CAR ACCIDENTS

2023/2024
DATA VISUALIZATION

CESARI GIANMARCO
DONGHI FEDERICO
GHIRO GIULIO

ABSTRACT

The data visualization analyzes car accidents in Italy in order to help government efforts in reducing them. In detail, it helps to identify frequent accident locations and trends. The study is based on maps and charts to examine the data, focused on the role of tourist flow, road quality, and population in accidents. It also details demographic trends in accident casualties, with insights on age and gender differences to create the necessary safety measures.

INTRODUCTION

The number of car accidents per year is a relevant parameter for a nation, indeed this kind of events can result in fatalities and injuries. Therefore, it is important to monitor and prevent road accidents. In the following sections, we present data related to this issue in Italy, spanning from 1991 to 2022. Our objective is to inform the government about the current situation so that it can take the necessary actions to reduce the number of road accidents.

Research question

Our study focuses on different aspects of road accidents through specific research questions. First, we explore areas with the highest number of accidents, looking for significant changes over time. Then, we examine the reasons behind the increase in accidents until 2002 and the subsequent decrease. Finally, we pay attention to the main reasons for the faster decline in the number of fatalities compared to the number of accidents from 2001 to 2022. This comprehensive approach aims to provide a detailed understanding of road accident dynamics over time.

Target

The data we aim to represent can be valuable for various purposes. In particular, they are crucial for law enforcement and emergency services, enabling these entities to identify high-risk areas and implement prevention strategies.

Secondly, even local administrations, thanks to these datasets, can intervene to improve road safety and urban planning, such as by modifying road infrastructure or adding signage.

Furthermore, public health analysts could utilize the data to understand trends related to road accidents and develop prevention programs aimed at reducing the number of deaths and injuries.

Insurance companies are highly interested in analyzing information on these issues because it allows them to assess insurance risk in different geographical areas and identify factors contributing to accidents.

Finally, providing this kind of information to the general public is always important; the information could be used to organize advertising campaigns to encourage safer driving.

Desire outcome

The detailed analysis of road accident data in Italy has highlighted significant trends. The projection map has identified provinces with higher accident rates, providing crucial information for targeted interventions, increasing public awareness of road risks, and promoting safe behaviors.

The faster decline in fatalities compared to accidents from 2001 to 2022 suggests improvements in road management and safety. These data can inform law enforcement, local administrations, emergency services, insurance companies, and the public to implement preventive strategies and promote safer behaviors. In conclusion, ongoing collaboration among stakeholders will be crucial for lasting progress in Italian road safety.

DATA SOURCES

Statistiche Istat

DATA PRE-PROCESSING

To visualize the ISTAT page that contains our dataset visit this link

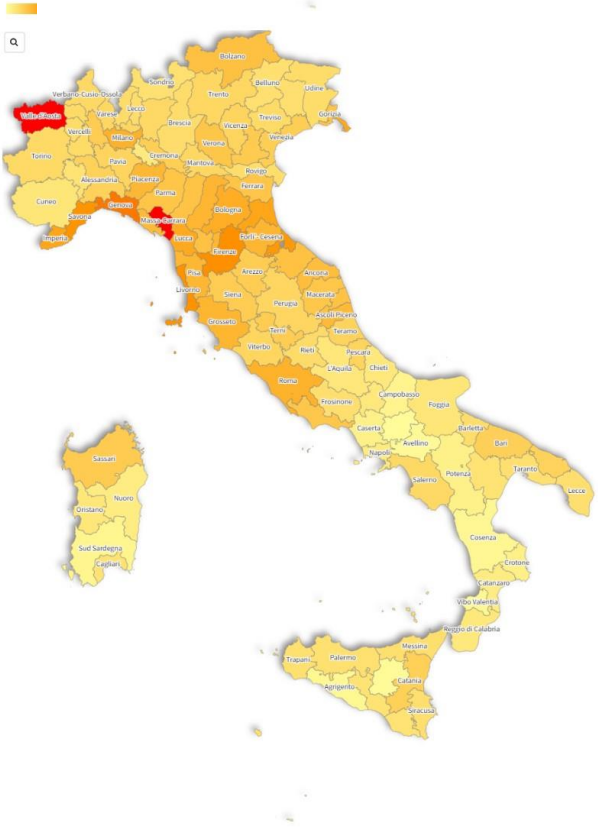
- Open the table number 1.5 to visualize the data of the various Italian provinces.
- Open the table number 2.20 to visualize the data of the causes.
- Open the table number 4.1 to visualize the data during the years 1991-2022.
- Open the table number 2.41 to visualize the data of the people that are accountable for an incident.

