

Seriously Injured in road accidents in Italy: MAIS3+ cases by national hospital discharge data



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6TH IRTAD CONFERENCE - 10-12 October 2017 Marrakech - Morocco

Background

✓ The **2020 target** set by the United Nations and the European Commission is a further halving, since 2010, of the number of deaths in road accidents in Europe and globally. Although a specific target was not launched, the decrease in the number of serious injuries is recommended too.



✓ In compliance with the recent programs for road safety and the new 2020 targets, to establish new standards for an international and **harmonized definition** of serious injury in road accidents was required.

✓ In **2013**, the **European Commission's policy orientations** on road safety 2011-2020 document was disseminated.

✓ In **2015**, the **European Commission defined guidelines** for Eu28 countries. **Italy**, part of the Eu CARE experts group, **adopted definitions and methods** using **Hospital Discharge** data for identifying serious injuries.



Definitions and methods

- ✓ The **European Commission defined specific guidelines** to classify the seriousness of injuries. The use of the existing scale of the trauma AIS (Abbreviated Injury Scale) and, specifically, **MAIS (Maximum Abbreviated Injury Scale)** was approved.
- ✓ Following the international recommendations and creating synergies among other national organisations, as Ministry of Transport and Ministry of Health, **Italy** calculated the number of serious injuries in road accidents, based on the **Hospital Discharge Data** (source Ministry of Health).



- ✓ Hospital patients for **acute** in **ordinary admission regime** with a **diagnosis** included among ICD9-CM (Trauma) and associated to the **external codes for Road accidents** were considered. Readmissions and deaths within 30 days were excluded.
- ✓ The use of Hospital Discharge, as recommended, **ensures the correct assessment of injury severity**, gathering these data do not require the development of new structures or processes as the information normally already exists in hospital data bases.



ICD 9 Mapping: MAIS 3+ conversion

Association Advancement of Automotive Medicine AAAM owner and licensee of injury coding products, provided to **European Commission**, under contract, and to Eu28 countries, two different mappings for International Classification of Diseases (ICD) revisions 9 and 10 into the code MAIS3+, MAIS<3, or indeterminable.



Italy adopted the **IC9-AIS conversion** table to apply to Hospital Discharge data.

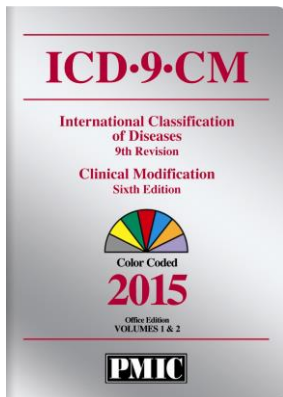
ICD9 Mapping example Total list 2500 records

CODE	DESCRIPTION	1 = AIS 3, 4, 5, 6 0 = AIS 1,2 9 = cannot determine
800	Fracture Of Vault Of Skull	0
800.0	Closed Fracture Of Vault Of Skull Without Mention Of Intracranial Injury	0
800.00	Closed fracture of vault of skull without mention of intracranial injury; unspecified state of consciousness	0
800.01	Closed fracture of vault of skull without mention of intracranial injury; with no loss of consciousness	0
800.02	Closed fracture of vault of skull without mention of intracranial injury; with brief [less than one hour] loss of consciousness	0
800.03	Closed fracture of vault of skull without mention of intracranial injury; with moderate [1-24 hours] loss of consciousness	1
800.04	Closed fracture of vault of skull without mention of intracranial injury; with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level	1

Data: Hospital Discharge (HDD)



In Italy every year:
9 million of hospital discharge in total;
600,000 for trauma and poisoning



- ✓ The **Hospital Discharge Data**, in Italy, is based on the collection of information about **each patient discharged** from the public hospital and private institutions throughout the country (National Laws 1991, 1993 and 2005 updates). Data source is the **Ministry of Health**.
- ✓ The Hospital Discharge records, in compliance with the privacy laws, are **filled in by the doctors** who have treated the patient hospitalized. The Hospital Discharge information is **mandatory in case of hospitalisation and day hospital**. It does not apply to medical consultation or social care facilities.
- ✓ The information is **collected** and **coded (ICD9_CM)** by the Regional Health System and sent to the Ministry of Health. It describes the **clinical aspects of hospitalization** (diagnosis and relevant symptoms, surgery, mode of discharge...)
- ✓ Since 2010 the information about the **External Cause of admission an discharge** is included (ICD9 E classification), useful to identify injuries due to road accidents.

