Sydney, AUSTRALIA | Beijing, CHINA | Hyderabad, INDIA | London, UK

Affiliated with the University of Sydney
Road Traffic Injuries in Asia

Professor Rebecca Ivers
Major causes of death

- AIDS: 1.8 million people (UNAIDS 2008)
- Tuberculosis: 1.3 million people (WHO 2007)
- Road traffic: 1.2 million people (WHO 2008)
- Malaria: <1 million people (WHO 2008)
Young adults and males are at greatest risk

- Half of all global road traffic deaths occur among young adults between 15 and 44 years of age.
- 73% of all global road traffic fatalities are males.
- In Africa, a third of all road traffic deaths occur among those aged 5-14 years.
- Males take more risks as drivers or pedestrians.
- In high-income countries young drivers are disproportionately represented.
- In low- and middle-income countries, most young victims are vulnerable road users.

Major implications for productivity, PYPLL
Distribution of global injury mortality, 2000

- Road traffic injuries: 25%
- Self-inflicted violence: 16%
- Interpersonal violence: 10%
- Other: 17%
- War: 6%
- Poisoning: 6%
- Falls: 6%
- Fires: 5%
- Drowning: 9%
Leading causes of unintentional injury deaths by age, GBD 2004
Baseline Projections of Deaths from Group III Causes, World, 2002–2030
Regional distribution of the global RTI mortality, 2000

Total no. of deaths = 1,260,000

- WPR: 24%
- AFR: 13%
- AMR: 11%
- EMR: 7%
- EUR: 10%
- SEAR: 35%

Of the WHO regions, South-East Asia (SEAR) accounts for the highest proportion of road traffic injury deaths.

Regional distribution of the global RTI burden (DALYs lost), 2000

Total no. of DALYs lost = 41,234,000

- WPR: 24%
- AFR: 14%
- AMR: 11%
- EMR: 8%
- EUR: 9%
- SEAR: 34%

The South-East Asia Region (SEAR) accounts for more than one-third of the total number of DALYs lost globally to road traffic injuries.
RTI deaths

Road traffic injury fatality rates* per 100 000 population, by WHO region

<table>
<thead>
<tr>
<th>WHO region</th>
<th>High-income</th>
<th>Middle-income</th>
<th>Low-income</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>African</td>
<td>—</td>
<td>32.2</td>
<td>32.3</td>
<td>32.2</td>
</tr>
<tr>
<td>The Americas</td>
<td>13.4</td>
<td>17.3</td>
<td>—</td>
<td>15.8</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>—</td>
<td>16.7</td>
<td>16.5</td>
<td>16.6</td>
</tr>
<tr>
<td>European</td>
<td>7.9</td>
<td>19.3</td>
<td>12.2</td>
<td>13.4</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>28.5</td>
<td>35.8</td>
<td>27.5</td>
<td>32.2</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>7.2</td>
<td>16.9</td>
<td>15.6</td>
<td>15.7</td>
</tr>
<tr>
<td><strong>Global</strong></td>
<td><strong>10.3</strong></td>
<td><strong>19.5</strong></td>
<td><strong>21.5</strong></td>
<td><strong>18.8</strong></td>
</tr>
</tbody>
</table>

* 30-day definition of a road traffic death
Source: Global Status Report on Road Safety. 2009

Africa and the Eastern Mediterranean have the highest rates of RTI deaths.
Figure 4: Fatal road traffic injuries rate (per 100,000 population) trends in the South-East Asia Region (using actual data updated from countries), 1995-2007

(Source: Government approved data from the participating countries.)
Table 2: Road traffic deaths (per 100 000 population) in 10 countries of the South-East Asia Region (using modelled data), 2007*

