

# Misreporting Injury Severity in European Road Accidents



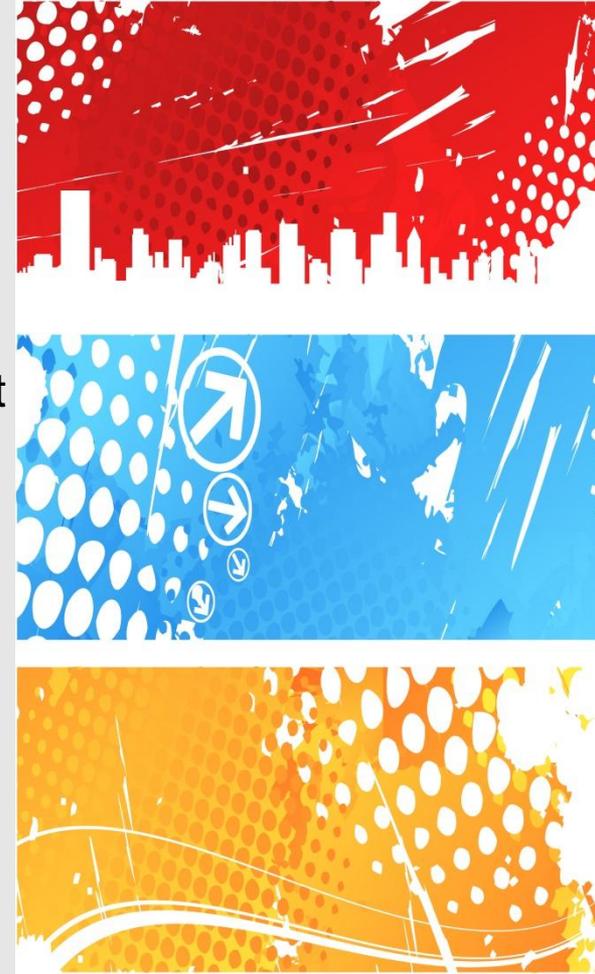
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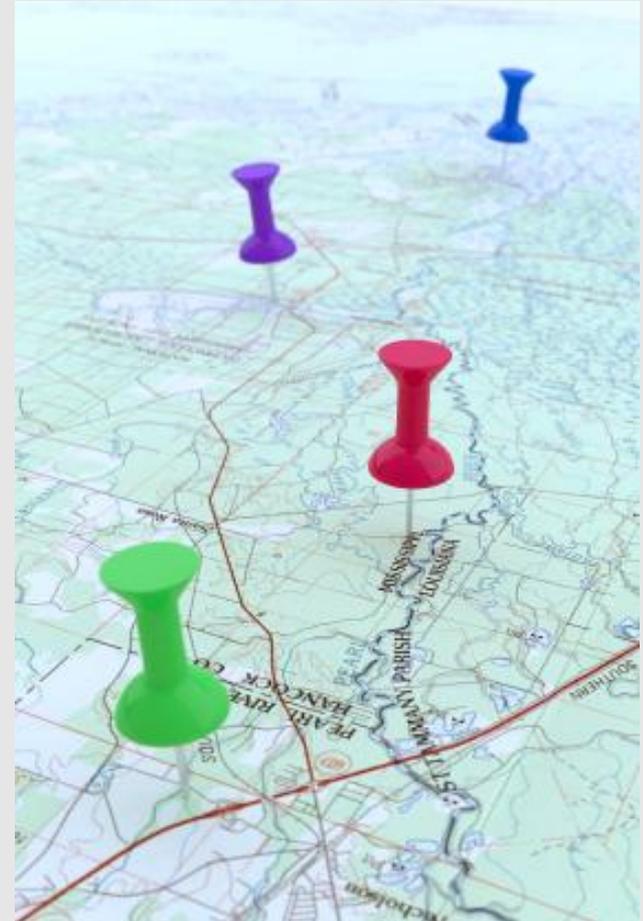
# Background

