



21 December 2017

Road accidents

Preliminary estimates. January-June 2017

During the first semester of 2017, the preliminary estimates data showed a reduction of both road accidents resulting in death or injury and injured persons, with a decrease of 4-5%, with respect to the final data for the same period in 2016. In this context, a reversal trend for victims is recorded, with a new growth and increases between 6.7 and 8.2% (Table 1 and Charts 1 and 2).

During the period January-June 2017, it is estimated that the road accidents resulting in death or injury were 82,525. The number of deaths, within thirty days, was 1,623, while the injured persons were 116,137.

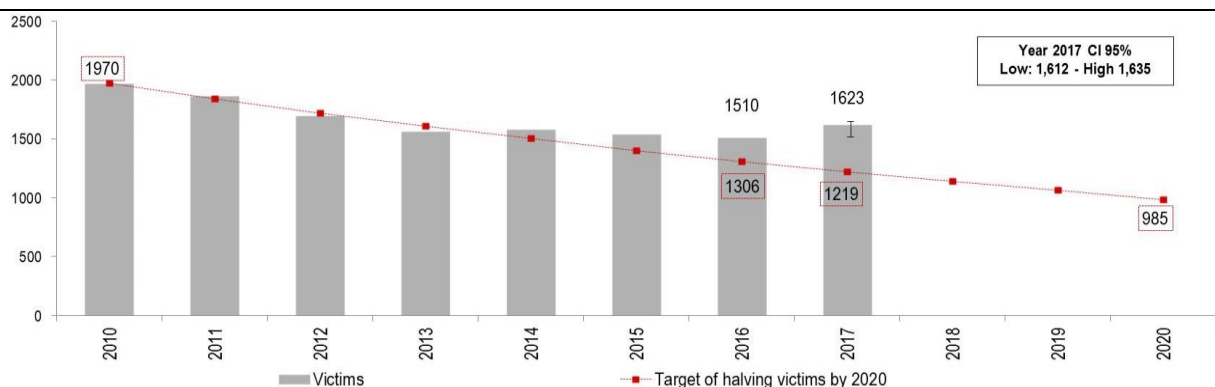
During the first six months of the year, regarding to the benchmark values for the road safety decades, the number of victims decreased, in average, of 17-18%, compared to the first semester 2010 and of 50-51%, with reference to the same period of 2001 (Chart 1). The increase of mortality levels, recorded in the first half of 2017, compared to the period January-June 2016, further removed the target on European halving of victims by 2020.

The mortality index (percentage ratio between the number of deaths and the number of accidents resulting in death or injury) was equal to 2.0, increasing from the first semester 2016, when it was 1.8).

The increase of victims, recorded during the first semester 2017, is due, mainly, to the growth on motorways and rural roads. Based on data provided by "Polizia Stradale", in fact, the number of deaths rose on motorways: from 117 victims during the first semester of 2016 to 149, in the same period of 2017 (+27,4%)¹. For rural roads, considering all accidents, the increase of deaths ranged between 11 and 12%.

The new registrations of passengers cars increased of 8.6%²; the yearly average motorway journeys increased, during the first semester of 2017, with respect of the same period of 2016, of 2.7%³, for light vehicles and of 3.6% for heavy good vehicles.

CHART 1. EUORPEAN UNION TARGET 2020: NUMBER OF DEATHS IN ROAD ACCIDENTS. First semesters years 2010-2016, preliminary estimates first semester 2017, low and high limits (Confidence Interval 95%) 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 2010-2016. Preliminary estimates – first semester 2017 (Ref. Data and Methods).

¹ The increase of victims in road accidents on the motorways, on the basis of Polizia Stradale data, is due to, partially, to the road accidents occurred on January 20th 2017, along the motorway A4, in correspondence of the interchange to Verona-Est, in which an Hungarian bus was involved, causing 16 deaths. On the basis of Polizia Stradale data, already available and referred to the period July-September 2017, a peak in July and August, for victims number, is observed, with a slight increase, instead, in September.

² Source: Automobile Club of Italy - Public Register of Motor-vehicles (PRA). Preliminary data 2017.

³ Source: Aiscat - Associazione Italiana Società Concessionarie Autostrade e Trafori. January-June 2017.

