</td>
</tr>
<tr>
<td>Viet Nam 2005</td>
<td>1. Road traffic injuries  2. HIV  3. Pneumonia</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Table 3: Leading causes of fatal injury in the Asia-Pacific Region, 2006**

<table>
<thead>
<tr>
<th>Countries (Sources + year)</th>
<th>Fatal injury</th>
<th>Mortality rates/100 000</th>
<th>Non-fatal injury</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>No information available</td>
<td>No data available</td>
<td>No information available</td>
<td>No data available</td>
</tr>
<tr>
<td>Bangladesh</td>
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<td>No data available</td>
<td>No information available</td>
<td>No data available</td>
</tr>
<tr>
<td>Bhutan</td>
<td>No information available</td>
<td>No data available</td>
<td>No information available</td>
<td>No data available</td>
</tr>
<tr>
<td>Cambodia</td>
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<td>No data available</td>
<td>No information available</td>
<td>No data available</td>
</tr>
<tr>
<td>Republic of Korea</td>
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<td>No data available</td>
<td>No information available</td>
<td>No data available</td>
</tr>
<tr>
<td>Countries (Sources + year)</td>
<td>Fatal injury</td>
<td>Mortality rates/100 000</td>
<td>Non-fatal injury</td>
<td>Proportion</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
<td>-------------------------</td>
<td>-----------------</td>
<td>------------</td>
</tr>
<tr>
<td>Maldives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IGMH Aug.–Nov. 2006</td>
<td>1. RTAs</td>
<td>No data available</td>
<td>1. Exposure to inanimate forces</td>
<td>No data available</td>
</tr>
<tr>
<td></td>
<td>2. Electric</td>
<td></td>
<td>2. Falls</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>3. RTAs</td>
<td></td>
</tr>
<tr>
<td>Mongolia</td>
<td></td>
<td>17.7</td>
<td>1. Falls</td>
<td>36.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.1</td>
<td>2. Violence</td>
<td>26.5</td>
</tr>
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<td></td>
<td></td>
<td>10.9</td>
<td>3. Transport accidents</td>
<td>17.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Suicides</td>
<td>1.1</td>
</tr>
<tr>
<td>Myanmar</td>
<td></td>
<td>No data available</td>
<td>No information available</td>
<td>No data available</td>
</tr>
<tr>
<td></td>
<td>1. Transport accidents</td>
<td>17.7</td>
<td>1. Falls</td>
<td>36.6</td>
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<td></td>
<td>3. Violence</td>
<td>10.9</td>
<td>3. Transport accidents</td>
<td>17.0</td>
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<td></td>
<td></td>
<td></td>
<td>4. Suicides</td>
<td>1.1</td>
</tr>
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<td>Philippines</td>
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<td>16.2</td>
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<td>No data available</td>
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<td>Health Statistics</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Year: 2003</td>
<td>1. Assault</td>
<td>16.2</td>
<td>No information available</td>
<td>No data available</td>
</tr>
<tr>
<td></td>
<td>2. Transport accidents</td>
<td>7.8</td>
<td>1. Toxic effects of pesticide</td>
<td>No data available</td>
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<td></td>
<td>3. Drowning</td>
<td>3.5</td>
<td>2. Traumatic injuries</td>
<td>No data available</td>
</tr>
<tr>
<td></td>
<td>4. Intentional self-harm</td>
<td>1.9</td>
<td>3. Snake-bites</td>
<td>No data available</td>
</tr>
<tr>
<td></td>
<td>5. Suicide</td>
<td>1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sri Lanka</td>
<td></td>
<td>No data available</td>
<td>1. Toxic effects of pesticide</td>
<td>No data available</td>
</tr>
<tr>
<td>Year:</td>
<td></td>
<td></td>
<td>2. Traumatic injuries</td>
<td>No data available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Snake-bites</td>
<td>No data available</td>
</tr>
<tr>
<td></td>
<td>1. Traumatic injuries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Snake-bites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Toxic effects of medications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Toxic effects of pesticide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Burns and corrosion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td>19.7</td>
<td>1. Transport accidents</td>
<td>49.4</td>
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<td>Death certificates</td>
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<td>2. Falls</td>
<td>15.8</td>
</tr>
<tr>
<td>Year: 2005</td>
<td>1. Transport accidents</td>
<td>19.7</td>
<td>1. Transport accidents</td>
<td>49.4</td>
</tr>
<tr>
<td></td>
<td>2. Suicide</td>
<td>6.9</td>
<td>2. Falls</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td>3. Drowning</td>
<td>5.2</td>
<td>3. Mechanical force</td>
<td>13.1</td>
</tr>
<tr>
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<td>4. Assault</td>
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<td>4. Intentional selfharm</td>
<td>9.9</td>
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<td>5. Falls</td>
<td>0.9</td>
<td>5. Suicides</td>
<td>4.1</td>
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<td>Viet Nam</td>
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<td>(rate unavailable)</td>
<td>1. Road traffic injuries</td>
<td>52.7</td>
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<tr>
<td>Health Statistics</td>
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<td></td>
<td>2. Working accidents</td>
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<td>Report 2005</td>
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<td></td>
<td>3. Suicides</td>
<td>12.4</td>
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<td></td>
<td></td>
<td></td>
<td>4. Burns</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Suicides</td>
<td>6.3</td>
</tr>
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</table>
Table 4: Injury surveillance systems in the Asia-Pacific Region in 2006

