



December 23, 2015

Road accidents

Preliminary estimates. January-June 2015

In the context of the continuous improvement of road accidents statistics information, this press release provides, for the first time, a preliminary estimate of a trend for road accidents occurred during the year; these data, referred to the first six months of 2015, increase the timeliness in the assessment of the actions to address the problem.

During the first semester 2015, it is estimated a number of road accidents resulting in death or injury just under 85 thousand. The number of deaths, within thirty days, is 1,596, while the injured persons would be 119,599.

Considering the final data for the same period of 2014, the preliminary estimates shows a decrease of road accidents resulting in death or injury of 2.9% and of injuries (-3.8%), while an increase of deaths has been registered (+1,0%), (Table 1 and Chart 2). During the first six months of 2015, a trend inversion of the deaths number decrease, rising the distance from the goal of a 50% victims reduction within 2020 (Chart 3).

With reference to the first semester of 2001, the number of killed decreased by 51.4%, while between 2010 and 2015, considering the first semester, the percentage change was equal to -19.0% (Charts 1 and 2).

The mortality index, calculated as the percentage ratio between the number of deaths and the number of accidents resulting in death or injury, is equal to 1.88. This value has a slight increase compared with the same index in the first semester of 2014 (1.81).

On inside urban area roads and minor rural roads, 76.1% road accidents, 72.7% injured and 47.4% killed are recorded. The number of killed increases by 7.4%, with respect of the same period in 2014. The mortality index is equal to 1.17, it was 1.06 in the first semester of 2014.

On the motorways 5.2% of road accidents, 6.2% of injured and 8.8% of killed were recorded. The number of victims, for this road category, shows a decrease compared to 2014 equal to 4.1%. Moreover, on the basis of the preliminary results, it would be recorded 3.14 deaths per 100 road accidents (3.34 in 2014).

On the rural roads, 18.7% out of total accidents, with 21.1% injured and 43.9% killed were recorded; the percentage change of victims number, in respect of the period January-June 2014, is equal to -4.1%. The mortality index is equal to 4.42 deaths per 100 road accidents (4.38 in 2014). (Charts 4 and 5).

The year 2015 shows a mobility recovery. In fact, preliminary data available¹ indicates that the new registrations of passenger cars, during the period January-June 2015, increased by 15.6% over the same period of the previous year.

TABLE 1. ROAD ACCIDENTS RESULTING IN DEATHS OR INJURIES, KILLED AND INJURED PERSONS IN ITALY²

First and second semester 2014 and first semester 2015. Absolute values and percentage changes 2015/2014 (first semesters).

ROAD ACCIDENTS RESULTING IN DEATHS OR INJURIES, FATALITIES AND INJURED PERSONS (a)	Absolute values			Percentage change I semester 2015/2014
	I sem. 2014 (a)	II sem. 2014 (a)	I sem. 2015 (b)	
Road accidents resulting in deaths or injuries	87,530	89,501	84,994	-2.9
Fatalities (within 30 days)	1,580	1,801	1,596	+1.0
Injured persons	124,383	126,764	119,599	-3.8

(a) Source: Istat – Survey on Road accidents resulting in death or injury – Years 2014-2015 (b) Preliminary estimates – first semester 2015 (Data and Methods).

¹ Source: Automobile Club of Italy - Public Register of Motor-vehicles (PRA). Preliminary data 2015.

² On the basis of data already provided from Highway Police and Carabinieri, for the period July-September 2015, an increase of the deaths number is recorded. This tendency variation indicates a possible further increase in the number of victims in the second half of 2015. To complete the information provided, is useful to consider that the average motorway journeys increase of 3.2%, during the period January-September 2015, on respect the previous year (Aiscat Data 2015).

