

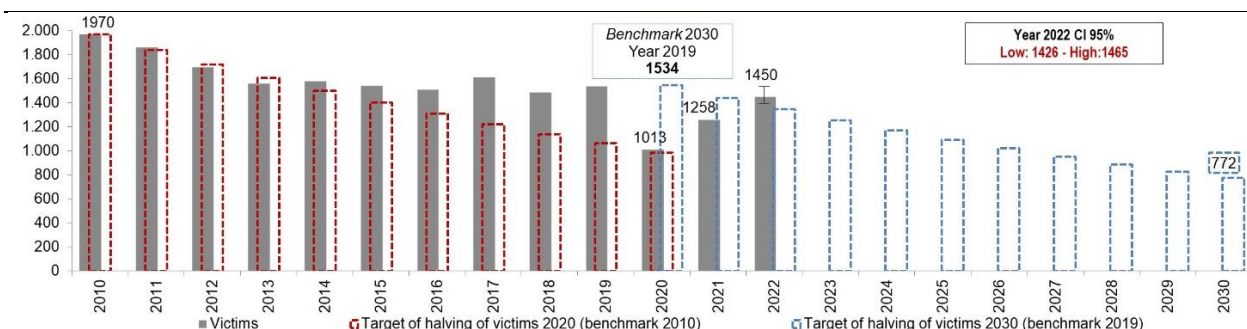


# ROAD ACCIDENTS

Preliminary estimates. January-June 2022

- The first semester 2022 is characterized by a clear recovery in mobility and, as a consequence, of road accidents, after the years in which the pandemic showed its most acute phase.
- According to the preliminary estimates January-June 2022, in respect of the same period of 2021, is recorded an increase of the road accidents resulting in death or injury number (81,437; + 24.7%), of the injured (108,996, + 25.7%) and of the victims within 30 days (1,450; +15.3%).
- Road accidents recorded, as expected, relevant increases for all aggregates also compared to 2020, (accidents: +64.3%, injuries: +63.0%, victims +43.2%). Compared to 2019, however, there is still a slight decrease for road accidents -2.6%; injured -6.8% and died -5.5% (Chart 1 and Table 1).
- Concerning the first six months of 2021, victims increase, especially on rural roads (+20%), following the urban roads (+11%) and the highways (+10%). Compared to first six months in 2019, during the first semester of 2022, the victims sharply decrease in fatalities on motorways (-11.8%), while on urban and rural roads the decrease is estimated in about 5%.
- For the decade 2021-2030, the European road safety targets expect the halving of the number of fatalities and serious injuries by 2030, compared to the benchmark year (set in 2019). Following the increase recorded for fatalities in the first six months of 2022, however, the path towards achieving road safety goals is already beginning with some difficulties.
- The car market<sup>1</sup> shows some sufferings during the first six months of the 2022: the first registrations of cars number decrease of 24.2% and of motorcycles of 4.1%. The same trend is registered for the second-hand market: -10.8% for passenger cars and -7% for motorcycles, in respect of the same period of the previous year. Inside the cities, the use of sharing services is still growing, including e-scooters, which have the highest share of rentals.
- Ever during the first semester of the current year, the motorway journeys increased by an average of 25.6%. The mobility recovery regards overall the light vehicles, in particular cars, with an increase in the indicator of *vehicles per km* on the roads, equal to 34%. For heavy vehicles the change was 7%. A similar situation for traffic was recorded on the main rural roads network: in the first four months of the year the increases reached peaks of 30%, while in May and June the changes, compared to the previous year, always positive, amounted to around 4%.

CHART 1. EUORPEAN UNION TARGET 2020 AND 2030: NUMBER OF DEATHS IN ROAD ACCIDENTS. Periods January-June years 2010-2022, preliminary estimates January-June 2022 low and high limits (Confidence Interval 95%) and hypothesis of halving with constant speed goals 2020 and 2030, first semesters years 2010-2022. Absolute values



Source: Istat - Survey on Road accidents resulting in death or injury – Years 2011-202. Preliminary estimates 2020 (Ref. Data and Methods).

<sup>1</sup> Source: Public Register of Motor-vehicles (PRA), Automobile Club of Italy; Sharing Mobility Observatory; Aiscat and Anas.

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

Periods January-June 2019, 2020, 2021 and preliminary estimates 2022 (a), lower and higher limits (Confidence Interval 95%). Absolute values and percentage changes 2022/2021, 2022/2020 and 2022/2019.

