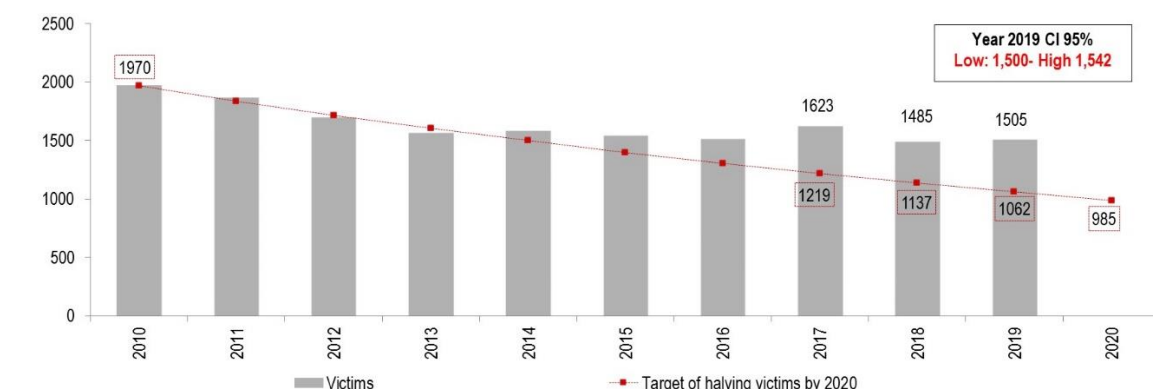


ROAD ACCIDENTS

Preliminary estimates. January-June 2019

- In the first half of 2019, according to preliminary estimates, data showed a reduction both in road accidents resulting in death or injury¹ (82,048), and in injuries (113,765), while the total number of victims within 30 days (1,505) showed a slight increase. In particular, road accidents and injuries decreased by 1.3% and 2.9% respectively, and victims increased by 1.3%, compared with the same period of the previous year (Table 1; Chart 1 and Chart 2).
- During the first six months of the year, regarding road safety benchmarks for 2001 and 2010, deaths decreased by 23.6% in comparison with the first half of 2010 and by 54.2% in comparison with the same period in 2001. In the first half of 2019, the increase in mortality drove away the European target of 50% reduction of victims by 2020 (Chart 3).
- The mortality index (percentage ratio between the number of deaths and the number of accidents resulting in death or injury) was equal to 1.8, remaining stable compared with the first semester 2018.
- Increasing deaths on motorways (more than 25%) and on roads outside built-up areas (+0.3%) were mainly responsible of victims' increase. On the contrary, deaths in rural roads decreased by 3%.
- New registrations of passengers' cars decreased by 3.4%². The yearly average of motorway journeys was stable during the first semester 2019, in respect of the same period in 2018 (+0.6%)³, while the traffic for heavy good vehicles increased (+2.1%).

CHART 1. EUORPEAN UNION TARGET 2020: NUMBER OF DEATHS IN ROAD ACCIDENTS. First semesters years 2011-2018, preliminary estimates first semester 2019 low and high limits (Confidence Interval 95%) and hypothesis of halving with constant speed, first semesters years 2011-2020. *Absolute values.*



Source: Istat - Survey on Road accidents resulting in death or injury – Years 2010-2018. Preliminary estimates – first semester 2019 (Ref. Data and Methods).

¹ Road accidents involving at least one moving vehicle in circulation on the road network and one person injured or killed as a consequence of this accident. (Vienna Agreement 1968 – Unece, ITF ed Eurostat 2019).

² Source: Automobile Club of Italy - Public Register of Motor-vehicles (PRA). Preliminary data 2019.

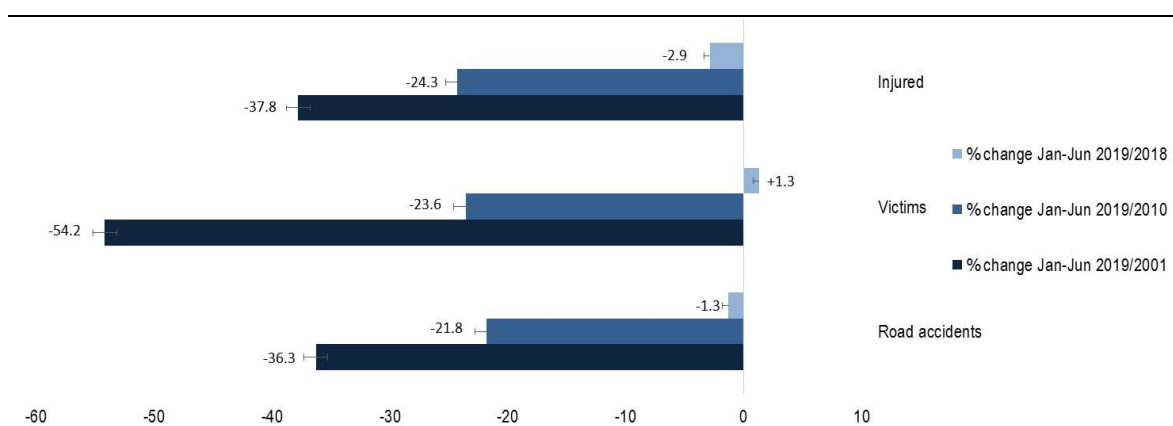
³ Source: Aiscat - Associazione Italiana Società Concessionarie Autostrade e Trafori. January-June 2019.