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

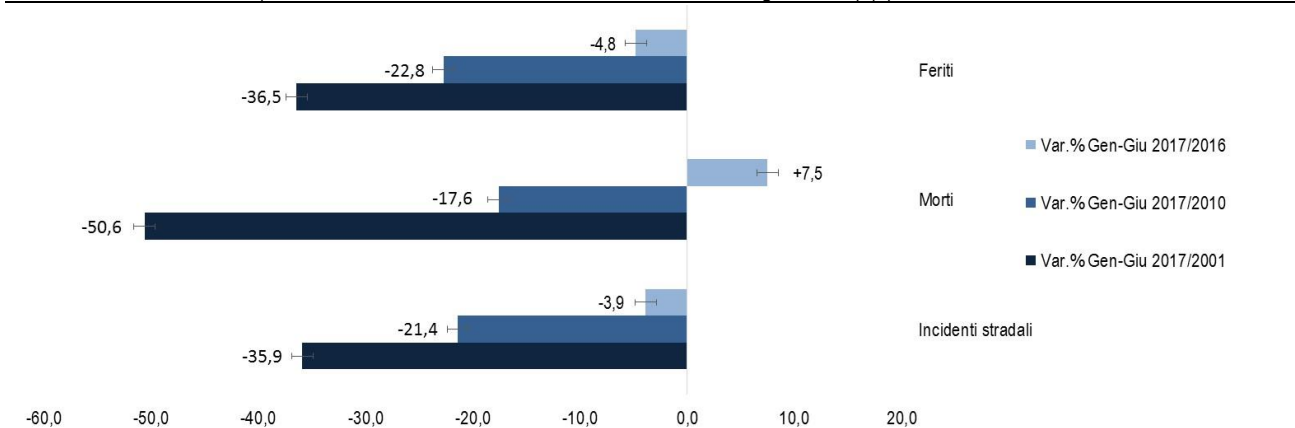
First and second semester 2016, preliminary estimates first semester 2017(a) and estimate value lower and higher limits (Confidence Interval 95%). Absolute values and percentage changes 2017/2016 (first semesters).

ROAD ACCIDENTS VICTIMS AND INJURED PERSONS (a)	Absolute Values					Percentage Change		
	JAN-JUN 2016 (b)	JUL-DIC 2016 (b)	JAN-JUN 2017 (c)	JAN-JUN 2017 Low (CI 95%) (c)	JAN-JUN 2017 High (CI 95%) (c)	JAN-JUN 2017 (c)	JAN-JUN 2017 Low (CI 95%) (c)	JAN-JUN 2017 High (CI 95%) (c)
Road accidents resulting in	85,873	89,918	82,525	80,701	83,993	-3.9	-6.0	-2.2
Fatalities (within 30 days)	1,510	1,773	1,623	1,612	1,635	+7.5	+6.7	+8.2
Injured persons	122,000	127,175	116,137	113,951	118,196	-4.8	-6.6	-3.1

(a) To provide a "range" of values within the estimated number is expected, a Confidence Interval (95%) and lower and higher limits of the confidence intervals for preliminary estimate of accidents, deaths and injuries, were provided.

(b) Source: Istat - Survey on Road accidents resulting in death or injury – Years 2010-2016. Preliminary estimates – first semester 2017 (Ref. Data and Methods).

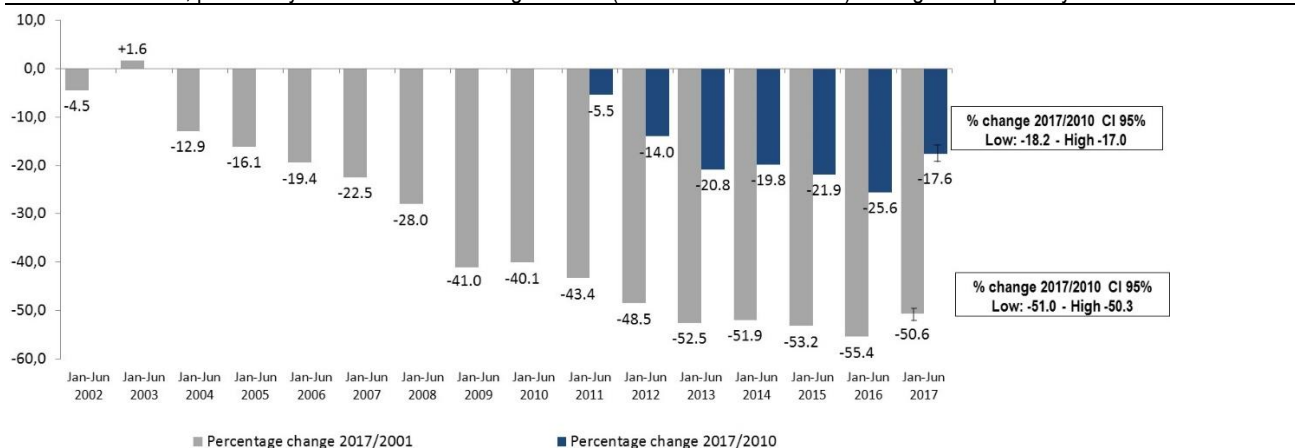
CHART 2. ROAD ACCIDENTS FATALITIES AND INJURIES NUMBER PERCENTAGE CHANGE. January-June 2017/2016, 2017/2010 and 2017/2001 (Confidence Interval 95% - estimate value lower and higher limits) (a)



(a) Confidence Interval 95% - estimate value lower and higher limits for Road accidents, Victims and Injured

% change	Road accidents	Road accidents	Victims (Low)	Victims (High)	Injured (Low)	Injured (High)
Jan-Jun 2017/2001	-37.3	-34.8	-51.0	-50.3	-37.7	-35.3
Jan-Jun 2017/2010	-23.1	-20.0	-18.2	-17.0	-24.2	-21.4
Jan-Jun 2017/2016	-6.0	-2.2	+6.7	+8.2	-6.6	-3.1

CHART 3. NUMBER OF DEATHS IN ROAD ACCIDENTS PERCENTAGE CHANGE. January-June 2002-2016, preliminary estimates first semester 2017, preliminary estimates lower and higher limits (Confidence Interval 95%). Change in respect of year 2001 and 2010



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.