- The importance of working with reliable injury severity data for the assessment of any factor that is related to road traffic accidents is stressed in several studies
- The issue of **injury under-reporting** (i.e. of casualties who are unavailable in police records, but who can possibly be found in hospital records) is often examined at national level,
  - Several national studies compare police and hospital data to estimate under-reporting coefficients
- It is acknowledged that there exists an **injury severity reporting inaccuracy** problem (from now on “misreporting”), covering in many countries for over 50% of all injuries (especially slight ones)
  - Little information is available in the literature on misreporting



# Objectives

- The objective of this research is the analysis of misreporting injury severity in European road accident injury data
- Identification of the degree of misreporting injury severity
- Identification of factors (road user, vehicle or accident-related) increasing the probability of misreporting injury severity
- Identification of country differences



# Data

- Within the SafetyNet project of the 6th Framework Programme of the European Commission, an in-depth road accident database was created on the basis of **Fatal Accident Investigation (FAI) data** collected by means of retrospective methods.
- Cases of fatal accidents from seven European countries (DE, FR, FI, IT, NL, SE, UK)
- Two classifications of injury severity at the level of individual road user:
  - **“Police injury severity”**, i.e. injuries or complications directly due to the accident within 30 days of the crash, as recorded by the Police.
  - **“SafetyNet medical outcome”**, i.e. overall outcome of the crash, validated or corrected on the basis of various additional data sources (hospital, insurance companies records etc.)
- The FAI database includes cross-checked, validated and enhanced data, on the basis of the initial Police records of this data.



# Data exploration

## ➤ Cross-classification of “Police” and “SafetyNet” injury scores

All countries except Italy

Police Injury Severity	SafetyNet Medical Outcome					Grand Total
	Fatal	Serious	Slight	Not Injured	Unknown	
Fatal	328					328
Serious	75	95	50	2	25	247
Slight		3	111	40	9	163
Not Injured			4	201		205
Unknown	1				10	11
<b>Grand Total</b>	<b>404</b>	<b>98</b>	<b>165</b>	<b>243</b>	<b>44</b>	<b>954</b>

*Note: Figures in the diagonal present the cases where the original reporting was correct; off-diagonal cells (white) present misreporting.*

Italy

Police Injury Severity	SafetyNet Medical Outcome					Grand Total
	Fatal	Serious	Slight	Not Injured	Unknown	
Fatal	87					87
Serious	70	15	45	2	19	151
Slight			24	38	5	67
Not Injured				99		99
Unknown					9	9
<b>Grand Total</b>	<b>157</b>	<b>15</b>	<b>69</b>	<b>139</b>	<b>33</b>	<b>413</b>

- In all countries except Italy, the large majority of cases is on the diagonal, i.e. there are proportionately few differences
- In Italy a larger proportion of Police scores were initially incorrect and needed to be corrected in the FAI database.

# Analysis methods

- Dependent variable: a binary one, indicating whether the two classifications (Police and SafetyNet) are the same or different.
  - 1: matching score, 0: different score
  - Focus on serious injuries
- Model: binary logistic regression model
- Explanatory variables

Variable	Values
Misreporting	0: Different Recording, 1: Same recording
Body Region Most Injured	0: Head/Thorax/Multiple, 1: All other (known) cases
Crash Participants	0: 1, 1: >=2
Road User Class	0: Driver / Passenger, 1: Pedestrian
Age	0: 15 - 54, 1: 0 - 14 / >=55
Gender	0: Male, 1: Female
Impairment	0: No, 1: Yes
Resident of region	0: No, 1: Yes
Familiar with region	0: No, 1: Yes
Avoidance manoeuvre	0: No, 1: Yes
Motorway (road type)	0: No, 1: Yes
Speed Limit	0: <50, 1: >50
Weather Conditions	0: Dry, 1: Wet
Light Conditions	0: Daylight/Dazzling sunlight, 1: Other (known) cases
Carriageway Type	0: Dual divided, 1: Other cases (uniform)
Number Of Lanes	0: 1/direction, 1: >=2/direction
Junction	0: No, 1: Yes
Area type	0: Rural, 1: Urban / Mixed
Traffic conditions	0: Light, 1: Normal / Heavy
Vertical Alignment	0: Flat, 1: Uphill / Downhill
Horiz. Alignment	0: Straight, 1: Bend / Junction / Other
Most harmful event	0: 1 <sup>st</sup> event, 1: 2 <sup>nd</sup> -plus event
Vehicle Type	0: 4wheelers, 1: 2wheelers & pedestrian / shoe vehicle
Crash Participants	0: 1, 1: >=2
Road Conditions	0: Dry, 1: Other
Event Type 1	0: Non-collision, 1: Collision
Accident Day	0: Weekdays, 1: Weekend