DATA VISUALIZATIONS

Total Number of Car Accidents per Province

The map represents the number of accidents for each Italian province in 2022. The greater the color intensity, the higher the number of accidents in that area. The visualization highlights the absolute number of accidents, i.e., not related to the population, allowing us to have a clear view of the places where a higher number of assistance vehicles and infrastructure are needed to better address the consequences of accidents. In fact, it is observed that in large cities such as Rome and Milan, the number of accidents is significantly higher than in other areas.

Car Accidents per 100.000 inhabitants by Province



On the other hand, this chart shows the number of accidents per capita. This information is vital because it helps us identify areas where enhancing road safety is needed, emphasizing the importance of prevention and citizen education.
The Valle d'Aosta and Massa Carrara show bright colors, meaning they have a high number of accidents compared to how many people live there. There are a few reasons why these areas might have more accidents:

1. **Tourist Traffic**:

Aosta Valley: This area is famous for holidays, especially for winter sports and mountain climbing. This could mean more cars on the road during some seasons, which might lead to more accidents for each person living there.
Massa Carrara: Known for its marble quarries and natural beauty, this place also might get more cars on the road because of tourists.

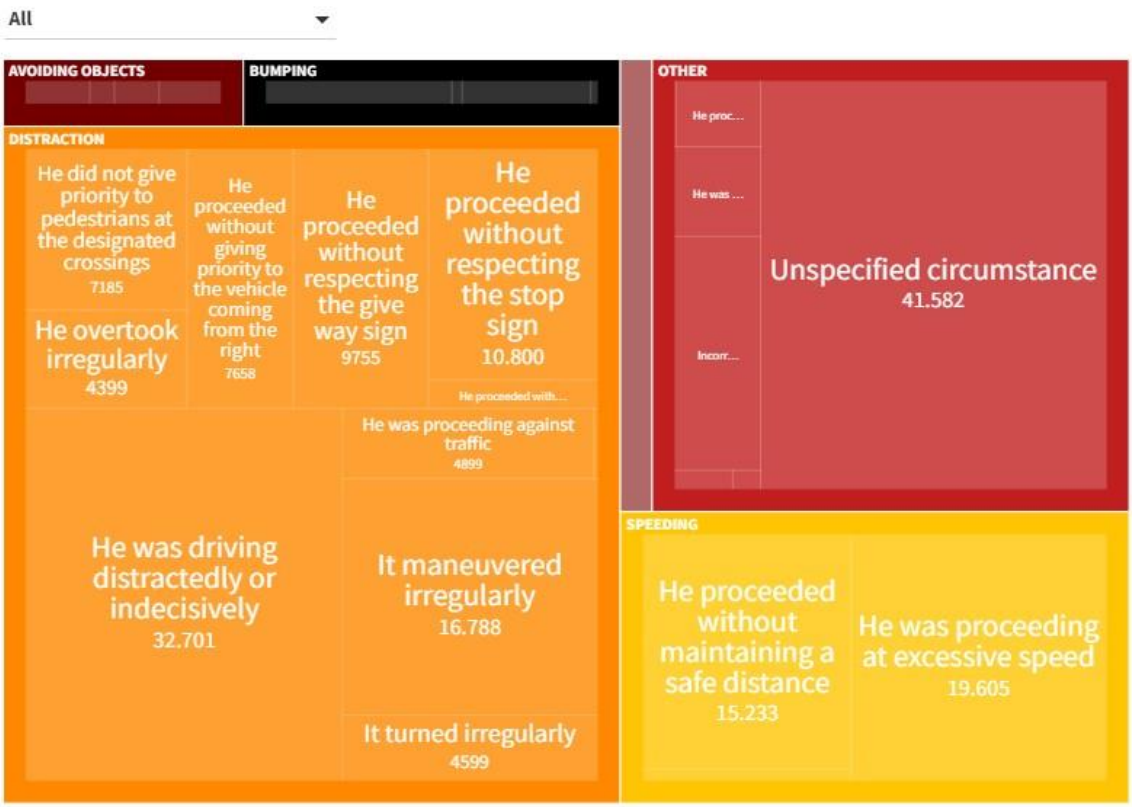
2. **Road Infrastructure**:

The roads in these areas could be harder or more dangerous to drive on, like narrow mountain roads, which can make accidents more likely.

3. **Population Size**:

Places with fewer people might show a higher rate of accidents for each person, even if the total number of accidents isn't very high.

Categorization of Car Accidents Causes - 2022



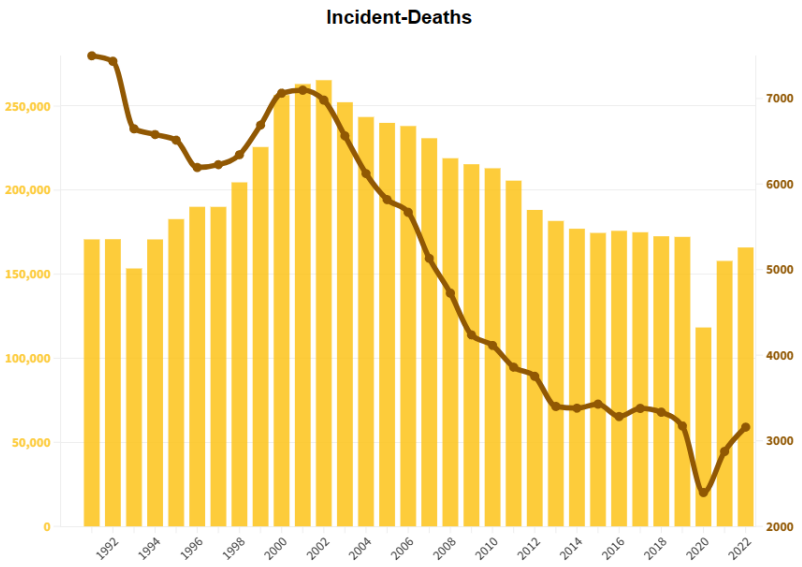
The "Categorization of Car Accidents Causes - 2022" treemap presented in this document is a visual representation of the various driving behaviors leading to road incidents. This treemap uses color-coding and proportional rectangles to illustrate the frequency of each type of incident, ranging from "Speeding" to "Avoiding Objects."

This visualization sheds light on the most prevalent issues on the roads, with a significant emphasis on incidents that cannot be clearly categorized, suggesting the complex nature of road incidents. The size of the rectangles, such as the one for "He proceeded without maintaining a safe distance," highlights the urgent need to address these behaviors.

This treemap offers a visual summary of the primary causes of road incidents, clearly indicating areas where safety measures and educational programs could be most effective. It quantifies the frequency of specific driving behaviors, highlighting key issues such as distracted driving or not following traffic signs. This makes the treemap a valuable part of our study, providing a foundation for discussions on focused strategies to improve road safety and encourage better driving practices. It's a crucial tool for understanding and addressing the factors contributing to road accidents.