Injured⁴

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 traditional survey of road accidents resulting in death or injury and the quarterly survey, in urban selected areas, are 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.

The preliminary estimate for the first semester 2017 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).

Data in urban areas is collected from 172 municipalities. The units selection was done using the technique of *Cut Off* (with a threshold of 50%). The subgroup contains 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.

The reduced availability of direct observations at infra-annual intervals compared to total aggregates requires the use of estimation methods based on indicators. These methods consist of dividing certain quantities, specifically, in relation to the performance of some selected indicators or benchmark rates.

To calculate the preliminary estimate of road accidents resulting in death or injury, victims and injured persons in urban areas, the quarterly trend of data for the municipalities subgroup in the period January-June 2017, and 2016 final data was used.

The technique estimates the six months period values, with reference to not available municipalities set, using the rates calculated on the resident population, in the previous year or in a series of previous years.

For the calculation of the preliminary six-month estimate for road accidents with injuries, deaths and injured persons, detected by the Local Police, road accidents, mortality and injury rates were processed. Rates were calculated on the basis of final data, referred to the subset of 172 municipalities in 2017 and final and complete 2016 data.

Specifically, in a first step, the rates for the first half of 2016, already disseminated indicators, were processed, separately for the 172 municipalities (quarterly survey) and for the rest of the Italian municipalities. The calculation of the absolute values for road accidents, injured and victims, for the first six months in 2017, was obtained by setting a relationship between the rates calculated for 2016 (t-1) in the two subsets of municipalities (172 quarterly survey municipalities and the rest of municipalities) and 2017 rates (t).

To provide a "range" for the estimated values, confidence intervals (CI 95%) have been calculated.

⁴ 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).

Considering the specific data set characteristics, the application of *Bootstrap method*⁵ 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.

The self-representative units consist in 7 municipalities⁶, 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 165 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. January-June 2017, Bootstrap t parameters, preliminary estimates and Lower and Higher limit (absolute values; Confidence Interval – CI 95%)

ROAD ACCIDENTS, FATALITIES AND INJURED PERSONS	Theta	Theta_var	T_lo	T_hi	Estimated value (a)	CI 95% (b)	
						Lower Limit	Higher Limit
Road accidents resulting in deaths or injuries	36401.70	1929.022	0.5943	-0.5328	82,525	80,701	83,993
Fatalities (within 30 days)	334.89	15.965	0.4774	-0.3713	1,623	1,612	1,635
Injured persons	47769.13	2507.906	0.5459	-0.5573	116,137	113,951	118,196

(a) The 2016 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 IC values are calculated with reference to the share of accidents, killed and injured from the quarterly survey in urban areas (172 Local police data). The values shown in the table were extended to the total of road accidents, deaths and injuries. The Theta, Theta_var, T_lo and T_hi quantities were calculated by means of *Bootstrap T* method. The values shown in the table for the lower and upper limits were extended to the total number of road accidents, deaths and injuries, including also given data from Polizia Stradale and Carabinieri.

Coverage and territorial detail

National data dissemination.

Timeliness and dissemination data

Preliminary estimates referred to the first semester (year *t*) disseminated in December of the same year (year *t*).

Links

European Commission, European Commission's policy orientations on road safety 2011-2020, Brussels, 19.3.2013, SWD (2013) 94 final.

http://ec.europa.eu/commission_2010-2014/kallas/headlines/news/2013/03/doc/swd%282013%2994.pdf

European Commission DG MOVE- Brussels 28/3/2017 - http://europa.eu/rapid/press-release_IP-17-674_it.htm

European Transport Safety Council, Annual PIN report. Year 2017 - <http://etsc.eu/11th-annual-road-safety-performance-index-pin-report-2/>

Istat ACI– Road Accidents in Italy

<https://www.istat.it/it/archivio/incidenti+stradali>

⁵ Di Ciccio T.J., Efron B. "Bootstrap Confidence Intervals" in Statistical Science 1996, Vol. 11, No. 3, 189-228;

Bononani 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.

⁶ The self-representative" units included in all first level samples are: Roma, Torino, Milano, Palermo, Genova, Bologna, Napoli.

For more details please refer to the Italian version

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