ROAD ACCIDENTS RESULTING IN DEATH OR INJURY	Road accidents	Killed (within 30 days)	Injured
	Absolute values		
<b>January-June 2022 (a)</b>	<b>81,437</b>	<b>1,450</b>	<b>108,996</b>
Lower limit (CI 95%) (b)	7,669.3	1,425.5	107,376.1
Higher limit (CI 95%) (b)	82,397.5	1,465.2	110,547.8
<b>January-June 2022/2021 (a)</b>	<b>+24.7</b>	<b>+15.3</b>	<b>+25.7</b>
Lower limit (CI 95%) (b)	+22.0	+13.3	+23.8
Higher limit (CI 95%) (b)	+26.2	+16.5	+27.5
<b>January-June 2022/2020 (a)</b>	<b>+64.3</b>	<b>+43.1</b>	<b>+63.0</b>
Lower limit (CI 95%) (b)	+60.7	+40.7	+60.6
Higher limit (CI 95%) (b)	+66.2	+44.6	+65.3
<b>January-June 2022/2019 (a)</b>	<b>-2.6</b>	<b>-5.5</b>	<b>-6.8</b>
Lower limit (CI 95%) (b)	-4.7	-7.1	-8.2
Higher limit (CI 95%) (b)	-1.5	-4.5	-5.5
<b>January-June 2021 (c)</b>	<b>65,312</b>	<b>1,258</b>	<b>86,722</b>
<b>January-June 2020 (c)</b>	<b>49,577</b>	<b>1,013</b>	<b>66,872</b>
<b>January-June 2019 (c)</b>	<b>83,629</b>	<b>1,534</b>	<b>116,992</b>

(a) Preliminary estimate 2022, based on microdata and summary data provided to Istat within November 6<sup>th</sup> 2022 (Ref. Data and Methods).

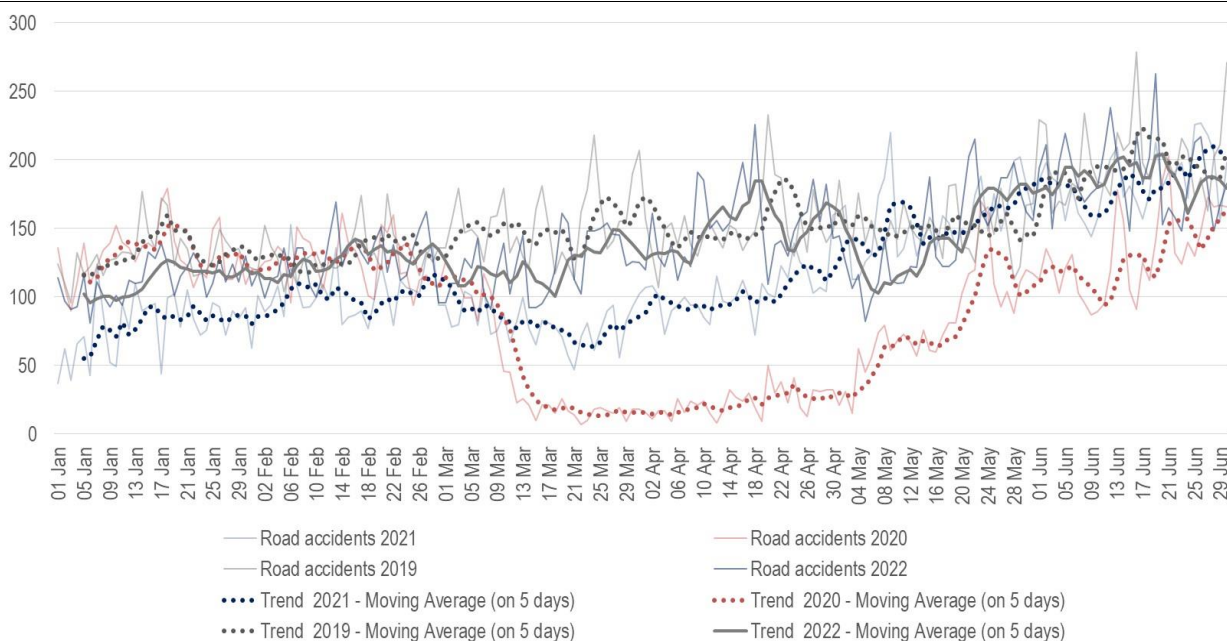
(b) To provide a "range" of values within the estimated number is expected, a Confidence Interval (95%) and lower and higher limits of the confidence intervals for preliminary estimate of accidents, deaths and injuries, were provided.

