1. INTRODUCTION

1.1 Overview

The project titled "Qlik Analysis of Road Safety and Accident Patterns in India" aims to address the high incidence of road accidents in India, which results in substantial loss of life and injuries. Despite advancements in transportation infrastructure, road accidents remain a significant problem. By leveraging Qlik's data analytics platform, this project seeks to provide a comprehensive analysis of road safety and accident patterns. The goal is to enable stakeholders to implement effective measures that enhance road safety, reduce accidents, and save lives.

1.2 Purpose

The main goal of the "Qlik Analysis of Road Safety and Accident Patterns in India" project is to use data analytics to understand and reduce road accidents in India. Specifically, the project aims to:

- **Target Safety Efforts:** Identify high-risk areas for focused interventions.
- **Uncover Patterns:** Analyze trends to understand recurring accident causes.
- **Educate the Public:** Raise awareness for safer driving habits.
- **Inform Policy:** Guide improvements in road safety regulations and infrastructure.
- **Measure Impact:** Assess the effectiveness of existing safety measures.
- **Develop Solutions:** Design data-driven strategies to prevent accidents.

By achieving these goals, the project aims to make roads safer and reduce the number of accidents.

1.3 Technical Architecture

1.3.1 Define Problem / Problem Understanding

Identify the Problem : To understand the high rate of road accidents in India and the necessity for a solution, setting the foundation for why the project is needed.

Set Requirements : To outline what data and analysis are necessary to address the problem, ensuring that all critical aspects are covered.

Research : To gather relevant studies and information on road safety and accident patterns, providing a knowledge base to inform the project's approach.

Assess Impact : To evaluate the potential social and business impacts of the project, highlighting how the project can benefit society by reducing accidents and improving safety.

1.3.2 Data Collection

Gather Data : To collect comprehensive information from various sources, ensuring a robust dataset for analysis.

Connect to Qlik Sense : To establish connections between the collected datasets and the Qlik Sense platform, facilitating seamless data analysis and visualization.

1.3.3 Data Preparation

Prepare Data : To clean, preprocess, and organize the data, ensuring it is ready for accurate and effective analysis and visualization.

1.3.4 Data Visualizations

Create Visuals : To develop charts, graphs, and other visual tools that make the data easier to understand and interpret, revealing key insights.

1.3.5 Dashboard

Design the Dashboard : To build an interactive and user-friendly dashboard that consolidates all visualizations, allowing users to explore the data and insights efficiently.

1.3.6. Story

Tell the Story : To create a narrative that explains the data and insights, making the findings accessible and engaging to a wider audience.

1.3.7 Performance Testing

Application of Data Filters : To test the effectiveness of data filters in the system, ensuring that they function correctly and allow for detailed analysis without hindrance.

Use of Master Items : Master Items, streamline filter application across various visualizations and dashboards, promoting consistency and efficiency in data analysis and visualization.

Number of Visualizations : To develop charts, graphs, and other visual tools that make the data easier to understand and interpret, revealing key insights to stakeholders and decision-makers.

1.3.8 Conclusion

Summarize Findings : To highlight the key results and insights from the data analysis, providing a clear and concise summary of the findings.

2. DEFINE PROBLEM / PROBLEM UNDERSTANDING

2.1 Business Problem

The primary business problem addressed by this project is the high incidence of road accidents in India, which results in significant loss of life and injuries. Despite advancements in transportation infrastructure, the number of accidents remains alarmingly high. Understanding the patterns, causes, and hotspots of road accidents through data analytics can enable stakeholders to implement effective measures to enhance road safety. By leveraging Qlik's data analytics platform, this project aims to provide a comprehensive analysis of road safety and accident patterns to support data-driven decision-making, ultimately reducing accidents and saving lives.

2.2 Business Requirements

Business requirements outline what is needed to solve the business problem and achieve the project goals. For the Like Analysis of Road Safety and Accident Patterns in India project, the business requirements include:

- **Data Collection and Integration** : Gather comprehensive data from various sources such as traffic data, accident reports, weather conditions, road infrastructure details, and demographic information.

- **Data Cleaning and Preprocessing** : Ensure data quality by cleaning and preprocessing the collected data to handle missing values, duplicates, and inconsistencies.

- **Hotspot Identification :** Develop a system to identify accident hotspots by analyzing accident data alongside factors like traffic volume, road conditions, and time of day.