<table>
<thead>
<tr>
<th>Country</th>
<th>Population(^a)</th>
<th>Reported number of deaths(^b)</th>
<th>Modelled number of deaths(^c)</th>
<th>Estimated road traffic death rate per 100 000 population(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>158 664 959</td>
<td>4 108</td>
<td>20 038</td>
<td>14 882–29 155</td>
</tr>
<tr>
<td>Bhutan</td>
<td>658 479</td>
<td>111</td>
<td>95</td>
<td>72–115</td>
</tr>
<tr>
<td>India</td>
<td>1 169 015 509</td>
<td>105 725</td>
<td>196 445</td>
<td>155 727–266 999</td>
</tr>
<tr>
<td>Indonesia</td>
<td>231 626 978</td>
<td>16 548</td>
<td>37 438</td>
<td>29 785–65 158</td>
</tr>
<tr>
<td>Maldives</td>
<td>305 556</td>
<td>10</td>
<td>56</td>
<td>37–105</td>
</tr>
<tr>
<td>Myanmar</td>
<td>48 798 212</td>
<td>1 638</td>
<td>11 422</td>
<td>6 905–16 883</td>
</tr>
<tr>
<td>Nepal</td>
<td>28 195 994</td>
<td>962</td>
<td>4 245</td>
<td>3 453–5 288</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>19 299 190</td>
<td>2 334</td>
<td>2 603</td>
<td>2 185–3 097</td>
</tr>
<tr>
<td>Thailand</td>
<td>63 883 662</td>
<td>16 240</td>
<td>16 240</td>
<td></td>
</tr>
<tr>
<td>Timor-Leste</td>
<td>1 154 775</td>
<td>49</td>
<td>186</td>
<td>143–255</td>
</tr>
</tbody>
</table>

(Source: Government approved data from the participating countries)
Road users killed in various modes of transport as a proportion of all RTI deaths (WHO, 2009)
Distribution of mortality rates by type of injury in India, GBD, 2004

<table>
<thead>
<tr>
<th>Type of Unintentional Injury</th>
<th>Male</th>
<th>Female</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road traffic accidents</td>
<td>25</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Fires</td>
<td>15</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Falls</td>
<td>10</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Poisonings</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Drownings</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Other injuries</td>
<td>20</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>
Upward trend in India (WHO, 2007)
Figure 6: Involvement of motorcycles in transport injuries among Thai children (less than 15 years), Thailand 2005.

Source: Santijiarakul S, National Injury surveillance, MOPH, Thailand
The burden of motorcycle injuries

- Motorcycle riders account for between 50-70% of road users in SEARO region
- Over 313 million motorcycles worldwide, 77% in Asia
- Fleet growing – from 1995 to 2006 from 20 to 100M in China, doubled in India, tripled in Indonesia
- Motorcyclists and scooter riders are at increased risk of crash, and more likely to die or be seriously injured than car occupants
- Increased risk for death and serious injury can be as high as 30-35X
- Range of different risk factors compared to high income settings
## Motorcycles and motorcyclists as proportions of all registered vehicles and road casualties

<table>
<thead>
<tr>
<th>Country</th>
<th>All vehicles n</th>
<th>Motorcycles</th>
<th>All vehicles % motorcycles</th>
<th>All road casualties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>711,043</td>
<td>134,767</td>
<td>19.0</td>
<td>45.9</td>
</tr>
<tr>
<td>Philippines</td>
<td>4,292,000</td>
<td>1,617,000</td>
<td>37.7</td>
<td>10.1</td>
</tr>
<tr>
<td>Malaysia</td>
<td>12,868,930</td>
<td>5,859,195</td>
<td>48.2</td>
<td>59.5</td>
</tr>
<tr>
<td>Thailand</td>
<td>25,100,000</td>
<td>17,800,000</td>
<td>70.9</td>
<td>73.6</td>
</tr>
<tr>
<td>Indonesia</td>
<td>24,994,890</td>
<td>18,800,000</td>
<td>75.2</td>
<td>73.1</td>
</tr>
<tr>
<td>Cambodia</td>
<td>447,428</td>
<td>336,502</td>
<td>75.2</td>
<td>86.2</td>
</tr>
<tr>
<td>Vietnam</td>
<td>12,054,000</td>
<td>11,379,000</td>
<td>94.4</td>
<td>62.9</td>
</tr>
<tr>
<td>China (2005)</td>
<td>NA</td>
<td>75,565,000</td>
<td>58.1</td>
<td>22.2</td>
</tr>
<tr>
<td>India (2008)</td>
<td>105,352,854</td>
<td>75,336,026</td>
<td>71.5</td>
<td>18.7</td>
</tr>
</tbody>
</table>

a. (ADB 2005f); b. (ADB 2005e); c. (ADB 2005d); d. (ADB 2005g); e. (ADB 2005c); f. (ADB 2005b); g. (ADB 2005h); h. (Traffic Administration Bureau); i. (Government of India 2010)
Motorcycle injuries

