

# **Analysis of Road Accident**

## **Introduction:**

Road traffic accidents are a major threat to public safety and well-being in today's fast-paced society. For the purpose of creating efficient preventative measures and enhancing road infrastructure, it is essential to comprehend the fundamental causes and trends linked to these accidents. We examine a large dataset of traffic accident data in this analysis with the goal of identifying significant patterns that can guide policy choices and improve traffic safety programs.

The dataset encompasses a wide array of variables ranging from accident severity and location to weather conditions and junction controls. Through meticulous data preparation and exploratory analysis, we seek to unravel trends, correlations, and potential risk factors associated with road accidents. By harnessing the power of data visualization and analytical techniques, our objective is to create a dashboard using PowerBI that sheds light on the dynamics of road traffic accidents and empowers stakeholders to proactively address safety concerns.

### Road Accident Dataset Overview:

The provided dataset offers a detailed glimpse into road traffic accidents, capturing various crucial aspects surrounding each incident. Here's a brief overview of the key attributes contained within the dataset:

- Accident\_Index: A unique identifier for each accident.
- Accident Date: The date when the accident occurred.
- Day\_of\_Week: The day of the week when the accident took place.
- Junction\_Control: Describes the type of junction control present at the accident location (e.g., give way, auto traffic signal).
- Junction\_Detail: Provides additional details about the junction where the accident occurred.
- Accident\_Severity: Indicates the severity of the accident (e.g., serious, slight).
- Latitude & Longitude: Geographic coordinates of the accident location.
- Light\_Conditions: Illumination conditions at the time of the accident.
- Local\_Authority\_(District): The local authority district where the accident occurred.
- Carriageway\_Hazards: Any hazards present on the carriageway at the time of the accident.

- **Number\_of\_Casualties:** The number of casualties involved in the accident.
- **Number\_of\_Vehicles:** The number of vehicles involved in the accident.
- **Police\_Force:** The police force handling the accident report.
- **Road\_Surface\_Conditions:** The condition of the road surface at the time of the accident.
- **Road\_Type:** Describes the type of road where the accident occurred.
- **Speed\_limit:** The speed limit applicable to the road where the accident occurred.
- **Time:** The time of day when the accident took place.
- **Urban\_or\_Rural\_Area:** Indicates whether the accident occurred in an urban or rural area.
- **Weather\_Conditions:** Weather conditions prevailing at the time of the accident.
- **Vehicle\_Type:** The type of vehicle involved in the accident.

This dataset presents a valuable opportunity to analyze and extract insights regarding the factors contributing to road traffic accidents, their severity, and the circumstances surrounding each incident. Through thorough exploration and analysis, we aim to uncover patterns and trends that can inform road safety measures and mitigate the risks associated with traffic accidents.

#### STAKEHOLDERS:

1. Transportation Authorities
2. Law Enforcement Agencies
3. Urban Planners
4. Road Safety Advocacy Groups
5. Insurance Companies
6. Vehicle Manufacturers
7. Community Groups and Residents

## 1. Data Preparation:

- Connecting PowerBI to Data Source.
- **Data Cleaning-** In the Accident\_Severity column there was a spelling mistake fatal was written as fetal so I replaced fetal to fatal.
- **Data Processing-** Created a Calendar custom table using time intelligence functions(CALENDAR, YEAR, FORMAT ).
- **Data Modelling-**Accident Date column from given Data table was connected to date column of Calendar table in the model view. So as some dates are repeated

in the Data table but no date is repeated in Calendar table the cardinality the PowerBI determines automatically is One to Many.

## 2. Exploratory Data Analysis:

### Requirements:

Create a Road Accident Dashboard for year 2021 and 2022 so that they can have insight on the below requirements:

- Total casualties and total accident data for the current year and growth from year to year are the primary KPIs.
- Total casualties by accident severity for the current year and progression from year to year is the primary KPI.
- Secondary KPI: The total number of casualties by type of vehicle for the current year.
- Monthly trend comparing the number of casualties from the previous year to the current one.
- Deaths by kind of road during the current year.
- Casualties by area/location, day/night, total casualties, and total accident by place for the current year.
- Weather Conditions vs. Accident Severity: Investigate the relationship between weather conditions (e.g., dry, wet) and accident severity to understand the impact of weather on road safety and guide weather-related safety protocols.

For data analysis DAX measures were created like some of them are:

CurrentYear Accidents = `TOTALYTD(COUNT(Data[Accident_Index]),'Calendar'[Date])`

PreviousYear Accidents = `CALCULATE(COUNT(Data[Accident_Index]),SAMEPERIODLASTYEAR('Calendar'[Date]))`

- Temporal Trends: Analyzed the monthly trends in the number of accidents to identify any seasonal patterns or trends.

- **Accident Severity Patterns:** Investigated the distribution of accident severity across different days of the week to understand if certain days are associated with more severe accidents.
- **Geospatial Analysis:** Visualized the locations of accidents on a map to identify spatial patterns and hotspots of accidents.
- **Junction Control and Road Type Analysis:** Explored the distribution of accidents based on junction control types and road types to understand their impact on accident frequency and severity.
- **Correlation Analysis:** Examined correlations between numerical variables such as the number of casualties, number of vehicles, and speed limit to identify any significant relationships.
- **Impact of Light and Weather Conditions:** Investigated whether light conditions and weather conditions have an impact on accident severity to understand their role in road safety.
- **Effects of Urban/Rural Areas:** Compared accident severity between urban and rural areas to identify any differences in patterns or trends.

## RESULTS:

- **Casualties by Vehicle Type:** Cars are the most common vehicle type involved in accidents, followed by vans and two-wheelers (motorcycles and scooters). There has been a decrease in the total number of casualties across all vehicle types in the current year compared to the previous year. The percentage decrease is highest for fatalities (-48.7%) and lowest for slight injuries (-14.3%).
- **Casualties by Location:** There are more accidents in rural areas than urban areas. However, the percentage of casualties in urban areas is nearly 60%.
- **Casualties by Time of Day:** Most accidents occur during the day.
- **Casualties by Weather Conditions:** There seems to be more accidents during rain conditions compared to all conditions. However, the data for this category is limited.
- **Casualties by Road Type:** Single carriageway roads have the most accidents, followed by dual carriageways.

Overall, the dashboard suggests that there has been a decrease in the number of road accidents and casualties in the current year compared to the previous year. However, there are still a significant number of accidents occurring, and more needs to be done to improve road safety.

Here are some additional insights that could be gleaned from the dashboard, if the data were available:

- **Time of Day with the Most Serious Accidents:** This could help to identify times when there are more drunk drivers or fatigued drivers on the road.
- **Causes of Accidents:** This could help to identify areas where road safety improvements can be made, such as adding more traffic lights or improving signage.
- **Type of Junctions Where Most Accidents Occur:** This could help to identify dangerous junctions that need to be redesigned.

By analyzing this data, policymakers and law enforcement agencies can develop targeted interventions to reduce the number of road accidents and casualties.

## CONCLUSION:

The data on the road accident dashboard paints a cautiously optimistic picture. While there has been a decrease in the overall number of accidents and casualties compared to the previous year, a significant number of accidents are still occurring.

This highlights the need for continued efforts towards improving road safety. By analyzing additional data points, like the time of day with the most serious accidents or causes of accidents, authorities can implement focused interventions to make our roads safer.