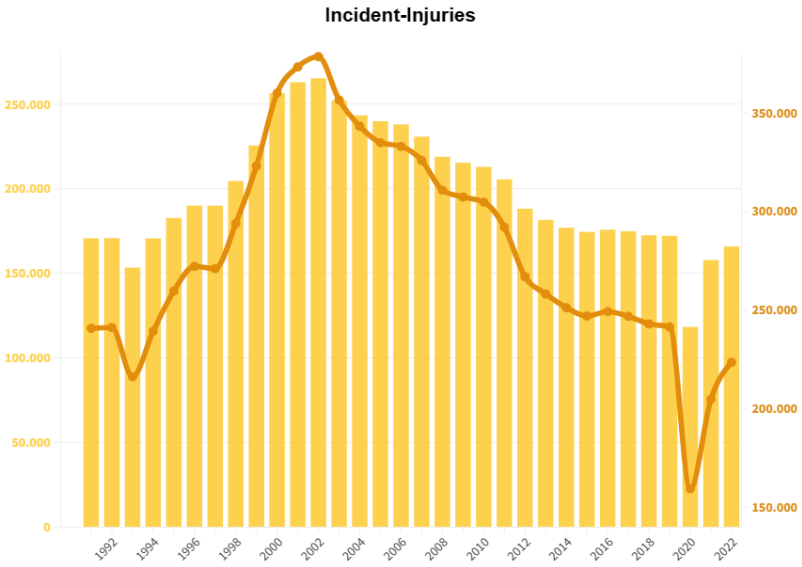
TRENDS IN CAR ACCIDENT FATALITIES AND INJURIES IN ITALY (1982-2022)

Annual Car Accident Fatalities in Italy (1982-2022)



In this graph, we've compared the number of accidents to the number of deaths from 1991 to 2002. We observe that the number of accidents increased until the year 2002, followed by a slow decline that continues until 2022. However, 2020 was an unusual year, with a significantly lower number of accidents. This data, however, is influenced by road circulation restrictions due to anti-COVID measures that affected that year. Additionally, from 2001 to 2022, the number of deaths decreases more rapidly compared to the number of road accidents. This is likely due to less severe accidents, improved emergency services, and the enhanced safety features of newer vehicles. A similar trend is noticeable, albeit less prominently, from 1992 to 2002, even though during these years, the ratio of deaths to accidents is significantly higher than in the subsequent years.

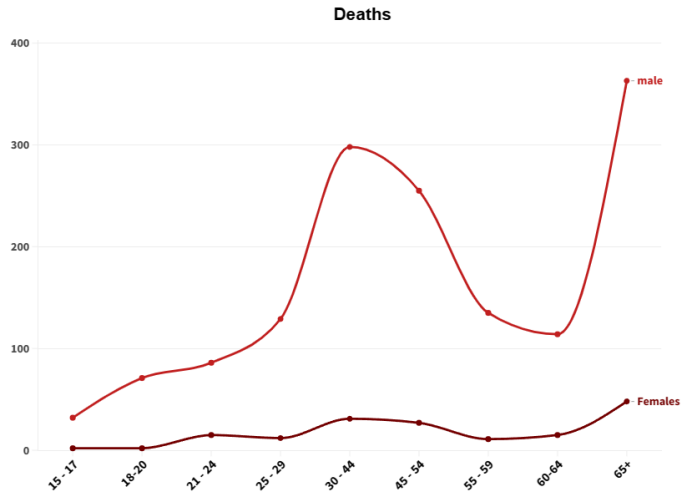
Annual Road Accident Injuries in Italy (1982-2022)