- Many injuries low severity but can be disabling
- Significant head injuries

- Patterns of transport, road systems, number of passengers and loads carried vary from those in HIC
- Higher proportion of children carried, including unrestrained children and infants
- Most research on effective interventions carried out in HIC settings – questionable relevance?
Major risk factors for motorcycle injury

Environment

Factors influencing exposure to risk:

- Economic factors
- Demographic factors
- Land use
- Travel modes
- Road design
Interventions – Environment

- **Road design – separated traffic**
  - Malaysia – exclusive motorcycle lane
  - USD 12850/death averted
  - High costs because of engineering – future lanes cheaper?
Interventions - environment

- Traffic mix (MC vs heavy vehicle)
- Unforgiving roadside objects
- Road condition (potholes, slippery surfaces etc)

- Traffic calming – slow speeds
  - Traffic calming/appropriate road design effective in reducing speed
  - Requires investment in infrastructure
  - Cost effective

- Alternatives
  - Effective public transport
  - Avoid shift to private car use
Major risk factors for motorcycle injury

People

• Driver inexperience (training and licensing)
• Speed
• Alcohol & other drugs
• Distractions
Interventions – people (1)

- **Effective driver licensing and training systems**
  - Unknown effectiveness but aids enforcement
- **Management of passenger/goods carriage**
  - Enforcement and education
  - Availability of alternatives
  - Unknown effectiveness

- **Alcohol/distraction**
  - Known risk factors
  - Enforcement and education effective
- **Speed**
  - Enforcement based approaches (effective)
Interventions – people (2)

- **Enforcement of road rules, traffic signals**
  - Effective, requires enforcement and education

- **Safe vehicles**
  - Well maintained, no defects
  - Registration and maintenance system (Cost effectiveness?)

- **Overloading of vehicles**
  - Passengers
  - Goods
  - Need alternatives
  - Enforcement effective
Interventions – people (3)

- **Helmets**
  - Very effective for reducing head injury and death
  - Design issues for children – mechanics of injury poorly understood; need for light-weight design
  - Motorsport helmet standard for children 6 yrs + may be appropriate
  - Unknown effectiveness of black-market helmets/locally manufactured

- **Protective clothing**
  - Effective at reducing injury, esp impact protectors
  - Expensive and impractical in hot weather
  - Need for management of heat stress issues (R&D)
Major risk factors for motorcycle injury

Vehicle

- Vehicle condition
- Vehicle design
- Visibility
Interventions - vehicle

- Regulation of vehicles
  - Bike type (size of engine, wheels, design)
  - Safety features
  - Maintenance

- Visibility
  - Visibility enhancement materials
  - Modest (?) effectiveness
Major risk factors for motorcycle injury

Injury severity

Risk factors influencing severity of post-crash injuries

- Human tolerance, health
- First response, emergency medical care
- Chain of medical care from pre-hospital to rehabilitation
Interventions – medical care

- Development of cost effective first response/emergency care
- Benefits all traumatic injury/RTI
- Improvements in medical care/trauma management
Most urgent needs - people

- Legislative, enforcement, social marketing initiatives around:
  - Helmet use
  - Drink driving
  - Distraction
  - Passenger carriage/overloading
- Need for research on these?
  - Potentially research needed to identify most effective communication campaigns
  - On how to encourage Government investment/police support
  - Police attitudes to enforcement and interventions to improve?
Most urgent needs - people

- **Helmets**
  - Development of appropriate helmet standard for children > 2 years
  - No consensus on experts regarding children < 2 so discourage MC use
  - Work to develop light weight helmet for tropical conditions; with appropriate safety rating
  - Work to regulate manufacture and sale of helmets
  - Licensing, training and registration
    - Some road safety benefits
    - Aid understanding of road rules
    - Aids enforcement
Most urgent needs - environment

- Separation of traffic
- Speed management via engineering and use of speed detection devices (cameras)