Violence and Injury Prevention
Students' Handout

Slide 2 &3:

The classic definition of injury, derived from Gibson (1) and Haddon (2) is:

> An acute exposure to physical agents such as mechanical energy, heat, electricity, chemicals, and ionizing radiation interacting with the body in amounts or at rates that exceed the threshold of human tolerance. In some cases, injuries result from the sudden lack of essential agents such as oxygen or heat.

This definition of injury is centered on the traumatic physical consequences that these energy exposures produce in the body.

There are many possible ways to define violence. However, the definition used by the World Health Organization (WHO) associates intentionality with the committing of the act itself, irrespective of the outcome it produces.

WHO defines violence as (3):

> The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation.

This definition includes a broad range of outcomes – including psychological harm and deprivation reflecting the growing recognition of the need to include violence that does not necessarily result in physical injury or death, but nonetheless results in other types of damage that can be just as devastating.

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Injury is a major public health issue. An estimated five million people died from injuries in 2000 accounting for 9% world's deaths. Road traffic injuries are the leading cause of injury-related deaths worldwide.

Injuries account for 12% of the world's burden of disease and the burden of disease due to injuries, particularly road traffic incidents, interpersonal violence, war and self-inflicted injuries is expected to rise dramatically by the year 2030.

More than 90% of the world's injury deaths occur in low- and middle-income countries. The South-East Asia and Western Pacific Regions account for the highest number of injury deaths worldwide.

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There are some important principles and definitions that need to be understood and differentiated.

The first, and possibly the most important, principle of injury prevention is that injuries are preventable. Many people are used to thinking that injuries are the result of accidents, which are typically considered to be unpredictable and unpreventable. In contrast, the first principle of injury prevention is that injuries occur as the result of events that can be predicted and prevented.

Accidents versus injury events

There has been a move away from use of the term "accident", in the English language, because of its connotations of inevitability and lack of apparent cause. On the other hand, the term "injury events" has been used to indicate that these are events that can be studied, understood and therefore prevented. See Davis and Pless (4) for a discussion of this issue.

An injury event can be characterized as either **unintentional** or **intentional.**

Intentionality distinguishes violence from unintended events that result in injury. However, the issue of intentionality can be quite complex, since the intent to use force may not necessarily mean there was an intent to cause damage (5). Consequently, there has been a move away from the use of the "intentional" classification in the field of violence prevention.

Injury prevention: refers to the actions or interventions that prevent an injury event or violent act from happening by rendering it impossible or less likely to occur.

Injury control: refers to actions aimed at reducing injuries or the consequences of injuries once they have occurred.

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Much of the injury research over the last few decades has occurred in the field of public health and has used the epidemiological model, first proposed for injury research by Gordon in 1948 (6, 7).

This model includes the host, the agent of injury (energy transfer), and the vector for this energy transfer and the environment. The interactions between the host, a vector and an agent within a determined environment contribute to the occurrence of an injury event.

In the case of injuries, for example, the host could be a person driving while under the influence of alcohol without a seat-belt, the vector would be a motor vehicle crashing and the agent causing an injury would be the energy exchange involved in the crash. The environment could be a wet road in an urban setting.

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Injuries result as a culmination of a set of circumstances and pre-existing conditions which can be best understood as a chain of events. One important model to understand the causal chain of events involved in injuries is that proposed by William Haddon, commonly known as the **Haddon Matrix.**

This model extends the epidemiological approach, to produce a matrix where the causal factors involved in injury can be better understood through the interaction of multiple factors over time. It consists of temporal notions of pre-event, event and post-event phases plotted against the host or person, agent (product) and environmental factors (physical and social) of the epidemiological model. When these two axes (time and other factors) are combined they produce the Haddon Matrix. This is generally a twelve-cell matrix although it can be a none-cell matrix if the physical and social environment columns are combined into one.

Haddon's model effectively separates out the factors which predispose an injury causing event to occur (pre-event phase) from the actual event itself (event phase) in which energy is transferred to the host in an amount to cause damage. Haddon also added a post-event phase, encompassing transport, emergency care and rehabilitation, which affect survival and ultimate outcome once the energy transfer has occurred (7).

Combining these phases of injury with the epidemiological model creates a matrix for the study of both injury causation and prevention. The temporal phases are generally associated with primary (pre-event), secondary (event) and tertiary (post-event) prevention.

