Unit 2
Risk factors for road traffic injuries
Objectives

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

• discuss the basic elements of the public health approach to road safety and the Haddon matrix;

• apply the principles of a systems approach to the analysis of risk factors for road traffic injuries;

• discuss the key risk factors for road traffic injuries;

• relate these risk factors to the trainee's own country, region or city.
Public health approach

1) **Surveillance**
   - What is the problem?

2) **Risk factor identification**
   - What are the causes?

3) **Develop and evaluate interventions**
   - What works?

4) **Implementation**
   - How is it done?
Understand the four inter-related steps of the public health approach

What is the problem?
- Determine the magnitude, scope and characteristics of the problem.

What are the causes?
- Identify factors that increase the risk of disease, injury or disability.
- Determine factors that are potentially modifiable.
Understand the four interrelated steps of the public health approach

What works?

- Assess measures that can be taken to prevent the problem.
- Pilot test and evaluate interventions.

How is it done?

- Implement proven and effective interventions.
- Evaluate effectiveness of interventions.
# Haddon Matrix

<table>
<thead>
<tr>
<th>Phase</th>
<th>Human</th>
<th>Vehicles and equipment</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-crash</td>
<td>Crash prevention</td>
<td>Information</td>
<td>Road design and road layout</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Attitudes</td>
<td>- speed limits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Impairment</td>
<td>- pedestrian facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Police enforcement</td>
<td></td>
</tr>
<tr>
<td>Crash</td>
<td>Injury prevention during the crash</td>
<td>Use of restraints</td>
<td>Occupant restraints</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Impairment</td>
<td>- other safety devices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- First-aid skill</td>
<td>- crash protective design</td>
</tr>
<tr>
<td>Post-crash</td>
<td>Life sustaining</td>
<td>First-aid skill</td>
<td>- ease of access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Access to medics</td>
<td>- fire risk</td>
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<td></td>
<td></td>
<td></td>
<td>- rescue facilities</td>
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<td></td>
<td></td>
<td></td>
<td>- congestion</td>
</tr>
</tbody>
</table>
Systems approach

• Understand the system as a whole.
• Understand interactions between different components.
• Consider not only underlying factors, but also role of different agencies and actors in prevention efforts.
Factors influencing exposure to risk

- economic factors
- demographic factors
- land-use planning practices
- traffic mix
- road function versus design and layout
Major risk factors are identifiable

- Risk factors influencing crash involvement
  - speed
  - alcohol or drugs
  - fatigue
  - male
  - vehicle defects
  - youth driving together
  - vulnerable road users
Major risk factors are identifiable

Risk factors influencing crash severity

- speed
- seat-belts, child restraints
- helmets
- Non-crash protective roadside objects
- insufficient vehicle crash protection
- alcohol and other drugs
Risk factors influencing post-crash outcome of injuries

- delay in detecting crash
- delay in transport to a health facility
- fire resulting from collision
- leakage of hazardous materials
- alcohol and other drugs
- rescue, extraction, evacuation
- poor trauma care and rehabilitation
Key points (1)

• A road traffic collision is the outcome of the interaction among a number of factors, some of which may not appear to be directly related to road traffic injuries.

• The public health approach is helpful in the analysis of risk factors and guiding decision-making.

• The Haddon matrix helps to identify human, vehicle and environmental factors during pre-, crash- and post-crash phases.
Key points (2)

- The systems approach considers all factors contributing to road traffic injuries as well as the role of different agencies and actors in prevention efforts.

- Main risk factors can be categorized into four groups:
  - factors influencing exposure to risk
  - factors influencing crash involvement
  - factors influencing crash and injury severity
  - factors influencing post-crash injury outcomes
Learning activity

Task

Read carefully this description of a road traffic collision scene.

A speeding motorist who is late for a meeting approaches a road junction and goes through a traffic light that has just turned red. He hits a motorcyclist, for whom the lights had just turned green. The motorcyclist, who is not wearing a helmet, suffers severe head injuries. The motorist suffers facial injuries. The police find out that the motorist had not put on his seat-belt.

Using the Haddon matrix, identify the pre-crash and crash risk factors related to the driver and the motorcyclist.
This exercise is meant to assist trainees in identifying the chain of events involved in road traffic injury causation. The exercise seeks to identify a few risk factors in this scene and classify them under the three phases of the Haddon matrix (pre-crash, crash, and post-crash) and by group (human, vehicle and equipment, and environment). In addition to identifying the risk factors, this exercise should lead trainees to look at the interaction among different elements of the broader system of road, road user, vehicle and environment, in the case presented.
Questions to think about

a) Why is the public health approach a useful framework in dealing with road safety issues?

b) What are the most important risk factors for road traffic injuries in your local setting?