International comparability of statistics on road traffic injuries

62-session Working Party on Transport Statistics

Harry Derriks

6 July 2011
Why international comparison of statistics?

• Is comparison necessary? Yes
• But why?
• For benchmarking
• To learn of each other
• To exchange knowledge about safety measures
• To cooperate international to develop together knowledge how to improve quality of life.

But also
• the possibility to get international insight in total volumes
• To develop international measures, for instance vehicle safety.

The base is formed with good statistics
International comparison

It requires comparable data but also exposure data, depending on the topics we compare.

For instance:

- Number of roads fatalities or injuries i.r.t.
  - the number of inhabitants
  - kilometres travelled
  - time spent in traffic
  - number of trips etc.

- Number of fatalities or injuries caused by sporting i.r.t.
  - The number of inhabitants
  - hours spent on sporting
  - Etc etc

- Etc etc
presentations

• Definitions
• Why data collection
• Data collection
• Linking data
• Conclusions
Definitions ITF/Eurostat/UNECE

Traffic accidents which occurred or originated on a way or street open to public traffic: which resulted in one or more persons being killed or injured or material damage and in which at least one moving vehicle was involved. (suïcide excluded) UNECE

Road traffic crash: a collision or incident involving at least one road vehicle in motion, on a public road or private road to which the public has right of access. WHO

NOT: an accident is a reported accident
Definitions 2

- A road fatality: a person who died within 30 days of a traffic accident (Irtad)
- A road traffic fatality: any person killed immediately or dying within 30 days as a result of an injury crash, excluding suicide.
- Person injured: any person who sustained an injury normally needing medical treatment (not killed) (ITF/Eurostat/UNECE)
- Road traffic injury: a person who has sustained physical damage (i.e.) injury as a result of a rtc.
- Seriously injured: any person injured who was hospitalized for a period of more than 24 hours
Definitions 3

days between crash and day of death
for registered fatalities in the Netherlands

<table>
<thead>
<tr>
<th>Registered number at waarden</th>
<th>cumulative factor</th>
<th>correction factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Died on the spot</td>
<td>59%</td>
<td>1.70</td>
</tr>
<tr>
<td>Died the same day</td>
<td>79%</td>
<td>1.27</td>
</tr>
<tr>
<td>Died 1 day later</td>
<td>86%</td>
<td>1.16</td>
</tr>
<tr>
<td>Died 2.5 days later</td>
<td>92%</td>
<td>1.08</td>
</tr>
<tr>
<td>Died 6-10 days later</td>
<td>96%</td>
<td>1.04</td>
</tr>
<tr>
<td>Died 11-30 days later</td>
<td>100%</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Why are data about consequences of road accidents important?

• Injuries and fatalities is a health problem

and

• It is road safety problem
Why are health statistics important

data of death causes and injuries are essential:
  • for medical purposes
  • for administrative financial purpose
  • for monitoring and evaluation
  • to develop improvements
  • for priority setting
  • etc
  • etc
FIGURE 2.1

Distribution of global injury mortality by cause

- Other unintentional injuries: 18.1%
- Suicide: 16.9%
- Drowning: 7.3%
- Fires: 6.2%
- Falls: 7.5%
- Poisoning: 6.7%
- Road traffic injuries: 22.8%
- Violence: 10.8%
- War: 3.4%
- Other intentional injuries: 0.2%

### TABLE 1.2

Change in rank order of DALYs for the 10 leading causes of the global burden of disease

<table>
<thead>
<tr>
<th>Rank</th>
<th>Disease or Injury</th>
<th>Rank</th>
<th>Disease or Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lower respiratory infections</td>
<td>1</td>
<td>Ischaemic heart disease</td>
</tr>
<tr>
<td>2</td>
<td>Diarrhoeal diseases</td>
<td>2</td>
<td>Unipolar major depression</td>
</tr>
<tr>
<td>3</td>
<td>Perinatal conditions</td>
<td>3</td>
<td>Road traffic injuries</td>
</tr>
<tr>
<td>4</td>
<td>Unipolar major depression</td>
<td>4</td>
<td>Cerebrovascular disease</td>
</tr>
<tr>
<td>5</td>
<td>Ischaemic heart disease</td>
<td>5</td>
<td>Chronic obstructive pulmonary disease</td>
</tr>
<tr>
<td>6</td>
<td>Cerebrovascular disease</td>
<td>6</td>
<td>Lower respiratory infections</td>
</tr>
<tr>
<td>7</td>
<td>Tuberculosis</td>
<td>7</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>8</td>
<td>Measles</td>
<td>8</td>
<td>War</td>
</tr>
<tr>
<td>9</td>
<td>Road traffic injuries</td>
<td>9</td>
<td>Diarrhoeal diseases</td>
</tr>
<tr>
<td>10</td>
<td>Congenital abnormalities</td>
<td>10</td>
<td>HIV</td>
</tr>
</tbody>
</table>

DALY: Disability-adjusted life year. A health-gap measure that combines information on the number of years lost from premature death with the loss of health from disability.