(c) Source: Istat - Survey on Road accidents resulting in death or injury – Year 2019-2021 and preliminary estimate 2022.

To accurately represent the events during the period January-June 2022, graphs were prepared with the daily and weekly data provided to Istat by the Traffic Police and Carabinieri.

Road accidents are presented in a daily series, including the trend lines to smooth the fluctuations effects. The tendency of accidents shows, for 2020 and 2021 the effects on road accidents of governing measures, business closures and recovery. The 2022 accidents line is located, instead, for all the period, except for the months January and February, in an intermediate position between 2019 and the pandemic years. (Charts 2).

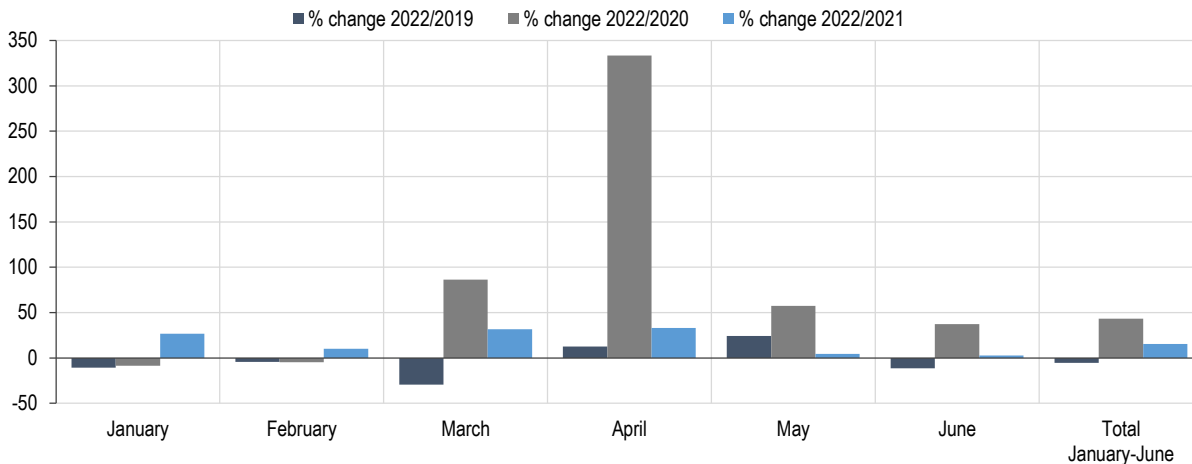
**CHART 2. ROAD ACCIDENTS RESULTING IN DEATHS AND INJURY COLLECTED BY POLIZIA STRADALE AND CARABINIERI, BY DAY AND MONTH, DURING THE PERIOD JANUARY-JUNE 2019, 2020, 2021 AND 2022 (absolute values)**



Source: Final data 2019, 2020, 2021 and provisional 2022 – Servizio di Polizia Stradale e Comando Generale dell'Arma dei Carabinieri

The percentage change in the number of victims shows a variable trend during the first six months of 2022, compared to the same period in the three previous years. The differences, recorded month by month, highlight, as expected, the relevant increase especially compared to the months of March and April 2020, but also positive percentage changes compared to April and May 1919, in the period before the pandemic. (Chart 3).