Road accidents in Italy: an overview on 2001- 2016 data

2016 vs 2015



Road Accidents: **+0.7%**

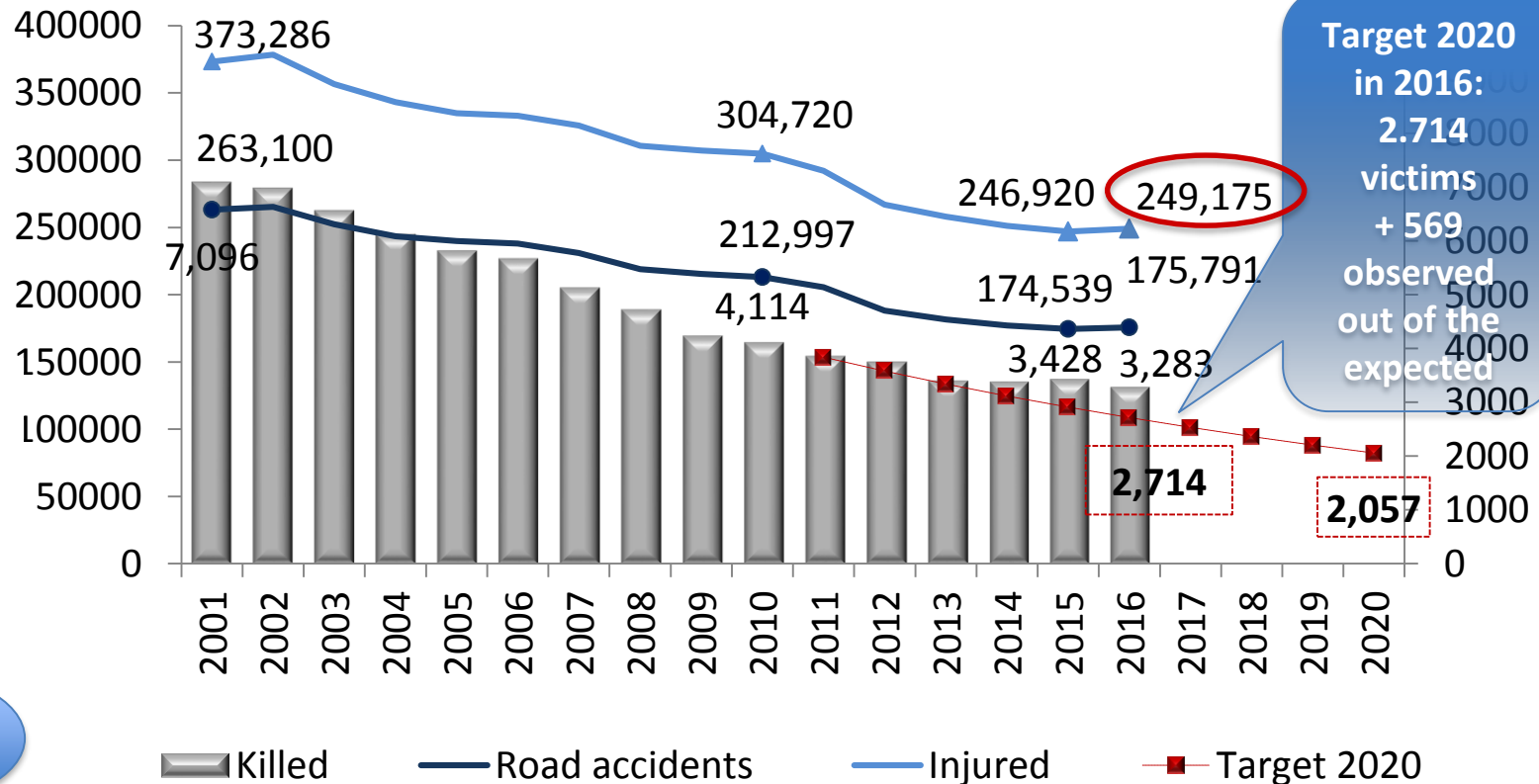


Victims **-4.2%**

Injured: **+0.9%**

Road accidents and Injured scale

Killed scale



Injured

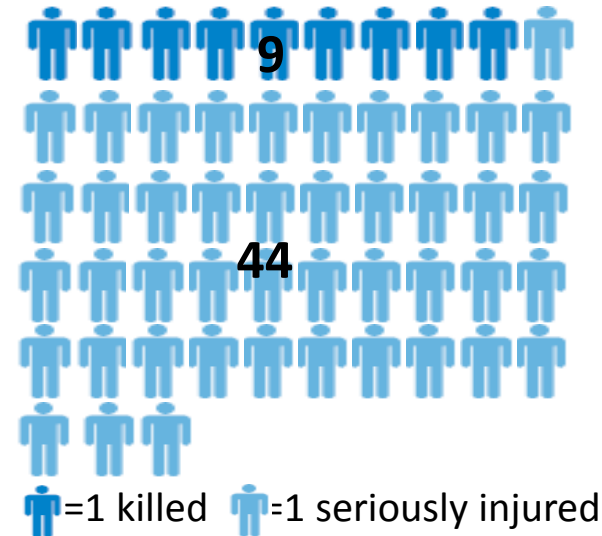
Seriously injured in Italy: MAIS3+ level. Years 2012-2016

Years	Serious injuries in Road Accidents HDD (MAIS3+) *	Killed in Road Accidents **	Serious Injuries per one road death
2012	13,112	3,753	3.5
2013	12,899	3,401	3.8
2014	14,493	3,381	4.4
2015	15,901	3,428	4.7
2016	17,324	3,283	5.3

Source: Ministry of Health *, Istat **

2012-2016 

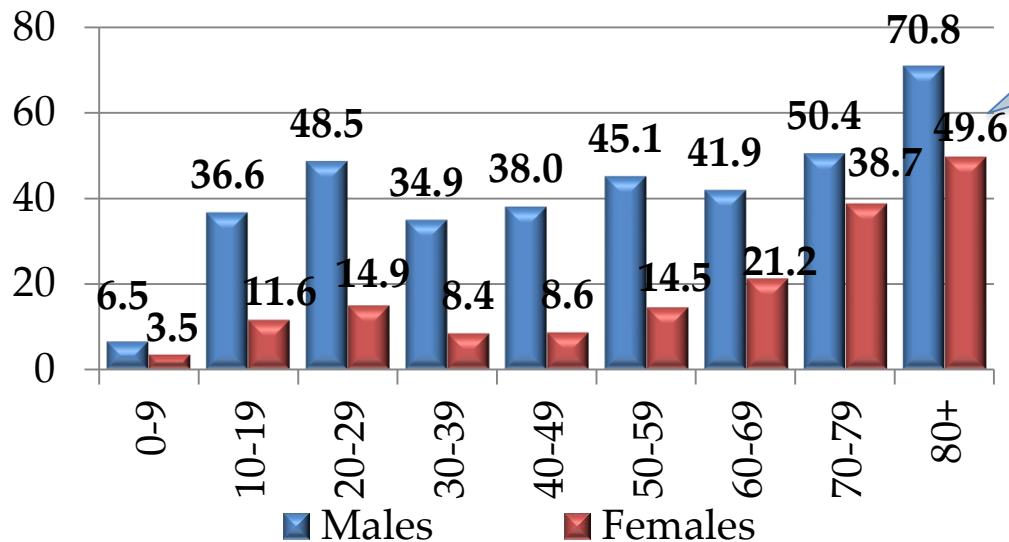
Daily killed and seriously injured average: Year 2016



- The number of seriously injured in road accidents, in 2016, was **up 9% from the previous year**.
- During the period 2012-2016, the ratio between serious injuries and deaths progressively increased, passing from 3.5 injured for each death in 2012 to 5.3 in 2016.
- In 2016, the serious injuries represented **about 7% out of the total** injured noticed by Police. This percentage, which gradually increased over the last five years, was also linked to an **improvement in quality and coverage of all injuries information among HDD**.
- Unknown cases: **code 9 MAIS3+ represents 3.9 %** out of total injuries for road accidents HD in 2016

Seriously injured in Italy by age and gender. Year 2016

Serious injury rate by age and gender: Year 2016
(rates per 100,000)



