Analysis of road crash costs in EU countries

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SafetyCube

• SafetyCube: Safety CaUsation, Benefits and Efficiency
• A European Commission supported Horizon 2020 project
• Aims at developing an innovative road safety Decision Support System (DSS), helping policy makers to
  – Assess effectiveness of road safety measures
  – Prioritize measures
  – Assess cost-effectiveness of measures
  – Monitor serious injuries and the associated socio-economic costs
• Including an Economic Efficiency Assessment (EEA) tool
  – Cost-benefit analysis
  – Cost-effectiveness analysis
Economic Efficiency Assessment tool

WP4,5,6 Info on measures
- Effectiveness: saved crashes per unit - per severity category
- Time horizon
- Measure costs

CBA calculator
- Cost Effectiveness Analysis:
  - Costs per crash prevented (for each severity category separately)
- Cost Benefit Analysis:
  - Net present value (benefits – costs)
  - Cost benefit ratio (benefit / costs)

WP3 Info per country
- Crash costs by severity category
- Distribution of severity categories
- Discount rate
Cost-benefit analysis

Road safety investments

Road crash cost savings (+ other impacts)
Costs as road safety indicator
Analysis of road crash costs

1. Literature review to identify
   – All relevant cost items
   – Methods
   – Best practices
2. Survey among EU countries
3. Descriptive analysis
4. Further statistical analysis
5. Developing standardized EU-values for EEA-tool.

This presentation: descriptive analysis, preliminary results

Data collection in collaboration with H2020 project InDeV
The SafetyCube-InDeV cost team

SafetyCube partners:
• BRSI
• SWOV
• TOI
• IFSTTAR
• KfV
## Previous cost reviews

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Number of countries</th>
<th>Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST313</td>
<td>1994</td>
<td>14</td>
<td>EU</td>
</tr>
<tr>
<td>Elvik</td>
<td>1995</td>
<td>20</td>
<td>EU (13), other (6)</td>
</tr>
<tr>
<td>Elvik</td>
<td>2000</td>
<td>12</td>
<td>EU (6), other (6)</td>
</tr>
<tr>
<td>Trawen et al.</td>
<td>2002</td>
<td>11</td>
<td>EU (8), US, AU, NZ</td>
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<tr>
<td>Wijnen &amp; Stipdonk</td>
<td>2016</td>
<td>17</td>
<td>Asia (8), EU (6), US, AU, NZ</td>
</tr>
</tbody>
</table>
The survey

- Survey among the 28 EU member states + Iceland, Norway, Serbia and Switzerland
- Questionnaires received from 31 countries
- Issues:
  - *Which cost items included?*
  - *Method(s) per cost item*
  - *Total costs (value, % of GDP)*
  - *Distribution costs among cost items*
  - *Costs per casualty and crash*
  - *Total costs by severity level*
- Official values used by national governments
Cost components

Costs of road crashes

Injury related
- Medical costs
- Production loss
- Human costs
- Other costs

Crash related
- Property damage
- Administrative costs
- Other costs
| Cost component | Cost item | Method if ‘other’ or several options: specify in ‘further comments’ for explanation see blue tab below. | Database if ‘other’ or several options: specify in ‘further comments’ for explanation see blue tab below. | Cost element | fatalities | seriously injured | slightly injured | property damage only | crashes with fatalities | crashes with seriously injured | crashes with slightly injured | crashes with property damage only | Other injuries | Other group, see Cost per unit |
|----------------|-----------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------|------------------|-------------------|-------------------|----------------------|----------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------|-----------------------------|
| Medical costs | First aid and transportation | Restitution | Hospitals | | ambulance | | | | | | | | | | |
|               | Emergency department | Restitution | Hospitals | | helicopter | | | | | | | | | | |
|               | In-patient hospital treatment (overnight stay) | Restitution | Hospitals | | | | | | | | | | | | |
|               | Out-patient treatment (no overnight stay) | Restitution | Hospitals | | | | | | | | | | | | |
|               | Non-hospital treatment | Restitution | other | | rehabilitation centres | | | | | | | | | | |
|               | Aids and appliances | other | other | | | | | | | | | | | | |
|               | other items: medicines | | | | | | | | | | | | | | |
|               | other items: | | | | | | | | | | | | | | |

1. Several types of data sources have been used for costs of non-hospital treatment have been used, including hospital data, national surveys and insurance data. 2. For some cost items, e.g. out-patient treatment of victims who have not been treated at the emergency department, national surveys have been used in addition to hospital data. 3. The severity categories for which costs of non-hospital treatment are calculated differ between the cost items (e.g. rehabilitation does not include ‘other’ injuries, while costs of general practitioner do include this group).