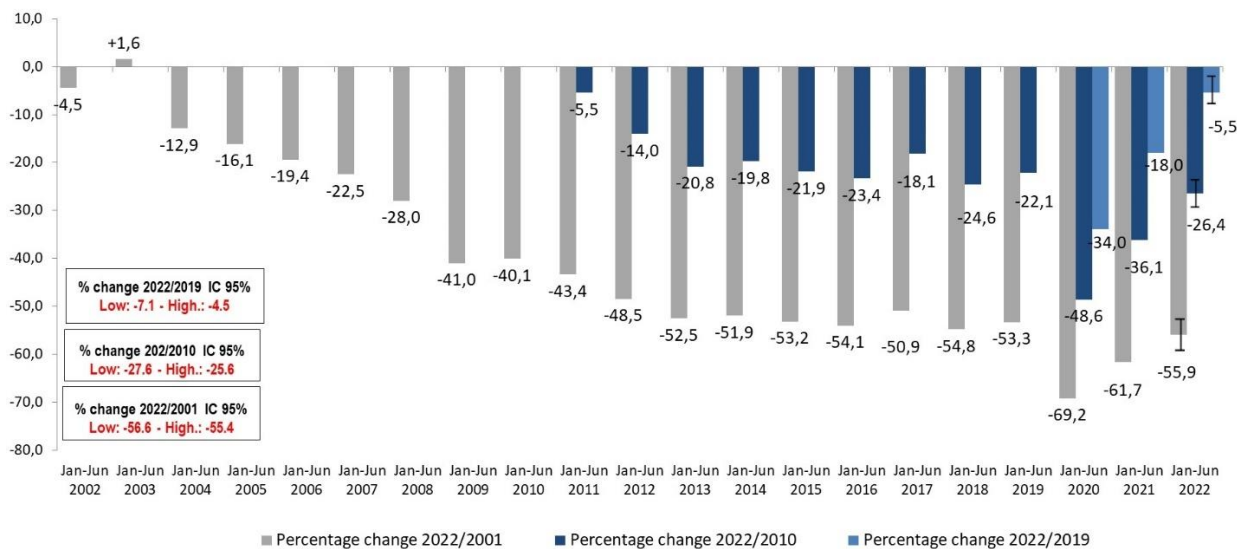
**CHART 3. PERCENTAGE CHANGE IN THE NUMBER OF VICTIMS BY MONTH. JANUARY-JUNE 2022, 2021, AND 2019.** Percentage change January-June 2022 vs 2019, 2020 and 2021.



Source: Istat - Survey on Road accidents resulting in death or injury – Years 2019-2021. Preliminary estimates 2022 (Ref. Data and Methods).

The number of victims show a decreasing trend, during the last 20 years. With reference to the new decade 2021-2030, the percentage change in 2022 is equal to -5,5%, in respect of the benchmark year, represented by 2019 (Chart 4).

**CHART 4. NUMBER OF DEATHS IN ROAD ACCIDENTS PERCENTAGE CHANGE.** Periods January-September 2002-2021, preliminary estimates January-June 2022, preliminary estimates lower and higher limits (Confidence Interval 95%). Change in respect of year 2001 and 2010 e 2019.



Source: Istat - Survey on Road accidents resulting in death or injury – Years 2019-2021. Preliminary estimates 2022 (Ref. Data and Methods).

## 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).

**Injured<sup>2</sup>:** 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.

## 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 2022 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 trend of data for the municipalities subgroup in the period January-June 2022, and 2021, 2020 and 2019 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 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 2022 and final and complete 2021, 2020 and 2019 data.

Specifically, in a first step, the rates for the first nine months of 2022, 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 2022, was obtained by setting a relationship between the rates calculated for 2021 (and 2019 and 2020 (t-1)) in the two subsets of municipalities (172 quarterly survey municipalities and the rest of municipalities) and 2022 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*<sup>3</sup> to derive reliable estimates of standard deviation and confidence intervals of parameters, was planned.

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<sup>2</sup> 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).

<sup>3</sup> 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 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 10 municipalities (January-June 2022)<sup>4</sup>, 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 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 2022, 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
<b>January-June 2021</b>							
Road accidents resulting in deaths or injuries	34,976.02	1,790.77	0.51714	-0.46221	<b>35,186</b>	34,049.93	35,803.74
Fatalities (within 30 days)	280.81	172.393	0.64271	-0.59506	<b>283</b>	269.730	291.068
Injured persons	43,894.37	2,189.65	0.47247	-0.43788	<b>43,878</b>	42,859.83	44,853.18

(a) The 2022 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.

### Timeliness and dissemination of data

Preliminary estimates referred to the first semester (year *t*) disseminated in November/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](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) – 20/04/2021

[https://ec.europa.eu/commission/presscorner/detail/en/IP\\_21\\_1767](https://ec.europa.eu/commission/presscorner/detail/en/IP_21_1767)

European Transport Safety Council, Annual PIN report, Year 2022 –

<https://etsc.eu/16th-annual-road-safety-performance-index-pin-report/>

Istat ACI– Incidenti stradali in Italia <https://www.istat.it/it/archivio/incidenti+stradali>

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<sup>4</sup> Self-representative units in the samples: Roma, Milano, Catania, Genova, Torino, Bologna, Taranto, Napoli, Palermo e Verona.