CHART 1. NUMBER OF DEATHS IN ROAD ACCIDENTS PERCENTAGE CHANGE. First semesters 2002-2015 (in respect of year 2001)

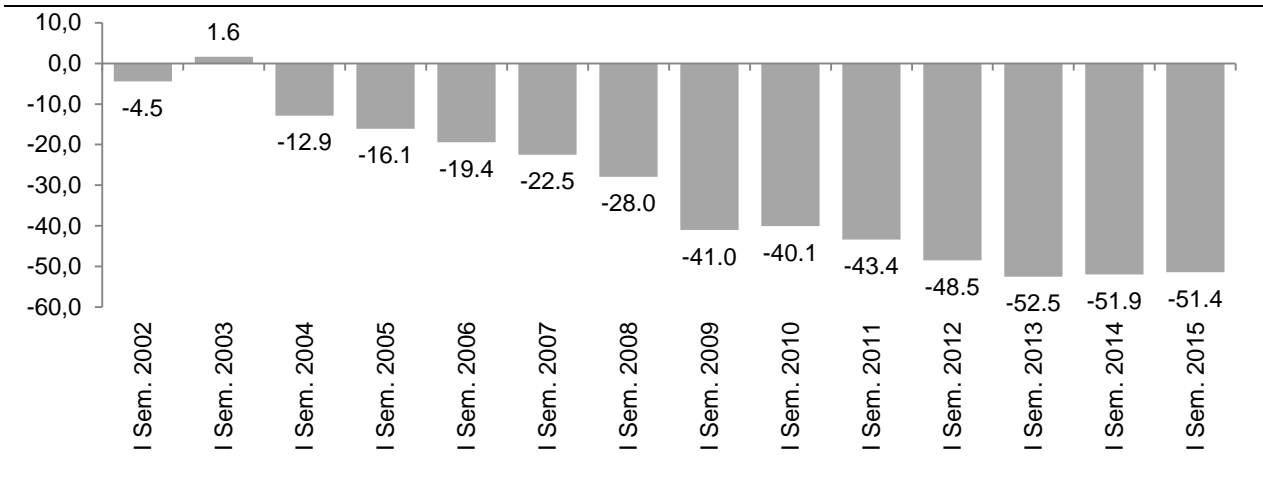


CHART 2. ROAD ACCIDENTS FATALITIES AND INJURIES NUMBER PERCENTAGE CHANGE. First semesters 2015/2014, 2015/2010 and 2015/2001