TABLE 1. ROAD ACCIDENTS RESULTING IN DEATHS OR INJURIES, KILLED AND INJURED PERSONS IN ITALY
 First and second semester 2018, preliminary estimates first semester 2019 (a) and estimate value lower and higher limits (Confidence Interval 95%). Absolute values and percentage changes 2019/2018 (first semester).

ROAD ACCIDENTS VICTIMS AND INJURED PERSONS (a)	Absolute Values					Percentage Change		
	JAN-JUN 2018 (b)	JUL-DIC 2018 (b)	JAN-JUN 2019 (c)	JAN-JUN 2019 Low (CI 95%) (c)	JAN-JUN 2019 High (CI 95%) (c)	JAN-JUN 2019/2018 (c)	JAN-JUN 2019/2018 Low (CI 95%)	JAN-JUN 2019/2018 High (CI 95%)
Road accidents	83,092	89,461	82,048	81,018	83,267	-1.3	-2.5	+0.2
Fatalities (within 30)	1,485	1,849	1,505	1,500	1,542	+1.3	+1.0	+3.8
Injured persons	117,124	125,795	113,765	112,887	115,941	-2.9	-3.6	-1.0

- (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 2010-2018. Preliminary estimates – first semester 2019 (Ref. Data and Methods).

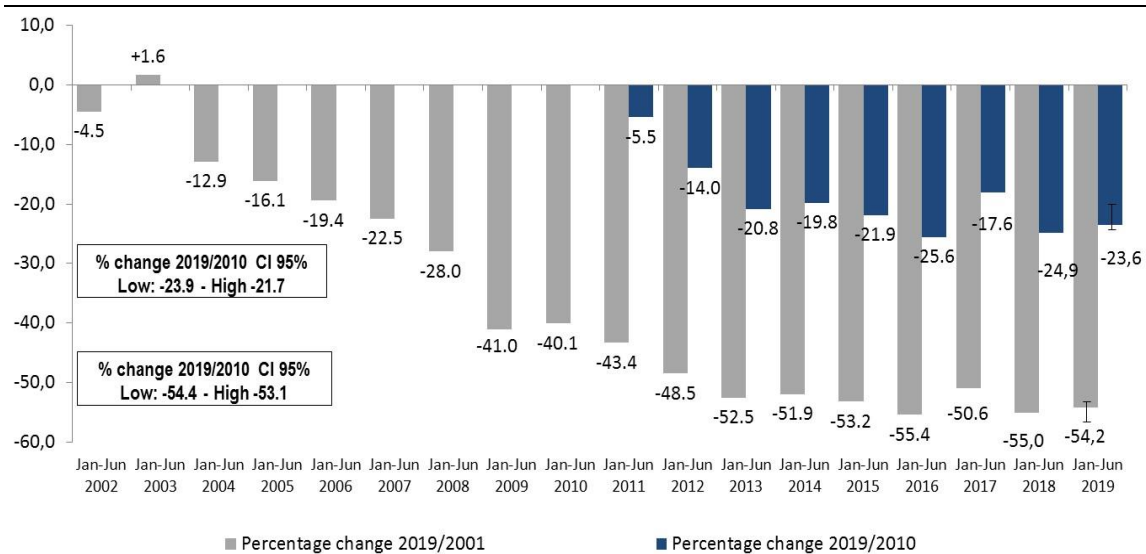
CHART 2. ROAD ACCIDENTS FATALITIES AND INJURIES NUMBER PERCENTAGE CHANGE. January-June 2019/2018, 2019/2010 and 2019/2001 (Confidence Interval 95% - estimate value lower and higher limits) (a)



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

% change	Road accidents (low)	Road accidents (High)	Victims (Low)	Victims (High)	Injured (Low)	Injured (High)
Jan-Jun 2019/2001	-37,0	-35,2	-54,5	-53,2	-38,1	-36,5
Jan-Jun 2019/2010	-22,7	-20,5	-24,8	-22,8	-24,0	-21,9
Jan-Jun 2019/2018	-2,3	0,4	0,8	3,6	-3,5	-0,8

CHART 3. NUMBER OF DEATHS IN ROAD ACCIDENTS PERCENTAGE CHANGE. January-June 2002-2018, preliminary estimates first semester 2019, 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 (Vienna Agreement 1968 – Unece, ITF ed Eurostat 2019).

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 2019 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 2019, and 2018 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

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).

final data, referred to the subset of 172 municipalities in 2019 and final and complete 2018 data.

Specifically, in a first step, the rates for the first half of 2018, 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 2019, was obtained by setting a relationship between the rates calculated for 2018 (t-1) in the two subsets of municipalities (172 quarterly survey municipalities and the rest of municipalities) and 2019 rates (t).

To provide a "range" for the estimated values, confidence intervals (CI 95%) have been calculated. 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 2019, 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	34501.92	2126.91	0.59605	-0.51622	82048	81018	83267
Fatalities (within 30 days)	295.38	195.544	0.77203	-0.56211	1505	1500	1542
Injured persons	4902.334	2648.65	0.64092	-0.51377	113765	112887	115941

(a) The 2019 preliminary estimate was obtained by the sum.: 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.

⁵ 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.

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

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 CARE (Community Data Base on Road Accidents) - Brussels 10/4/2018 http://europa.eu/rapid/press-release_IP-18-2761_it.htm

European Transport Safety Council, Annual PIN report. Year 2018 -

<https://etsc.eu/12th-annual-road-safety-performance-index-pin-report/> European

Istat ACI– Road Accidents in Italy

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