# Results for Italy

- 132 cases, Likelihood Ratio test significant at 95%, 91% correctly predicted outcomes

<i>Variables</i>	<i>Parameter estimates</i>			
	B	S.E.	Sign.	Exp(B)
Traffic(normal/heavy)	-1.791	0.628	0.004	0.167
Traffic(light)	.	.	.	.
Vehicle Type(pedestrians-riders)	-1.550	0.830	0.062	0.212
Vehicle Type(occupants)	.	.	.	.
Junction(yes)	-1.103	0.670	0.100	0.332
Junction(no)	.	.	.	.
Gender(female)	-1.643	0.850	0.053	0.193
Gender(male)	.	.	.	.
Constant	0.150	0.563	0.790	1.161

- The heavier the traffic, the more likely to observe misreporting
- The same appears to hold for the presence of a junction.
- Non-matching scores are also more frequent for female road users.
- Two-wheelers riders and pedestrians are much more likely to have their injury severity changed than vehicle occupants.

# Results for all other countries

- 90 cases, Likelihood Ratio test significant at 95%, 90% correctly predicted outcomes

<i>Variables</i>	<b>Parameter estimates</b>			
	B	S.E.	Sign.	Exp(B)
Age(0-14 / 55+)	-1.689	0.776	0.030	0.185
Age(15-54)	.	.	.	.
Light Conditions(dusk/night)	2.087	1.129	0.065	8.064
Light Conditions(daylight)	.	.	.	.
Area(urban/mixed)	-2.062	0.980	0.035	0.127
Area(rural)	.	.	.	.
Constant	2.666	0.632	0.000	14.378

- The absence of daylight appears to enhance correct scores (Police recording more careful during the night?)
- Increased probability of misreporting for individuals who are either very young or rather old (more vulnerable?)
- Increased probability of misreporting in urban areas

# Summary (1/2)

- A general (although weak) trend is identified, according to which, the more complex the accident and the accident site, and the more vulnerable the road user, the higher the probability of injury severity misreporting.
- It is unclear whether score differences are mainly due to recording bias (e.g. the Police may tend to record severity incorrectly under some conditions), or to the lack of a sound definition of injury severity (making it difficult to identify the correct severity score).



# Summary (2/2)

- In the other countries, serious injuries' reporting problems may come from the type of injury (e.g. person age) and not from reporting errors as such, as non-matching scores only represent a very small proportion of total cases.
- On the other hand, additional parameters related to the type of accident are dominant in the Italy model, suggesting the presence of recording bias (to be further investigated).



# Discussion (1/2)

- Multinomial models were explored as well:
  - Dependent variable: -1: change to a lower severity score, 0: matching score, 1 : change to a higher severity score.
- The impact of the selected variables on the dependent variable not always of the same magnitude and direction, and the small sample size made the interpretation difficult.
- The lack of a sound international definition of injury severity hinders the identification of the correct severity score.



# Discussion (2/2)

- At least partly, misreporting may simply be attributed to the fact that in some cases severe injuries have an increased probability of becoming fatal ones.
- However, the systematic factors identified suggest that other types of misreporting are observed as well.
- These results should be considered with some caution, given the small sample size.



# Misreporting Injury Severity in European Road Accidents

## Apoio



## Patrocinadores