The value of this model is that it points out different areas in which interventions can be mounted to prevent or reduce the severity of injuries. The point of intervention is not necessarily early in the chain of events. It should be where the intervention is possible, or ideally, where it is most effective.

Slide 8:

There are several ways of understanding injuries. Haddon's model refers to the transfer of energy and the occurrence of events in time and place. Another model for understanding how injuries occur is known as the ecological model.
This model has been particularly useful for understanding the causes of violence. No single factor explains why some individuals behave violently towards others or why violence is more prevalent in some communities than in others. Violence is the result of the complex interplay of individual, relationship, social, cultural and environmental factors. Understanding how these factors are related to violence is one of the important steps in the public health approach to preventing violence (5).

First introduced in the 1970s, the ecological model was initially applied to child abuse, then youth violence and more recently, it been used to understand intimate partner violence and abuse of the elderly. The model explores the relationship between individual and contextual factors and considers violence as the product of multiple levels of influence on behaviour (5).

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Public health interventions are traditionally characterized in terms of three levels of prevention, which relate back to the temporal dimension of the Haddon Matrix.

Primary prevention includes any strategies aimed at stopping injury events from taking place, and thus relates to the time **before** injuries actually occur (pre-event phase).

Secondary prevention includes any strategies aimed at minimizing the harm that occurs during an injury event (e.g. car crash or event phase). Examples include the protection of motor vehicle occupants in crashes (e.g. seat-belts).

Tertiary prevention includes all efforts aimed at treating and rehabilitating injured people or in some cases, the perpetrators of violence. It is concerned with the period after an injury event has occurred (post-event phase).

Another way of defining prevention activities focuses on the target group of interest. This definition groups interventions on three levels.

Universal interventions are aimed at groups or the general population without regard to individual risk (e.g. violence prevention curricula delivered to all students in a school or children of a particular age; community-wide media campaigns; seat-belt laws; drinking and driving laws).

Selective interventions are aimed at those considered at heightened risk of injury or violence – that is, have one or more risk factors (e.g. driver education for young or elderly drivers; training in parenting for low-income, single parents).

Indicated interventions are aimed at those who have already demonstrated risk behaviors (e.g. interventions to curb alcohol consumption among alcohol abusers and avoid drinking and driving; treatment programmes for perpetrators of domestic violence).

Passive versus active interventions

Passive interventions are those aimed at preventing injuries where the individual is not required to take any action (e.g. an airbag deploys automatically on impact). They are interventions that are independent of human behaviour.

Active interventions are those where an individual's behaviour is involved (e.g. a seat-belt requires the individual to put the belt on). Such interventions require some human involvement for their success.

In the field of unintentional injury prevention there is a strong consensus that passive interventions, aimed at creating a safer environment, are more likely to be successful than active interventions. This emphasis on passive countermeasures parallels the management of other public health problems. For example, the provision of a clean water supply is more successful in preventing disease, than asking people to boil their water before drinking, just as automatic sprinklers constitute a more effective fire protection than reliance on hand held extinguishers (8).

Slide 10:

There are a number of different strategies that have been proposed for controlling or preventing unintentional injuries.

1. Engineering: includes making products safer for people.
2. Environmental modifications: aimed at reducing the likelihood that individuals will have an injury by reducing risks in the environment.
3. Enforcement: includes legal and police measures aimed at ensuring that certain behaviors and norms are maintained in the population. It also includes adequate rehabilitation of perpetrators who have caused injuries. It covers enforcement of laws directed at creating safe environments. Finally it also covers laws and norms that ensure the production and distribution of safe products.
4. Education: includes programmes aimed at changing attitudes, beliefs and behaviors in the general population but also targeting individuals who are at higher risk of having an injury or producing an injury.
5. Evaluation: refers to those actions aimed at determining which interventions, programmes and policies work best for injury prevention. It informs researchers and policy-makers as to what are the best course of action for prevention and control of injuries.

A number of strategies may be employed concurrently or sequentially to achieve a particular objective. While education is a component of most intervention strategies, it is most effective when used to support a design measure or an enforced regulatory measure (e.g. advertising to support speed camera operations or random breath testing).

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Defining characteristics of the public health approach (5).

1. It is population-based: By definition, public health is not about individual patients but rather is concerned to prevent health problems and extend better care and safety to whole populations.

2. It is multidisciplinary: It draws on knowledge from many disciplines including medicine, epidemiology, engineering, sociology, psychology, criminology, education and economics.
3. It is evidence-based: The public health approach is based on the scientific method.