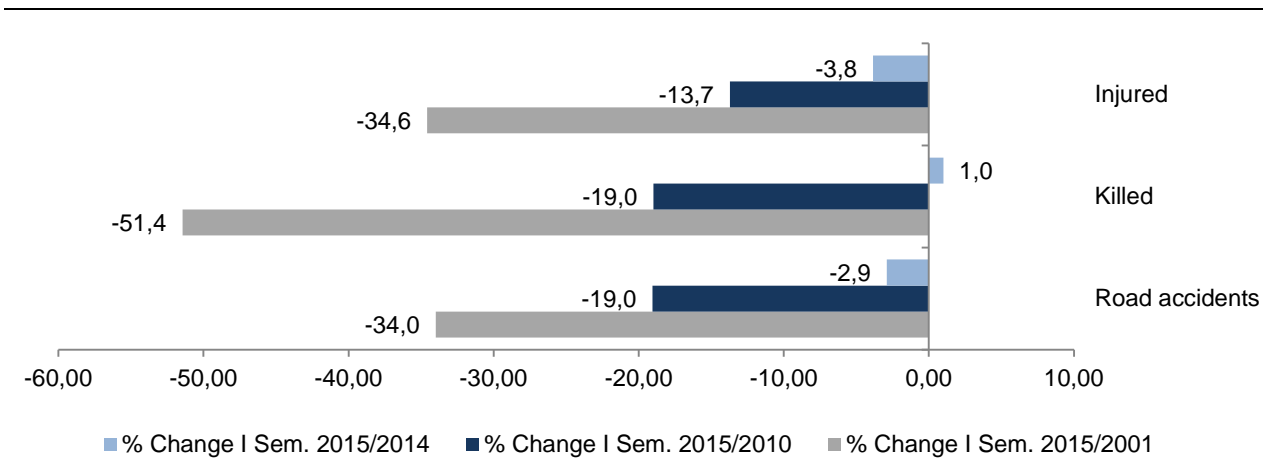
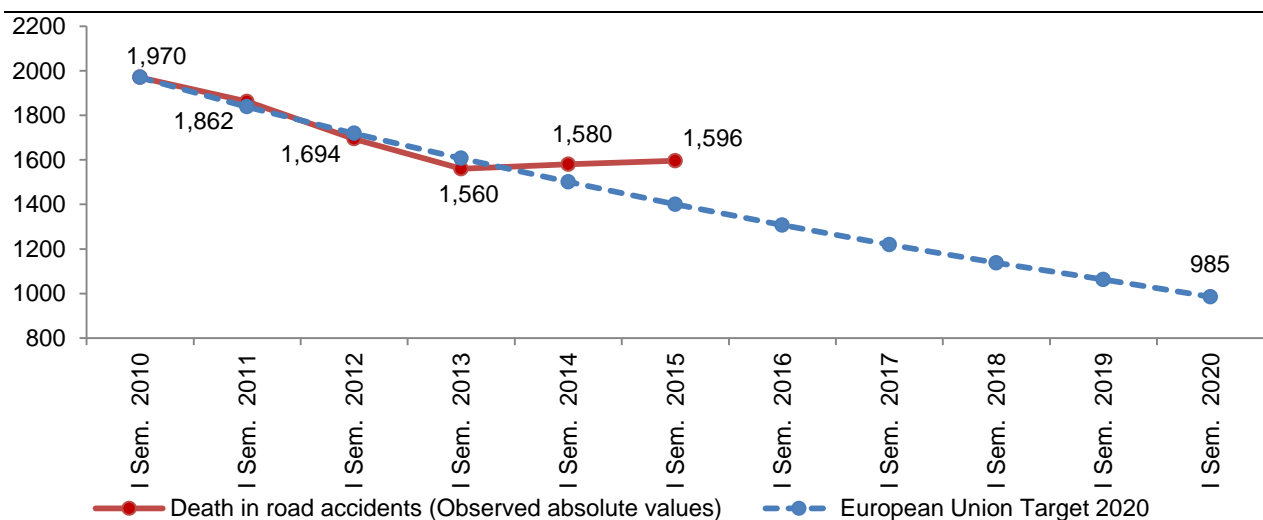
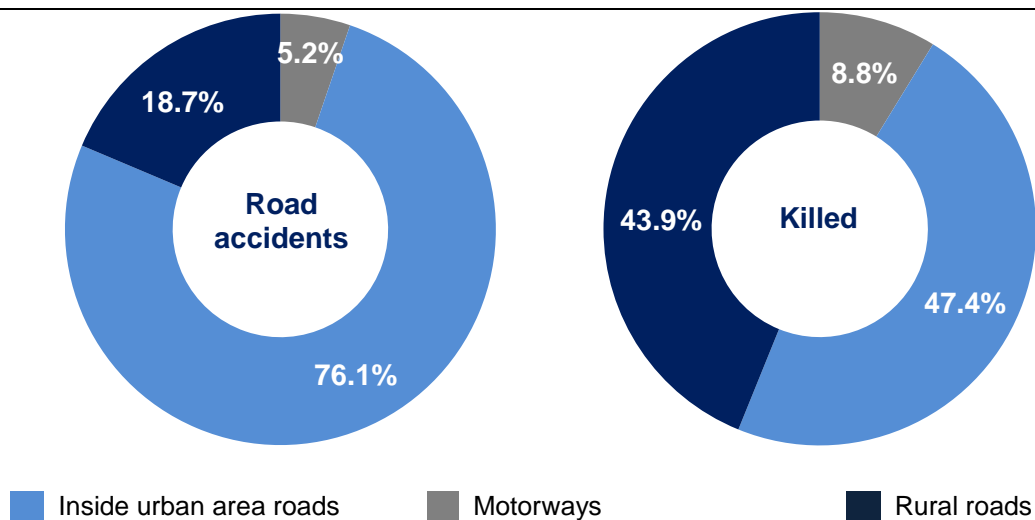


CHART 3. EUROPEAN UNION TARGET 2020: NUMBER OF DEATHS IN ROAD ACCIDENTS. First semesters years 2010-2015 and hypothesis of halving with constant speed, first semesters years 2010-2020 (absolute values)



