Introduction:

Globally, road safety is a major concern. By examining accident data, trends that can lower fatalities and enhance public safety can be found. As part of this project, a Power BI dashboard that offers analytical and visual insights from actual traffic accident data was created.

The objective is to:

- Recognize the trends and causes of traffic accidents.
- Determine the situations and places that are prone to accidents.

Dataset Description:

- **Total Records**: 1600+
- **Key Columns**:
  - Accident_Index, Number_of_Casualties, Time, Day_of_Week
  - Road_Surface_Conditions, Weather_Conditions
  - Light_Conditions, Accident_Severity

Data Cleaning & Transformation:

The raw dataset required preprocessing using **Power Query**. The following steps were taken:

- Removed nulls and duplicates
- Split time into hours
- Created custom columns:
  - Hour_of_Day
- Standardized categorical values (e.g., "Fine no high winds", "Raining + winds" etc.)

Dashboard Descriptions and Key Insights:

Dashboard 1: Road Accident Overview:

Goal: By providing a comprehensive overview of traffic accident incidents throughout the dataset, this dashboard aids stakeholders in rapidly comprehending the frequency and distribution of accidents over time.

Key Visuals:

- Total Accident Count (Card)
- Overall Deaths (Card)
- Yearly Accidents (Column Chart)
- Accidents by Type of Road and Weather (Bar Chart Stacking)
- Accident Distribution by Region (Map)

Important Takeaways:

- A discernible increase or decrease in accidents over a certain period of years could be the result of seasonal factors or policy changes.
- The majority of accidents happen on single-carryway roads in favorable weather, which suggests that human mistake may be a more significant contributing factor than environmental factors.
- Accident rates are greater in urban areas and locations with a high vehicle density.

Dashboard 2: Vehicle and Casualty Analysis:

Goal: To examine the correlation between different vehicle types involved in accidents and the resulting casualties. This aids in determining which vehicle categories are more susceptible to severe incidents.

Key Visuals:

- Casualty Statistics by Vehicle Category (Bar Chart)
- Casualty Statistics by Age Group and Gender (Stacked Column Chart)
- Distribution of Fatal, Serious, and Minor Casualties (Pie Chart or Donut Chart)

Important Takeaways:

- The highest number of casualties is attributed to cars and motorcycles.
- A significant percentage of casualties occurs within the 25–44 age demographic, underscoring the necessity for focused awareness efforts targeting working adults.
- There is a higher incidence of male casualties compared to female casualties, suggesting possible differences in behavioral risk-taking or exposure levels.
- Pedestrians and users of two-wheeled vehicles are at greater risk and frequently suffer severe or fatal injuries.

Dashboard 3: Location and Environmental Factors:

Goal: To investigate how environmental factors and road types affect the severity of accidents.

Key Visuals:

- Accidents by Lighting Conditions (Column Chart)
- Accidents by Road Surface Quality (Pie/Bar Chart)
- Junction Characteristics vs Severity (Stacked Bar Chart)
- Urban vs Rural Accident Comparison (Map or Bar Chart)

Important Takeaways:

- The majority of accidents occur during daylight hours, however, the severity tends to be greater at night or in dimly lit conditions.

- Wet and icy road conditions lead to an increase in serious and fatal accidents, particularly at intersections.
- Intersections are critical areas for accidents, highlighting the need for enhanced signage, better lighting, and potential structural improvements.

Dashboard 4: Time of Day vs Casualties:

Goal: To reveal peak hours during which accidents resulting in casualties are most common. This can help in scheduling road safety campaigns or traffic regulation enforcement.

Key Visuals:

- Line or Area Chart showing Number of Casualties per Hour (0–23)
- Optional Slicer for filtering by Day of the Week

Important Takeaways:

- Peak accident times are typically during morning (8–10 AM) and evening (5–8 PM) rush hours.
- Accidents during late-night hours (11 PM – 2 AM) often result in higher severity, possibly linked to driver fatigue or alcohol influence.
- This information can support planning targeted police patrolling, public transport improvements, and awareness campaigns during vulnerable hours.

Conclusion:

An in-depth examination of road accident statistics using Power BI dashboards uncovers important insights into the trends, causes, and severity associated with road accidents. The research indicates that, despite the influence of environmental and road conditions, a

significant proportion of accidents happen during clear weather and in daylight—suggesting that human behavior, distractions, and risky actions are major factors at play.

The key discoveries highlight the susceptibility of two-wheeler riders, pedestrians, and individuals in the young to middle-aged demographic, with cars and motorcycles being linked to most of the incidents. Additionally, high-risk areas such as intersections, urban streets, and certain periods like peak traffic times have been pinpointed.

- In order to reduce road accidents and minimize injuries, a comprehensive strategy is required:
- Strict enforcement of traffic regulations, particularly during periods of elevated risk.
- Enhancements to roadway infrastructure, such as improved lighting and better junction layouts.
- Public awareness initiatives aimed at specific demographics and types of vehicle operators.
- Utilization of data analysis to inform decision-making and implement preventative strategies.

This assessment not only aids in the strategic planning efforts of road safety authorities but also highlights the effectiveness of visual data storytelling through Power BI in fostering data-driven policy choices for increased road safety.