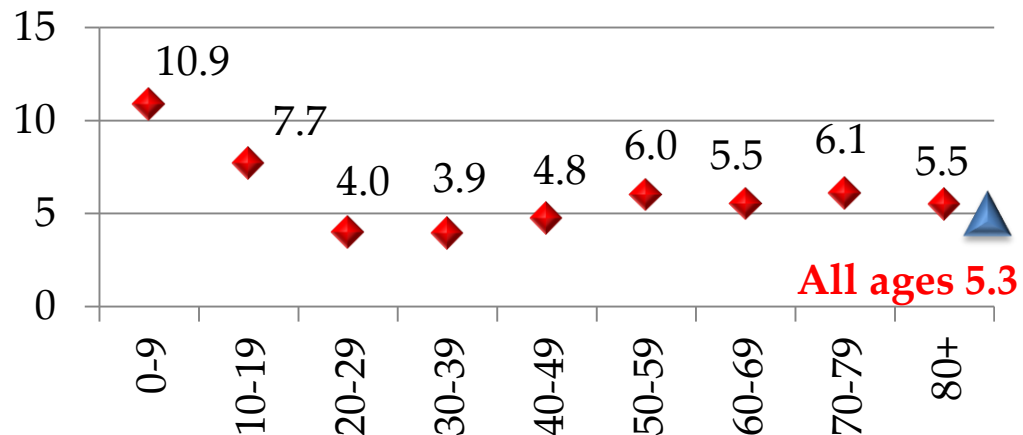
In 2016, in Italy, the total Serious Injury rate is equal to **28.6 (*100,000)**
Males **39.9** and Females **17.9**

The **Serious Injury rate** is higher for people over 70 years old and 20-29 than the other age classes. Males show a clear disadvantage in respect of females.

Serious injuries per one road death by age in Italy: Year 2016

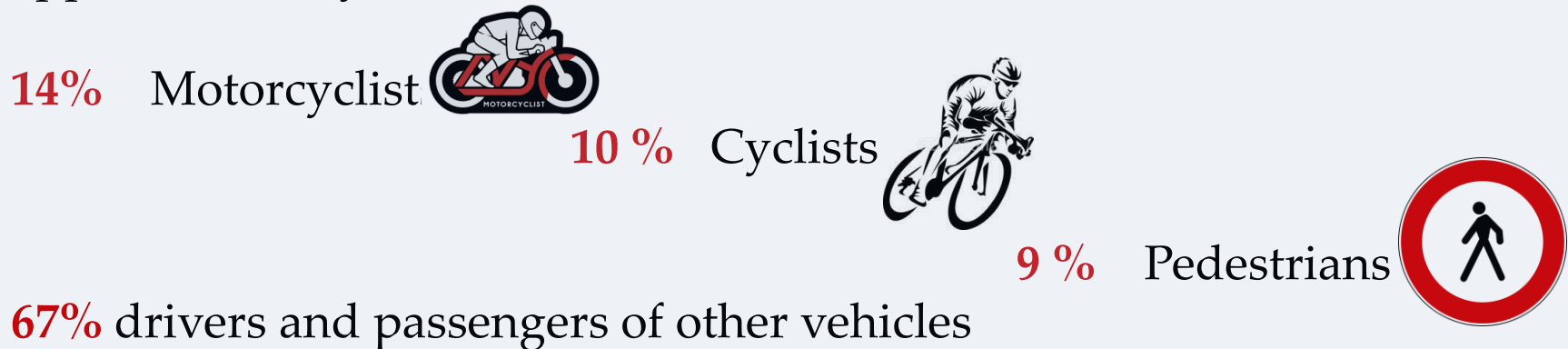
The ratio **Serious Injuries/Deaths** is higher for over 50 years old and aged 0-9 and 10-19.

To notice that children 0-9 years old data concern very few cases.



Seriously injured: road users and injuries nature

The percentage of **Seriously Injured vulnerable users in 2016** was approximatively 33% in total:



**Istat processing on Ministry of Health data*

The percentage of **Serious Injuries in 2016** were mainly (~ 70%) due to:

- ✓ Fracture
 - of vault of skull and face bones
 - of rib(s), sternum, larynx, and trachea
 - of pelvis and neck of femur
 - of tibia and fibula
- ✓ Cerebral laceration and contusion
- ✓ Subarachnoid, subdural, and extradural hemorrhage, following injury
- ✓ Traumatic pneumothorax and hemothorax
- ✓ Injury to heart, lung and spleen

Serious injuries in Italy by geographical area

Serious injuries per one road death, by hospital discharge geographical area in Italy. Years 2012-2016