4. It emphasizes collective action: It has been proved over and over again that cooperative efforts from such diverse sectors as health, education, social services, justice and policy are necessary to solve what are often assumed to be purely "medical" problems
5. It emphasizes prevention: Above all, public health is characterized by its emphasis on prevention. Rather than simply accepting that injuries happen, its starting point is that injury events and violent behavior, and their consequences, can be prevented.

Slide 12:

The public health approach to injury and violence prevention is based on the rigorous requirements of the scientific method. In moving from problem to solution, there are four key steps (5).

1. Uncovering as much basic knowledge as possible on all aspects of injury or violence. Through systematically collecting data on the magnitude, scope, characteristics and consequences of injury and/or violence at the local national and international levels.
   This involves the collection of data, or the gathering of information, through the use of surveillance, surveys or other techniques.

2. Investigating why injuries and violence occur:
   - the causes and correlates of injuries and violence;
   - the factors that increase or decrease the risk of injury or violence;
   - The factors that might be modifiable though interventions.

   Through the information-gathering process, and through epidemiological research, multiple risk and protective factors can be identified and associated with specific injury outcomes.

3. Exploring ways to prevent injury and violence, using the information derived in the research process by designing, implementing, monitoring and evaluating interventions. The modification of risk factors is a crucial element that determines the design of interventions aimed at reducing injuries. Once the identification of effective preventive measures has occurred, these measures should be implemented through policy measures. These interventions should always be evaluated.

4. Implementing, in a range of settings, interventions that appear promising, widely disseminating information and determining the cost-effectiveness of programmes. The implementation of these measures should change the nature of the problem which, when re-assessed, leads to a re-evaluation of the situation and so on.

Slide 13: The public health approach in action: DESEPAZ in Colombia (5)

In 1992, the mayor of Cali, Colombia - himself a public health specialist - helped the city set up a comprehensive programme aimed at reducing the high levels of crime there. Rates of homicide in Cali, a city of some two million inhabitants, had risen from 23 per 100 000 population in 1983 to 85 per 100 000 in 1991. The programme that ensued was called DESEPAZ, an acronym for Desarrollo, Seguridad, Paz (development, security, peace).

In the initial stages of the city's programme, epidemiological studies were conducted so as to identify the principal risk factors for violence and shape the priorities for action. Special budgets were approved to strengthen the police, the judicial system and the local human rights office.

DESEPAZ undertook education on civil rights matters for both the police and the public at large, including television advertising at peak viewing times highlighting the importance of tolerance for others and self-control. A range of cultural and educational projects was organized for schools and families in collaboration with local nongovernmental organizations, to promote discussions on violence and help resolve interpersonal conflicts.

There were restrictions on the sale of alcohol, and the carrying of handguns was banned on weekends and special occasions.

In the course of the programme, special projects were set up to provide economic opportunities and safe recreational facilities for young people. The mayor and his administrative team discussed their proposals to tackle crime with local people, and the city administration ensured the continuing participation and commitment of the community.

With the programme in operation, the homicide rate in Cali declined from an all-time high of 124 per 100 000 to 86 per 100 000 between 1994 and 1997, a reduction of 30%. In absolute numbers, there were approximately 600 fewer homicides between 1994 and 1997 compared with the previous three-year period, which allowed the law enforcement authorities to devote scarce resources to combating more organized forms of crime. Furthermore, public opinion in Cali shifted strongly from a passive attitude towards dealing with violence to a vociferous demand for more prevention activities.

Slide 14:

There is no single comprehensive and mutually exclusive method for injury categorization. All classifications have merit, and often a combination is chosen. Some categorizations which have been used include:

- severity (level of medical treatment required)
- setting (e.g. home, school, workplace, road)
- activity (e.g. sport, recreation, work)
- mechanism (e.g. fall, burn, dog bite, motor vehicle crash, drowning)
- intent (intentional, unintentional)
- nature of injury (e.g. fracture, burn).

Other categorizations are based on the demographics of injury victims and may include:

- age (child, adolescent, elderly)
- gender
- socioeconomic status
- Ethnicity or aboriginality.

Slide 15:

A disease classification system is a system of categories to which diseases and causes of death are assigned according to established criteria. It is used to organize information so as to permit easy storage, retrieval and analysis of data. According to Fingerhut & McLoughlin (9), an injury classification system should allow for the capture of information about the nature of injury, the body region affected, the external cause (mechanism), intentionality, and circumstances such as location, activities and products involved.