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of establishment</th>
<th>Ongoing surveillance</th>
<th>Pilot</th>
<th>Responsible organization</th>
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<tbody>
<tr>
<td>Australia</td>
<td>1985</td>
<td>✓</td>
<td></td>
<td>● Multiple systems and complex arrangements</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>● Multi-sectoral</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>● Federal structure</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>2005</td>
<td>Pilot</td>
<td>CIPRB</td>
<td></td>
</tr>
<tr>
<td>Bhutan</td>
<td>2007</td>
<td>Phase 1</td>
<td>MoPH</td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>2004</td>
<td>RTAVIS</td>
<td>Handicap International, MoH</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>2003</td>
<td>✓</td>
<td>MoH, NCNCD</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>2007</td>
<td>Feasibility test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>2005</td>
<td>✓</td>
<td>MoH</td>
<td></td>
</tr>
<tr>
<td>Maldives</td>
<td>2005</td>
<td>✓</td>
<td>MoH</td>
<td></td>
</tr>
<tr>
<td>Mongolia</td>
<td>2006</td>
<td>✓</td>
<td>NTORC</td>
<td></td>
</tr>
<tr>
<td>Myanmar</td>
<td>2005</td>
<td>✓</td>
<td>MoH</td>
<td></td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>2006</td>
<td>✓</td>
<td>MoH</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>1995</td>
<td>✓</td>
<td>MoH</td>
<td></td>
</tr>
<tr>
<td>Viet Nam</td>
<td>2005</td>
<td>✓</td>
<td>MoH</td>
<td></td>
</tr>
</tbody>
</table>
### National Injury Surveillance Record Form, Thailand 1995-2007

**Annex 2**

**National Injury Surveillance Record Form, Thailand**

<table>
<thead>
<tr>
<th>Date occurred</th>
<th>Time occurred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date arrived at hospital</td>
<td>Time arrived at hospital</td>
</tr>
</tbody>
</table>

**Location:** District | Province


**External causes of injury**

1. Transport accidents
   1.1 Type of injured person
      - Pedestrian
      - Driver
      - Passenger
      - Unknown
   1.2 Vehicle of the injured
      - BI/tricycle
      - Motorcycle
      - Motor-tricycle
      - Sedan
      - Pickup/Van
      - Heavy truck
      - Trailer Truck
      - Mini-Bus
      - Bus
      - Others (specified)
   1.3 Injured due to
      - Fall from vehicle
      - Vehicle overturned, sunk etc.
      - Collision with
      - Others (specified)

2. Other causes of injury (Specify)

3. Unknown

**Transportation of the injured to hospital**

1. From injured site or others
   - Person who transported: No
   - No Known
   - EMS
   - Charitable foundation volunteers
   - Police
   - Others (specified)

2. From health facility: Name | Province

**Diagnosis**

1. No person taking care

2. With referral letters: Yes | No

**First aid / care while transport**

Breathing care
- Yes-appropriate
- No-appropriate
- Not needed
- No

Bleeding care
- Yes-appropriate
- No-appropriate
- Not needed
- No

Splits/slabs
- Yes-appropriate
- No-appropriate
- Not needed
- No

IV Fluid
- Yes-appropriate
- No-appropriate
- Not needed
- No

**Date disposition from E.R.**

BY D.H.A D/C Ds Refrs Ds Against advice Ds Escape Ds Dead Ds Discharge Ds Admit to

**Final diagnosis** (Specify organ and injury in detail) If admitted, do not fill at E.R.

1. (BR, AIS...)
2. (BR, AIS...)
3. (BR, AIS...)

**Date discharged from ward**

Outcome
- Improve
- Refer
- Against advice
- Escape
- Dead
- Ask to go back to die at home

Recorders name
Annex 3

List of participants at the Bi-Regional Workshop on Injury Surveillance, Chiang Mai, Thailand, 2006

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Planning Department  
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Department of Orthopaedic Surgery  
University of Medicine (1)  
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3. Partner  

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Trauma and Emergency Medicine Project Manager  
AmeriCares  
Sri Lanka

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Coordinator  
NMH/VIP/UIP  
WHO HQ  
Geneva  
Switzerland
Dr Than Sein  
Director  
Noncommunicable Diseases & Mental Health  
WHO-SEARO  
New Delhi  
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Dr Chamaiparn Santikarn  
Regional Adviser  
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Profile of Injury Surveillance Systems in selected Member States of the Asia-Pacific Region
Injury and deaths due to it have emerged as a major public health problem globally. In recent years, every day almost 16,000 people around the world die from all types of injuries. Injuries represent about 10% of deaths from all causes worldwide. In 2004, the World Health Organization reported that around 50% of deaths due to injury occurred in countries of the South-East Asia and Western Pacific Regions, which together have more than a third of the world’s population. As such, these two Regions account for the highest number of deaths from injuries worldwide. In 2004, injuries ranked fifth among all causes of death for the South-East Asia Region with 1.5 million deaths reported.

Injury surveillance is the process of systematically collecting, analysing, interpreting and disseminating data to those responsible for the prevention and control of injuries. Injury prevention and control is multisectoral, and collaboration among agencies and sectors can be facilitated by surveillance systems that keep partners appropriately informed.

This publication is the first-ever report on existing injury surveillance systems in the Member States of the two WHO regions in the Asia-Pacific.