Applying correction factors to police data (deliverable WP7.1)

Den Haag 24/05/2016
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Co-funded by the Horizon 2020 Framework Programme of the European Union
Theory
Correction factor: what is it?

- One of the three options proposed by the EC to estimate the number of MAIS3+ victims in a EU country
- It is defined by the EC as a factor that should be applied to police data to estimate the number of MAIS3+ casualties
- Need access to some reference/comparison data, namely hospital data
Correction factor: what is it?

Number of RTC in police data

Corr.factors(1)
- Observed number of RTC in hospital data (Uncorrected)

Corr.factors(2)
- Actual number of RTC in hospital data (corrected for flaws in registration procedure)

Corr.factors(3)
- Actual number of RTC in society (corrected for the number of casualties never admitted to hospital)
Correction factor: why?

- No recent hospital data available (e.g. Belgium: 2009-2011)
- Only a sample of hospital data are available (e.g. France Rhône Register)
Some time ago … Safetynet

- Estimation of MAIS3+
- European Project held in 2004 – 2008 in 8 countries
- Estimation method requires linking (probabilistic)
- Result

<table>
<thead>
<tr>
<th></th>
<th>Correction factor / serious</th>
<th>Correction factor / slight</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK Scotland</td>
<td>0.20</td>
<td>0.01</td>
</tr>
<tr>
<td>CZ</td>
<td>0.21</td>
<td>0.02</td>
</tr>
<tr>
<td>FR</td>
<td>0.68</td>
<td>0.06</td>
</tr>
<tr>
<td>EL</td>
<td>0.46</td>
<td>0.12</td>
</tr>
<tr>
<td>HU</td>
<td>0.48</td>
<td>0.04</td>
</tr>
<tr>
<td>NL</td>
<td>0.39</td>
<td>0.016</td>
</tr>
<tr>
<td>ES</td>
<td>0.26</td>
<td>0.02</td>
</tr>
</tbody>
</table>

- Two correction factors
- Same table was calculated for each road user type

Conclusion: correction factors are neither temporally, nor geographically constant and should be recalculated if the time or location parameters change
Correction factors: how many?

- Ratios (and thus correction factors) vary according to the characteristics of the victims and of the accident
  - Victims: road user type, age, gender
  - Accident: severity, number of vehicles involved, motorized vehicle involved (Y/N), year

- An overall national correction factor should not be applied to a subgroup in police data (e.g. cyclists)

- It is recommended to calculate a correction factor
  - for those variables that have the most diverse impact on hospital/police ratios (beginning with road user type)
  - for each combination of those variables (e.g. male cyclist versus female cyclist versus male driver versus female driver...)

<table>
<thead>
<tr>
<th>Category</th>
<th>MAIS3+ Hosp / Seriously Injured Pol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian</td>
<td>0,5</td>
</tr>
<tr>
<td>Bike</td>
<td>1,4</td>
</tr>
<tr>
<td>PTW</td>
<td>0,6</td>
</tr>
<tr>
<td>Motor vehicle other than PTW</td>
<td>0,4</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>2,2</td>
</tr>
</tbody>
</table>
Guidelines: how to do it

- The calculation of correction factors requires access to hospital data of good quality
- An overall national correction factor should not be applied to a subgroup in police data
- Ideally, more than one correction factor should be estimated, beginning with a correction factor for each road user type
- Correction factors vary over time and place
  - Correction factors should be updated on a regular basis
  - Countries should not apply correction factors that are estimated in other countries
- A statistical model allows to identify which variables have a significant impact on the ratio “MAIS3+ / police data”
Case study Belgium
Estimation of MAIS3+ in Belgium

- Belgium applies option 2 and option 1 proposed by the EC
  - Option 2, use of hospital data, for the period 2009-2011
  - Option 1, correction factors applied to police data, for the period 2005-2013
Calculation of MAIS3+ victims between 2009 and 2011: use of hospital data

- All diagnoses
- Exclusion of readmissions and fatalities 30 days
- Not adjusted for missing E-codes causing an underestimation of MAIS3+ victims

Estimated number of MAIS3+ road casualties based on option 2 (use of hospital data)

Source: FPS Public Health / Edited by BRSI
Calculation of MAIS3+ victims between 2005 and 2013: use of correction factors

- Calculation of ratios MAIS3+ / injured recorded by the police for the period 2009-2011
  - \textit{Calculated for each combination of the following variables: year (3); gender (3); road user type (5); age (about 100); and accident involving motorized vehicles (2)}
- These ratios (+/- 2000 ratios) were modelled by a generalized linear regression model
- \text{Log (ratio)} = \text{Gender} + \text{Road User Type} + \text{Accident with motorized vehicles (yes/no)} + \text{Age} + \text{Age}^2
  - \text{Year = not significant (p=0.07)}
  - \text{R}^2 = 0.770
  - \text{Model results in +/- 2000 “correction” factors}
MAIS3+ (hospital data)
Injured (police data)

Log

Motor veh in acc
No motor veh in acc

Man
Woman

RoadUserType
- Pedestrian
- Cyclist
- PTW
- Motorized other than PTW
- Other and unknown

log(ratio)

Age
Applying the estimated correction factors

Estimated number of MAIS3+ road casualties based on option 1
(use of correction factors)

Source: FPS
Public Health /
Edited by BRSI
Limitations

- Further refinement of the model (next weeks)
  - *Include year in the model?*
  - *Interaction terms?*
- Further refinement of selected traffic victims based on the code E849 “place of occurrence” (next weeks)
- Not able to adjust for missing E-codes causing an underestimation of MAIS3+ victims
Guidelines: how to do it

- The calculation of correction factors requires access to hospital data of good quality.
- An overall national correction factor should not be applied to a subgroup in police data.
- Ideally, more than one correction factor should be estimated, beginning with a correction factor for each road user type.
- Correction factors vary over time and place:
  - Correction factors should be updated on a regular basis.
  - Countries should not apply correction factors that are estimated in other countries.
- A statistical model allows to identify which variables have a significant impact on the ratio “MAIS3+ / police data”.
Discussion

• Questions and remarks?
• Do you agree with the guidelines?
• Same understanding of “correction” factors?
• Comments on the Belgian Case Study?
  – Too complex?