Calculation of loss of future market production is based on statistics of Statistics Netherlands (production data, sick leave and inability to work) and Netherlands Bureau for Economic Policy Analysis (CPB), which are based on national surveys.
### Costs per component

**More detailed information**

Do you have more detailed information on the crash costs **per cost component** and **per casualty**? If so, please fill those in here. If you only have data on total costs, please choose the right tick box.

<table>
<thead>
<tr>
<th>Is the information below given in costs per casualty or in total costs?</th>
<th>Costs per casualty (preferred)</th>
<th>Total costs</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Currency in which the official information is provided (EUR/Pound/etc.):</th>
<th>EUR</th>
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#### Official figure

<table>
<thead>
<tr>
<th>Medical costs</th>
<th>Production loss</th>
<th>Human costs</th>
<th>Property damage</th>
<th>Administrative costs</th>
<th>Other costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>fatalities</strong></td>
<td>9,904</td>
<td>576,679</td>
<td>1,991,083</td>
<td>10,805</td>
<td>17,462</td>
</tr>
<tr>
<td><strong>serious injuries</strong></td>
<td>10,229</td>
<td>20,859</td>
<td>232,957</td>
<td>10,498</td>
<td>5,667</td>
</tr>
<tr>
<td><strong>slight injuries</strong></td>
<td>1,036</td>
<td>1,122</td>
<td>-</td>
<td>4,323</td>
<td>1,747</td>
</tr>
<tr>
<td><strong>fatal crashes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>serious injury crashes</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>slight injury crashes</strong></td>
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<tr>
<td><strong>property damage only (PDO) crashes</strong></td>
<td></td>
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</tbody>
</table>

| **Other injuries** | 222 | - | - | 3,060 | 965 | 623 |

[other groups] (your definition from tab 'Costs per unit')

| Total crashes |  |  |  |  |  |  |

**Further notes:**

Costs of house adaptions and visiting people in hospital are included in medical costs.
Cost components included

fatalities
serious injuries
slight injuries
fatal crashes
serious injury crashes
slight injury crashes
property damage only
Methods

Valuation methods

Restitution costs approach
Costs of resources needed to restore casualties to initial situation

Human capital approach
Loss of productive capacities of road casualties approach

Willingness to pay approach
Amount of money individuals are willing to pay for a risk reduction

- Medical costs
- Property damage
- Administrative costs

Production loss

Human costs
Method human costs
Cost by component

WTP countries

Non-WTP countries
Total costs (%GDP)
What explains the differences in total costs?

- Road safety level (number of casualties / crashes)
- Methodological issues:
  - Cost items included
  - Methods
  - Severity categories included, particularly property damage only crashes
  - Correction for underreporting?
Relation mortality – total cost
Total costs (%GDP)
Total costs by severity

- **UK**
- **Switzerland**
- **Sweden**
- **Spain**
- **Slovenia**
- **Slovakia**
- **Serbia**
- **Romania**
- **Portugal**
- **Poland**
- **Norway**
- **Netherlands**
- **Malta**
- **Luxembourg**
- **Lithuania**
- **Latvia**
- **Italy**
- **Ireland**
- **Iceland**
- **Hungary**
- **Greece**
- **Germany**
- **France**
- **Finland**
- **Estonia**
- **Denmark**
- **Czech Republic**
- **Cyprus**
- **Croatia**
- **Bulgaria**
- **Belgium**
- **Austria**

Severity categories:
- Fatalities
- Serious injuries
- Slight injuries
- PDO crashes
Total costs by severity

severity categories
- fatalities
- serious injuries
- slight injuries
Correction for underreporting
Costs per fatality

- Austria
- France
- Iceland
- Estonia
- Norway
- Netherlands
- Finland
- Croatia
- Greece
- Sweden
- Slovenia
- UK
- Belgium
- Denmark
- Ireland
- Switzerland
- Italy
- Malta
- Spain
- Bulgaria
- Czech Republic
- Germany
- Cyprus
- Latvia
- Lithuania
- Hungary
- Portugal
- Poland
- Slovakia

Costs range from 0 to 300,000.
Costs per fatality
Human cost fatalities

Cost per fatality vs Human cost of fatality graph.
Costs of serious injuries
Costs of slight injuries
Conclusions

- Official estimates of costs of road crashes in European countries range from 0.3 to 3.2% of GDP
- Costs per fatality range from 0.7 to 3.0 million EUR (2015)
- Variations mainly explained by methodological differences:
  - Different cost components
  - Willingness to pay or other method
  - Correction for underreporting
  - Inclusion of property damage only crashes
- Harmonization of cost estimates is needed for cost-benefit analysis on EU level
Next steps

• Developing a coherent set of EU values for cost-benefit analysis
• Value transfer
  – *Adding missing cost components*
  – *Estimating values using methods recommended in guidelines*
• Incorporating all values in the EEA-tool of the SafetyCube Decision Support System