- **Trend Analysis** : Analyze historical accident data to identify patterns and recurring factors such as types of accidents, seasonal variations, and driver behaviors.

- **Interactive Dashboards** : Design interactive and visually compelling dashboards to display key insights, trends, and predictive analytics.

- **Impact Measurement** : Develop metrics and methods to measure the impact of implemented safety measures and interventions based on the analysis.

By meeting these business requirements, the project aims to provide actionable insights that can significantly improve road safety and reduce accidents in India.

2.3 Literature Survey

Paper 1: "Road Traffic Accidents in India: Issues and Challenges" by K. Srinivasan and K. V. Raman

This paper provides a comprehensive analysis of the issues and challenges surrounding road traffic accidents (RTAs) in India. It highlights the significant socio-economic impact and public health consequences of RTAs, emphasizing the urgent need for effective measures to address the root causes. The authors discuss various contributing factors, including human behavior, road infrastructure, vehicle conditions, and enforcement issues. Additionally, they assess existing road safety policies and interventions, identifying gaps and areas for improvement. This paper serves as a valuable resource for understanding the complexities of road safety in India and guiding future interventions and policy reforms.

Paper 2: "Analysis of Road Traffic Accidents in India: A Case Study of National Capital

Territory" by V. Jain and P. R. Tiwari

This paper presents a detailed case study examining road traffic accidents (RTAs) in the National Capital Territory (NCT) of India. Through spatial and temporal analysis, the authors identify hotspots and key contributing factors to RTAs in the region. Factors such as human behavior, road conditions, vehicle characteristics, and environmental factors are carefully examined. The study provides localized insights that can inform targeted interventions and policy reforms to improve road safety in the NCT. Its findings are instrumental in understanding the specific challenges and dynamics of RTAs in urban areas.

Paper 3: "Factors Influencing Road Traffic Accidents in Urban India: An Empirical Investigation" by S. Kumar and S. Mittal

This study analyzes factors behind road traffic accidents (RTAs) in urban India, highlighting socio-demographic, infrastructural, and behavioral contributors. Key determinants include population density, road design, traffic volume, and driver behavior. The findings offer actionable insights for targeted interventions to enhance urban road safety, aiding policymakers and stakeholders in mitigating RTA risks.

2.4 Social Impact

The social impact of this project is significant, as it aims to reduce road accidents and improve overall safety on Indian roads. Specific social impacts include:

- **Reduction in Fatalities and Injuries** : By identifying and addressing accident hotspots and contributing factors, the project can help reduce the number of fatalities and serious injuries.

- **Improved Public Awareness** : Enhanced understanding of accident patterns and causes can lead to more effective public awareness campaigns on road safety.

- **Policy and Infrastructure Improvements** : Data-driven insights can guide policy reforms and infrastructure improvements, such as better road designs, improved traffic management, and stricter enforcement of traffic laws.

- **Enhanced Safety Measures** : Insights into driver behavior and accident causes can inform the development of targeted safety measures.

- **Community Engagement** : Engaging communities through transparent sharing of data and findings can foster a collaborative approach to improving road safety.

By addressing these aspects, this project tackles road safety, fostering safer communities and a better quality of life.

3. DATA COLLECTION

Data collection refers to the systematic approach of gathering and measuring information on specific variables to address research questions, test hypotheses, assess outcomes, and derive insights. This process is crucial for ensuring that the data collected is accurate, relevant, and sufficient for the intended analysis.

3.1 Downloading The Dataset

Downloading a dataset involves transferring data from a remote source to a local system for analysis. The dataset has been downloaded from Kaggle for this project.

3.2 Understand The Data

Understanding the data is a crucial step in any data analysis process. It involves comprehensively exploring and interpreting the dataset to grasp the structure, contents, and potential insights it holds.

4. DATA PREPARATION

4.1 Preparing the Data for Visualization

Preparing the data for visualization involves cleaning and transforming the dataset to ensure accuracy and consistency. This includes handling missing values, correcting errors, and normalizing data. Relevant variables are selected and, if necessary, new derived metrics are created to enhance insights.