HOSPITAL DISCHARGE GEO-AREA	Year 2012	Year 2013	Year 2014	Year 2015	Year 2016
North-west	3.3	3.8	4.5	4.4	5.2
North-east	3.3	3.5	3.4	3.8	5.0
Centre	3.5	3.4	4.6	5.1	5.8
South	3.3	4.3	4.8	5.3	5.3
Islands	4.9	4.1	5.6	4.9	4.9
Italy	3.5	3.8	4.4	4.7	5.3

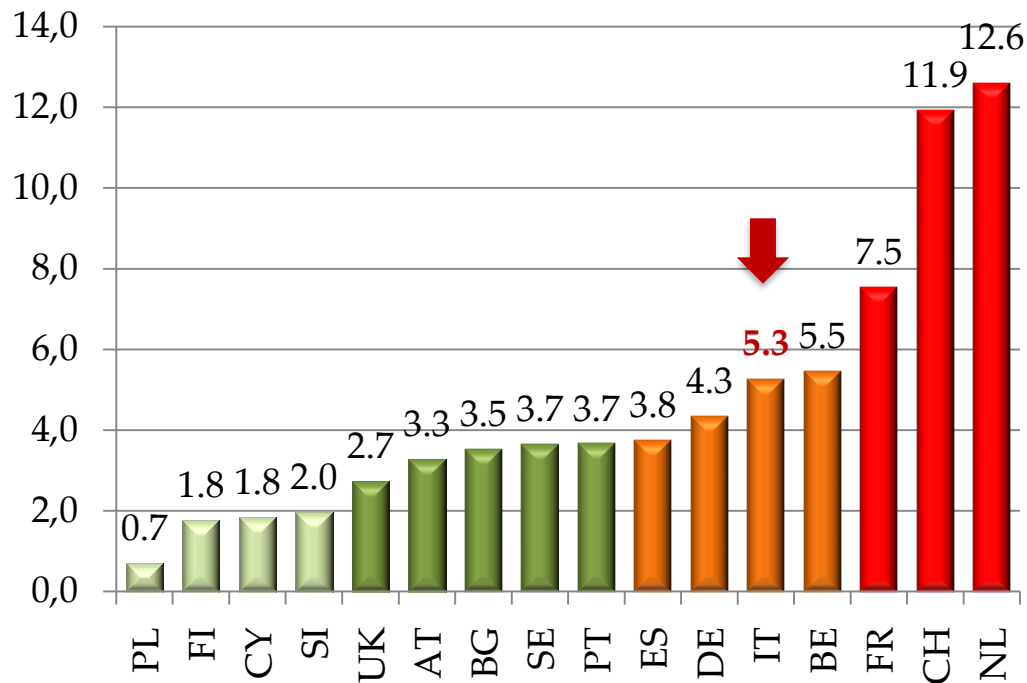


During 2016, Regions in the Centre of Italy, show a number of Serious Injuries per one death higher than the national average (5.8 vs 5.3)

Source: Ministry of Health - Hospital Discharge Data - Istat – Survey on Road accidents resulting in death or injury

Serious injuries in EU countries

Serious injuries per one road death in EU



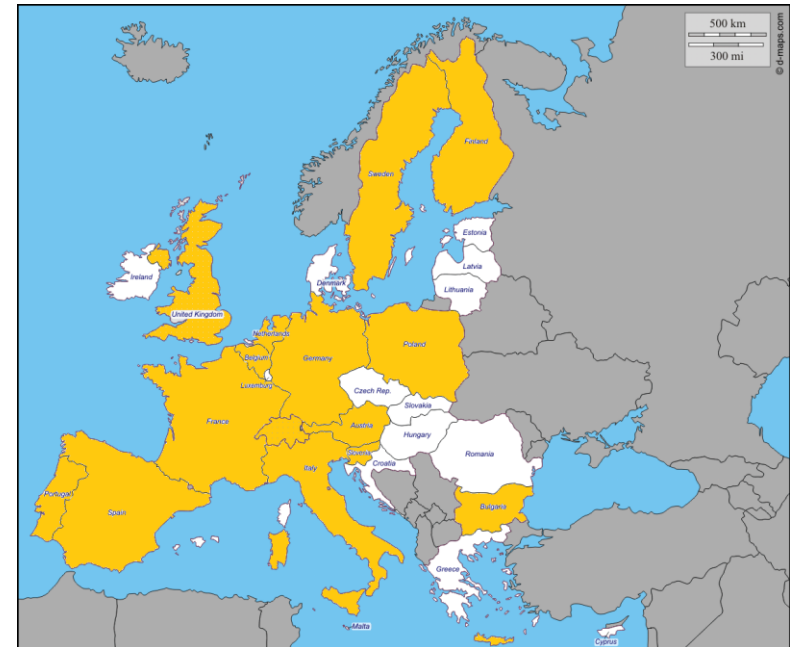
2016 data for BG, IT, SE;