Source: reference 2.
Why are data about consequences of road traffic accidents important?

- Policy planning and target setting
- Development of measures /interventions
- Insight in accident causes
- Insight in medical consequences
- Monitoring and evaluation (ex post and ex ante)

but also

- To inform policy and society about this negative aspect of traffic
- To calculate social costs
- For benchmarking (regions but also other domains) as well real numbers/rates as the trends between countries
Costs of road traffic accidents

Costs associated with traffic crashes in NL 2003, AVV(2006):

<table>
<thead>
<tr>
<th></th>
<th>Million €</th>
<th>Per Casualty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical costs</td>
<td>232</td>
<td></td>
</tr>
<tr>
<td>Material costs</td>
<td>3,866</td>
<td></td>
</tr>
<tr>
<td>Settlement costs</td>
<td>1,262</td>
<td></td>
</tr>
<tr>
<td>Production loss</td>
<td>1,294</td>
<td></td>
</tr>
<tr>
<td>Traffic jam costs</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>Human costs</td>
<td>5,549</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>12,327</td>
<td>11.7</td>
</tr>
</tbody>
</table>

This equals 2.6% of the GNP
Datacollections

- Each dataset has its own purpose
- Accident data
- Medical/health data
Road traffic accident data
accident reporting system

Police informed → Police visit location → Police report accident

- Accident database
- Add information
- Accident recorder
- Polcie office (paper form, electronic way)
- Regional office
- National statistics
- Quality control

Ministry of Infrastructure and the Environment

6 July 2011
accident reporting system

Police informed ➔ Police visit location ➔ Police report accident

Accident database ➔ Add information

Police office
- paper form
- electronic way

Regional office

National statistics

Quality control

Ministry of Infrastructure and the Environment
accident reporting system

Police informed → Police visit location → Police report accident

Hospital database

Add information

National statistics

Quality control

Regional office

Police office

Accident recorder

paper form

Electronic way

paper form
Traffic accident reporting systems

- accident database not complete
- accident database not representative
- registration of accidents not stable over the years
Medical injury data
Medical databases

- Death cause statistics

- Hospital databases LMR
  persons admitted in a hospital

- Injury Information System (Consumers & Safety) LIS
  persons treated at a first aid department

- Injuries and Physical Activities (OBiN)
  persons injured by road traffic accidents, sport participation, work, domestic activities, violence etc.
Estimating procedures
Estimation of road traffic fatalities

3 sources
1. Accident database
2. Death cause statistics
3. Court files
Estimation of road traffic fatalities 2

• A total of 881 different cases have been recognized of which are present
• 77% (675) of the cases are present in all three sources
• 95% (833) in the Death Cause statistics
• 88% (772) in the Court Files (88%)
• 90% (796) in the Road Crash Database
Estimation of serious injured persons 1

Data 1993-2008 were linked.

Annually:

- About 14,000 injuries in medical hospital records (traffic ecodes)
- 46,000 road casualties police recorded (of which 11,000 hospitalized)

- New definition of seriously injured (Mais 2+)
Estimation of serious injured persons 2

No ID present
Variables common to both files:
• Date/time of crash / hospital admittance
• Date of birth
• Gender
• Region of hospital
• Severity in police record (killed, not on the spot, hospitalized, A&E treated, slight)
• External cause of injury in hospital record (E-code within the range E810-E829)
Estimation of serious injured persons 3

Distance function

- If records have an identical value for a variable, their distance is 0
- If there is a small difference in a variable's value, a small distance is added
- Links are established between pairs that have each other as closest neighbour
- Links with low distance and high selectivity are matched