Most countries in the world use a version of the International Classification of Disease (ICD), developed by WHO, for coding deaths and morbid conditions. It includes a code for classifying the nature of injury and another for the external cause of injury. External cause of injury codes (E-codes) in the ICD captures the circumstances of injury along two dimensions:

- intent (unintentional, self-inflicted, assault, legal intervention, undetermined)
- mechanism (e.g. fall, drowning, gunshot, fire, motor vehicle collision).

Intent takes precedence over mechanism in the structure of the ICD in that the coder must first determine the intent (e.g. self-inflicted) before assigning the mechanism (e.g. fall/jump) (20).

Other injury classification systems include the:

- Occupational Injury and Illness Classification System (OIICS)
  Used in the United States by the Bureau of Labour Statistics for classify information relating to occupational injury and illness.
- NOMESCO
  Used in some European countries, the NOMESCO (Nordic Medico-Statistical Committee) classification was developed to collect information on events resulting in injury treated in hospital emergency departments.
- The International Classification of External Causes of Injury (ICECI)
  The ICECI is being developed under the auspices of WHO by an international working group to remedy some of the shortcomings of the ICD for injury prevention.
- The Abbreviated Injury Severity Scale (AIS)
  Developed by the Association for the Advancement of Automotive Medicine (AAAM), the American Medical Association (AMA) and the Society of Engineers (SAE), to catalogue the anatomic injuries sustained in motor-vehicle crashes, the primary role of the AIS was to supplement crash investigations with detailed anatomical descriptions of occupant injury. The AIS90 incorporates a unique six-digit description code in addition to an AIS severity score (10).

Slide 16:

The injury experience of a population is often presented as a pyramid based on the level of medical treatment, which is a broad surrogate for injury severity (9). The apex represents the relatively small number of fatal injury cases, and the broader, lower parts of the pyramid represent the more numerous injuries of lesser severity. In descending order of severity, but increasing level of magnitude, one can identify injuries that require hospitalization, ambulatory treatment, injuries that are not emergencies, mild forms of injuries treated by paramedics and the most common which are injuries that are go unreported.

Two points need to be emphasized.

First, the availability of injury data is in direct proportion to case severity and in inverse proportion to case frequency. In countries with well-developed vital statistics systems, quite a lot is known about the relatively small number of injury deaths, less about hospital inpatient cases, and still less about cases requiring less medical treatment. While the priorities implied by this hierarchy of information availability may be correct, the importance, in human and economic terms, of ‘less severe’ injuries should not be under-rated.

Second, constructing the pyramid highlights the crudeness of injury case categorization used. For want of more direct measures, hospital admission or attendance at a hospital emergency department tends to be used as a proxy for case severity. This is done despite the fact that:

- clinical criteria for admission may vary considerably;
- economic and other factors may determine which cases go to which service and these factors vary with time and place;

- level of medical treatment is often dependent on the services available.

Improving the ability to measure injury severity (particularly injury that is not life-threatening), rigorously and practicably is a challenge for injury researchers and important for international comparability of injury data (11).

Slide17&18:

Having discussed important aspects of how injuries are conceptualised, it is important to define, as a first step, where information on injuries can be obtained. As discussed in the public health model the initial question is directed at identifying the magnitude and characteristics of the problem.

Different types of data are needed for different purposes, including:

- describing the magnitude and impact of injury and violence
- understanding which factors increase the risk of injury and violence
- knowing how effective injury and violence prevention programmes are.

Mortality data are an important source of information, available in most countries, which provides an indication of the extent of the injury problem. Other types of information are also necessary for describing the magnitude of the injury problem. Since non-fatal outcomes are more common than fatal outcomes and because certain types of injury and violence are not fully represented by mortality data, other types of information are necessary. Such information can help to understand the circumstances surrounding specific incidents and in describing the full impact of injury and violence on the health of individuals and communities.

These types of data include (5):

- health data on diseases, injuries and other health conditions;
- self-reported data on attitudes, beliefs, behaviours, cultural practices, victimization and exposure to violence;
- community data on population characteristics and levels of income, education and unemployment;
- crime data on the characteristics and circumstances of violent events and violent offenders;
- economic data related to the costs of treatment and social services;
- data describing the economic burden on health care systems and possible savings realized from prevention programmes;
- data on policy and legislation.

Potential sources of various types of information include (5):

- individuals
- agency and institutional records
- local programmes
- community and government records
- population-based and other surveys
- special studies.

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