2015 data for FI, NL, PT ;

2014 data for CY, CH, BE, DE ,ES, FR, PL, SI, UK

Source: European Transport Safety Council - Annual PIN report. Year 2017

Serious injury MAIS3+ in EU: data availability



Differences between countries, sometimes relevant, could be due not only to the road accidents national pattern but also to slight discrepancy in coding.

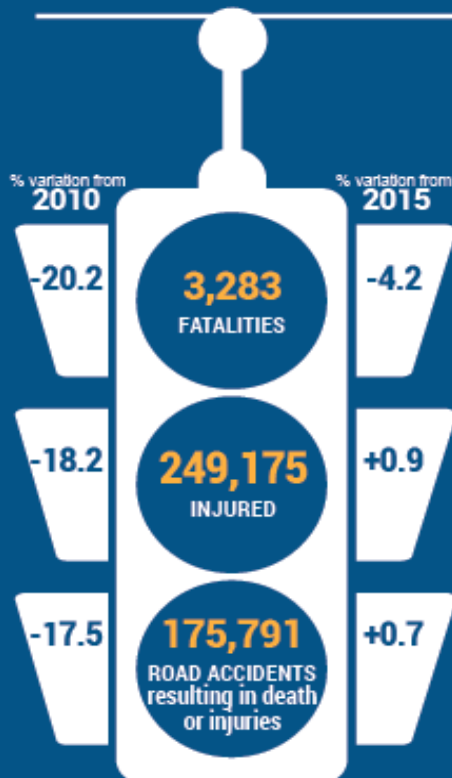
Conclusions

- ✓ During the period 2012-2016, in Italy, the number of serious injuries and the ratio between serious injuries and deaths progressively increased.
- ✓ The increase was, realistically, due the road accidents pattern but also to an **improvement in quality and coverage of all injuries information among hospital discharge data.**
- ✓ The main goal is the **improvement of the coverage level** of all injuries information in Hospital Discharge Data, to reach a correct and more detailed SI calculation.
- ✓ Furthermore, the next step, in Italy, in medium term, could be the **Linkage between Police and Hospital data sources**, with the aim to reduce risk of both underreporting and misreporting.
- ✓ As regards linking of data, the principles of integrity and **data protection must be kept in mind.**

Highlights from Italian Road Accidents statistics

Road accidents in Italy. Year 2016

Istat | Italian National Institute of Statistics



total numbers include all vehicles categories

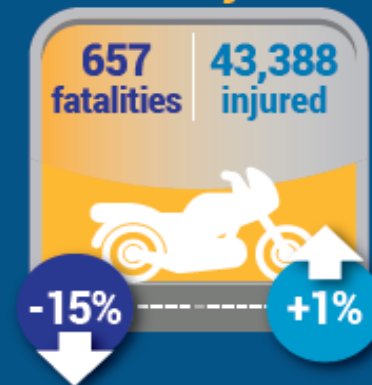
Pedestrians



Pedal cycles



Motorcycles



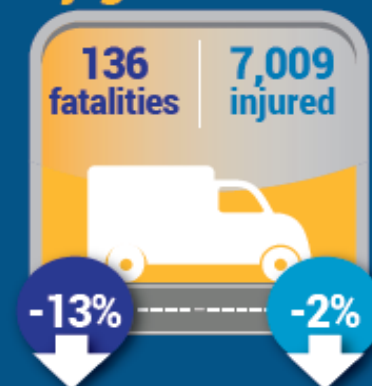
Passenger cars



Mopeds



Heavy goods vehicles



Deaths (within 30 days) and injuries by vehicle category number include all drivers and passengers. All percentage variations are from 2015

Causes of road accidents



16%
distracted driving

15%
failing to obey a precedence or the traffic light signals

11%
speed excess

<https://www.istat.it/en/archive/202807>

Istat

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