Small differences are tolerated
### Matching principles

<table>
<thead>
<tr>
<th></th>
<th>LMR</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crash without motor vehicle</td>
<td>No Traffic crash</td>
<td>Crash with motor vehicle</td>
<td>SUM</td>
</tr>
<tr>
<td>In BRON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicle crash</td>
<td>$M \cdot P_M \cdot a_1$</td>
<td>$M \cdot P_M \cdot a_2$</td>
<td>$M \cdot P_M \cdot (1 - a_1 - a_2)$</td>
<td>$M \cdot P_M$</td>
</tr>
<tr>
<td>Crash without motor vehicle</td>
<td>$N \cdot P_N \cdot (1 - b_1 - b_2)$</td>
<td>$N \cdot P_N \cdot b_2$</td>
<td>$N \cdot P_N \cdot b_1$</td>
<td>$N \cdot P_N$</td>
</tr>
<tr>
<td>Not in BRON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicle crash</td>
<td>$M \cdot (1 - P_M) \cdot a_1$</td>
<td>$M \cdot (1 - P_M) \cdot a_2$</td>
<td>$M \cdot (1 - P_M) \cdot (1 - a_1 - a_2)$</td>
<td>$M \cdot (1 - P_M)$</td>
</tr>
<tr>
<td>Crash without motor vehicle</td>
<td>$N \cdot (1 - P_N) \cdot (1 - b_1 - b_2)$</td>
<td>$N \cdot (1 - P_N) \cdot b_2$</td>
<td>$N \cdot (1 - P_N) \cdot b_1$</td>
<td>$N \cdot (1 - P_N)$</td>
</tr>
<tr>
<td>SUM</td>
<td>$N_{LMR}$</td>
<td>Other$_{LMR}$</td>
<td>$M_{LMR}$</td>
<td>$N+M$</td>
</tr>
</tbody>
</table>

Bron= police recorded; LMR = Hospital database

The white cells should be estimated
The matching result and the estimates of the unknown cells

<table>
<thead>
<tr>
<th></th>
<th>MAIS 2+</th>
<th>LMR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crash without motor vehicle</td>
<td>No Traffic crash</td>
</tr>
<tr>
<td>In BRON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicle crash</td>
<td>287</td>
<td>1.351</td>
</tr>
<tr>
<td>Crash without motor vehicle</td>
<td>256</td>
<td>70</td>
</tr>
<tr>
<td>Not in BRON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicle crash</td>
<td>121</td>
<td>568</td>
</tr>
<tr>
<td>Crash without motor vehicle</td>
<td>4.120 = 121 + 3.999</td>
<td>1.094</td>
</tr>
<tr>
<td>SUM</td>
<td>4.663</td>
<td>3.082</td>
</tr>
</tbody>
</table>

Result in 2000: \( M = 10806 \) \( N = 5884 \) total: 16690
Result 1993 2008: real volume Mais 2+
Reporting levels police registration

![Graph showing reporting levels over years.](image)
hospitalized according to the police

slightly according to the police
<table>
<thead>
<tr>
<th>ICD codes /transport accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External causes of morbidity and mortality</strong> (V01–V98)</td>
</tr>
<tr>
<td>V01–X59</td>
</tr>
<tr>
<td>V01–V09</td>
</tr>
<tr>
<td>V10–V19</td>
</tr>
<tr>
<td>V20–V29</td>
</tr>
<tr>
<td>V30–V39</td>
</tr>
<tr>
<td>V40–V49</td>
</tr>
<tr>
<td>V50–V59</td>
</tr>
<tr>
<td>V60–V69</td>
</tr>
<tr>
<td>V70–V79</td>
</tr>
<tr>
<td>V80–V89</td>
</tr>
<tr>
<td>V90–V94</td>
</tr>
<tr>
<td>V95–V97</td>
</tr>
<tr>
<td>V98–V99</td>
</tr>
</tbody>
</table>
Conclusions 1

1. A complete insight of the consequences of road crashes is needed.
2. This requires the use of several databases to get this information on the most efficient way.
3. Cooperation between several departments (Infrastructure / Health / Police) is necessary.
4. The databases should be linkable by common variables.
5. The quality should be validated and checked.
6. The severity of injuries is important for traffic safety policy, so doctors should assess the severity.
7. Knowledge of estimation procedures should be exchanged.
Conclusions 2

8. Each country should describe his registration and estimation procedures

9. Definitions should be harmonised and better described.
10. Countries should describe how they fulfil the definitions.

11. Create one unique international forum and website with definitions/knowledge and assistance. An opportunity is the Irtad group but because of conclusion 3 cooperation with WHO and other departments are necessary. The WHO can fill up this role
Thank you for your attention.

harry.derriks@minvenw.nl