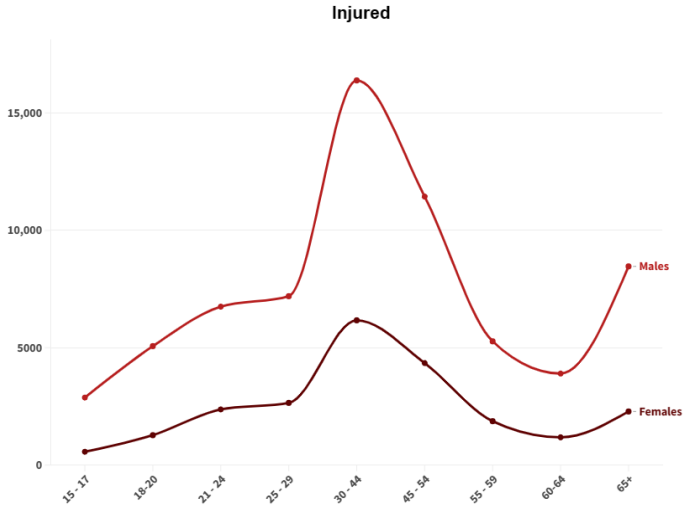
In this graph, we've compared the number of accidents to the number of injuries from 1991 to 2002. Similar to the accidents-deaths graph, we see an increase in the number of accidents until 2002, followed by a slow decline continuing until 2022. However, 2020 stands out as an anomalous year with a significantly lower number of accidents, influenced by COVID-related road circulation restrictions. Secondly, we notice a close correlation between the number of injuries and the number of accidents. The trends in accidents also reflect changes in the number of injuries.

GENDER AND AGE DISTRIBUTION OF ROAD ACCIDENT VICTIMS IN ITALY

Fatalities by Age and Gender:
The chart shows how many men and women have died. For men, there is a big increase in deaths for people between 30 and 40 years old. After that, the numbers go down until the age group of 60 to 64. Then, the numbers go up a lot for people older than 65. For women, there are way fewer deaths compared to men. There's a smaller increase for those aged 30 to 44 and another rise after age 65.



Injuries by Age and Gender:
This chart looks similar but with way more people. For men, the biggest number of injuries happen between ages 30 and 44. Then, the numbers drop a lot until the age group of 60 to 64, and there's another big increase after age 65. For women, the numbers are much lower again and follow a pattern like the men's with an increase at ages 30 to 44. Then the number of injuries slowly goes down but goes up a bit after age 65.



Common Points in Both Charts:

- In both charts, more men are in accidents where they are at fault than women.
- Both charts show increases at ages 30 to 44, which might mean that middle-aged people are more at risk.
- The numbers tend to go down after age 44 but rise again for those older than 65.

These charts can help find out which age groups are more at risk and make plans to stop road accidents from happening.

INTERFACE DESIGN

The design of our website is focused on making it straightforward for users to find and interact with different data visualizations. The colors and fonts are uniform throughout the site, which makes everything look neat and connected.
Interactive elements are a key part of our charts and graphs. Users can click on items to get more details or zoom in on the data they're interested in. This makes the experience more hands-on and helps bring the data to life.
We made sure that our site is easy for all users, including those with disabilities, by following web accessibility guidelines.

NEXT STEPS

1- Improve the way data is gathered, especially for unclear categories, to enhance data quality and accuracy.
2- Introduce more advanced analysis features to offer deeper insights, such as trend analysis or predictive models.
3- Consider including more years of data or data from different regions for a broader perspective.
4- Use the project as an educational tool for raising public awareness about driving safety and preventive measures.

CONCLUSION

This project allowed us to thoroughly analyze road accidents in Italy to support government efforts in reducing them. It focuses on identifying areas with frequent accidents and trends, using maps and charts to examine how road quality and population affect accidents. The detailed analysis revealed significant trends, like a faster decrease in fatalities compared to accidents from 2001 to 2022, indicating improvements in road management and safety. This data is vital for law enforcement, emergency services, local administrations, insurance companies, and the public to develop preventive strategies and promote safer behavior. Ongoing collaboration among stakeholders is key for lasting progress in road safety in Italy.