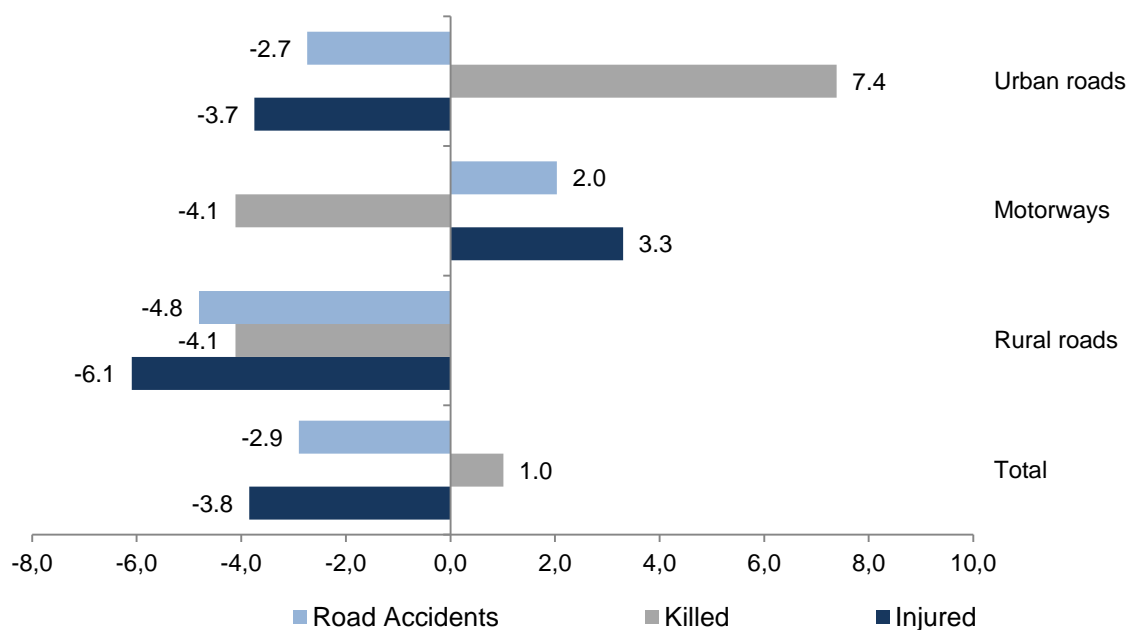
Source: Istat - Survey on Road accidents resulting in death or injury – Years 2001-2015.) Preliminary estimates – first semester 2015 (Data and Methods).

CHART 4. ROAD ACCIDENTS AND DEATHS BY ROAD TYPE (a). First semester 2015 (Percentage values)



(a) Inside urban area roads include minor rural roads.

CHART 5. ROAD ACCIDENTS, DEATHS AND INJURIES BY ROAD TYPE (a). Percentage change for the first semester 2015 (in respect of the same period 2014)



(a) The percentage change for the first semester 2015 in respect of the same period 2014 has been calculated with the formula: $\left(\frac{D^{\text{I Semester 2015}}}{D^{\text{I Semester 2014}}} - 1\right) * 100$.

Definitions

Road accidents resulting in death or injury

All road accidents involving at least one moving vehicle and one person injured or killed as a consequence of this accident. Not injured participants within an injury accident can optionally be recorded. Material damage-only accidents are not considered.

Injured³

The road user was seriously or slightly injured (but not killed within 30 days) in the road accident.

Killed or Fatally injured persons

Death within 30 days of the road accident, confirmed suicide and natural death are not included.

Percentage change: The percentage change is calculated by means the difference between data at t time and data $t-1$ (or $t-x$) time, divided by data at $t-1$ (or $t-x$) time, per 100.

Data and Methods

The preliminary estimate for the first semester 2015 of road accidents resulting in death or injury data has been calculated on the basis of:

- 1) the provisional data provided by the Ministry of the Interior (Servizio di Polizia Stradale);
- 2) the provisional data provided by the Ministry of the Defence (Arma dei Carabinieri);
- 3) data from the quarterly survey of road accidents in urban areas (main municipalities).

The quarterly survey of road accidents in urban areas is carried out by Istat with the cooperation of ACI (Automobile Club of Italy) and Regions and Provinces participating to a National Agreement with Istat, aimed to a decentralization of collection and monitoring for road accidents statistics.

To calculate the preliminary estimate of road accidents resulting in death or injury in urban areas, the quarterly trend for the municipalities subgroup in the period January-June 2015, provisional, and for 2014, final data, in the same set of municipalities, detailed by geographical area, was used. The 2010-2014 time series for road accidents was also taken into account.

Data is collected from 172 municipalities; the units selection was done using the technique of *Cut Off* (with a threshold of 50%), including all main municipalities in the provinces and some municipalities for which a significant share of the total number of accidents in the Province was recorded (just in case the percentage of accidents occurred in a main municipality is less than 50% of the amount in province). The share of accidents in the municipalities collected through the quarterly accounts for over 65 % of accidents with injuries recorded by the Local Police in Italy.

To provide a "range" for the estimated values, confidence intervals have been calculated.

Considering the specific data set characteristics, the application of *Bootstrap method*⁴ to derive reliable estimates of standard deviation and confidence intervals of parameters, was planned.

The use of Bootstrap resampling techniques allows to build confidence intervals statistically accurate, with optimal efficiency, without the need to formulate the assumption of normal distribution for the population, basic hypothesis for the calculation of confidence intervals with traditional methods.

In particular, the confidence interval estimation was performed using the alternative method called *Bootstrap-t*, based on the selection of 100 random samples for the first level and 100 samples extracted for each of the previous ones, for the second level (over 10,000 in total). The samples, each one with size equal to 172 units, identical to the original set of data, were selected with the units replacement.

Some "self-representative" units were included in all first level samples.

³ The harmonized definition of severity of lesions, established at the international level, involves the use, for serious injuries of MAIS 3 + score, i.e., the maximum AIS value equal to or greater than 3. AIS (Abbreviated Injuries Scale) is a classification which describes the severity of the trauma, reported for each of the nine regions in which the human body is divided: the head, face, neck, chest, abdomen, spine, upper limbs, lower limbs, other. The degree of injury varies from 1 (minor injury) to 6 (fatal injury).

⁴ Di Ciccio T.J., Efron B. "Bootstrap Confidence Intervals" in *Statistical Science* 1996, Vol. 11, No. 3, 189-228;
Bonanomi A. "Intervalli di confidenza "Bootstrap: una veduta d'insieme e una proposta per un indice di cograduazione" – in Working papers - Dipartimento di Scienze Statistiche Università Cattolica S.C., Milano, 2007;
Morana M.T., Porcu M. "Il Bootstrap. Un'applicazione informatica per un problema di ricampionamento" - Dipartimento di Ricerche Economiche e Sociali - Università di Cagliari, 2002;
Efron B., Le Page R. "Introduction to bootstrap" in "Exploring the limits of Bootstrap" edited by Le Page R., Billard L., Wiley, New York, 1992.

The self-representative units consist in 10 municipalities⁵, for which was recorded a high number of deaths and accidents (the number of road accidents detected in the self-representative units is over 50% out of the total), while the remaining 162 Municipalities were randomly chosen in each sample. The Table 2 includes the values for standard deviation and lower and upper limit of the confidence intervals of the estimated values.

TABLE 2. ROAD ACCIDENTS RESULTING IN DEATHS OR INJURIES, KILLED AND INJURED PERSONS IN ITALY

First semester 2015, preliminary estimates absolute values, Lower and Higher limit of the Confidence Interval 95%

ROAD ACCIDENTS RESULTING IN DEATHS OR INJURIES, FATALITIES AND INJURED PERSONS	Preliminary estimates I semester 2015 Absolute numbers (a)	Confidence Intervals - 95% (b)	
		Lower limit	Higher limit
Road accidents resulting in deaths or injuries	84.994	83.843	85.672
Fatalities (within 30 days)	1.596	1.584	1.605
Injured persons	119.599	118.152	120.607

- (a) The 2015 data preliminary estimate was obtained by the sum of : 1) weighted data from 172 Municipalities Local Police and provisional data from Polizia Stradale and Carabinieri.
 (b) The lower and higher level interval estimate are calculated with reference to the share of accidents, killed and injured from the quarterly survey of road accidents in urban areas (172 Local police data) . The values shown in the table have been extended to the total of road accidents, deaths and injuries.

For more details please refer to the Italian version

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⁵ The self-representative" units included in all first level samples are: Torino, Milano, Genova, Bologna, Firenze, Perugia, Roma, Napoli, Palermo, Catania.