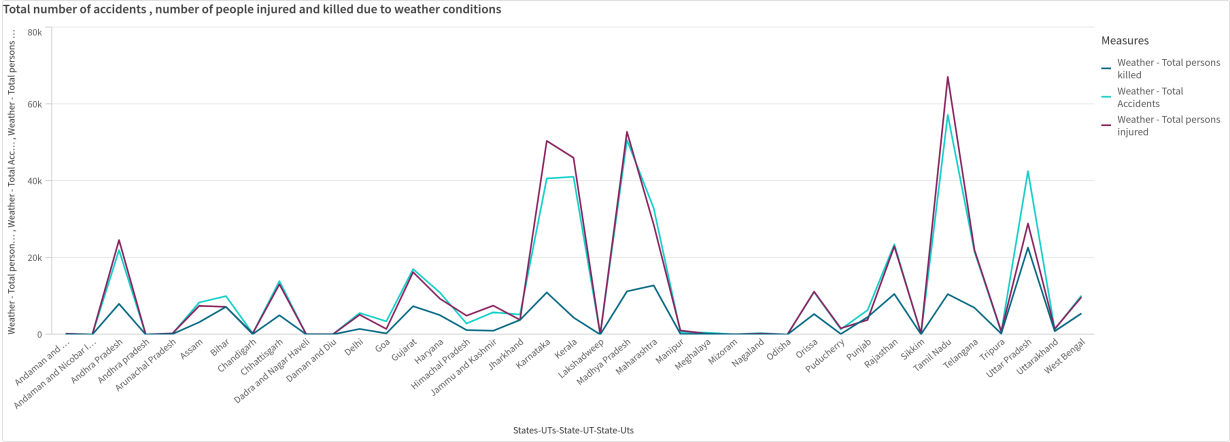
5. DATA VISUALIZATION

Data visualization involves crafting graphical representations of data to enhance

comprehension and interpretation. It aims to simplify complex datasets, making them more accessible and intuitive. By utilizing visual elements like charts, graphs, and maps, it enables quick identification of patterns, trends, and anomalies.

5.1 Number Of Unique Visualizations

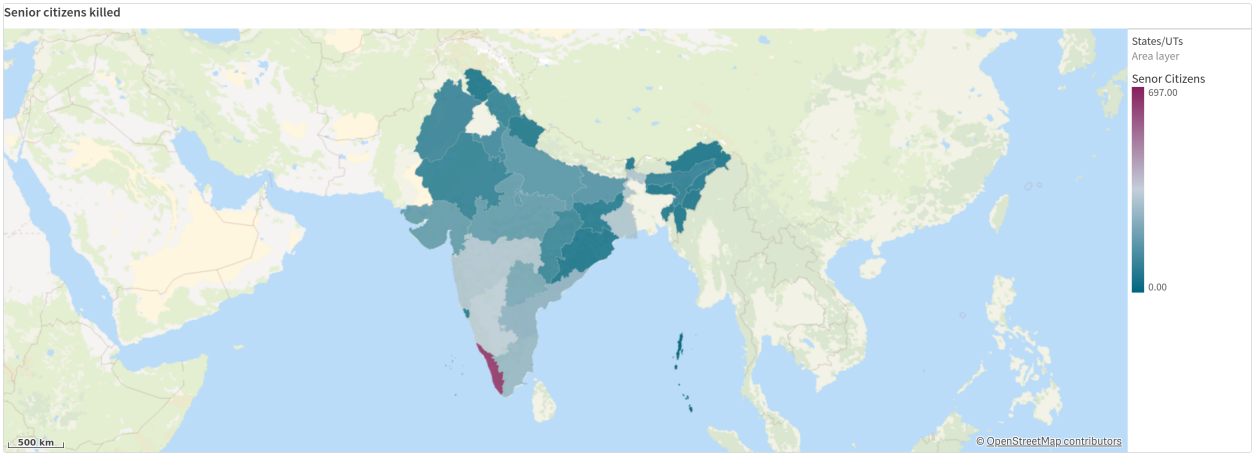
5.1.1 Weather Conditions and Accident Frequency



- ➤ DIMENSION : States/Union Territories (States/UTs)
- ➤ MEASURES : Total persons killed
  Total accidents
  Total persons injured

The line chart helps us to track accident rise in bad weather across locations and guides targeted safety improvements for high-risk areas.

5.1.2 Senior citizens killed in road accidents



- DIMENSION : States/Union Territories (States/UTs)

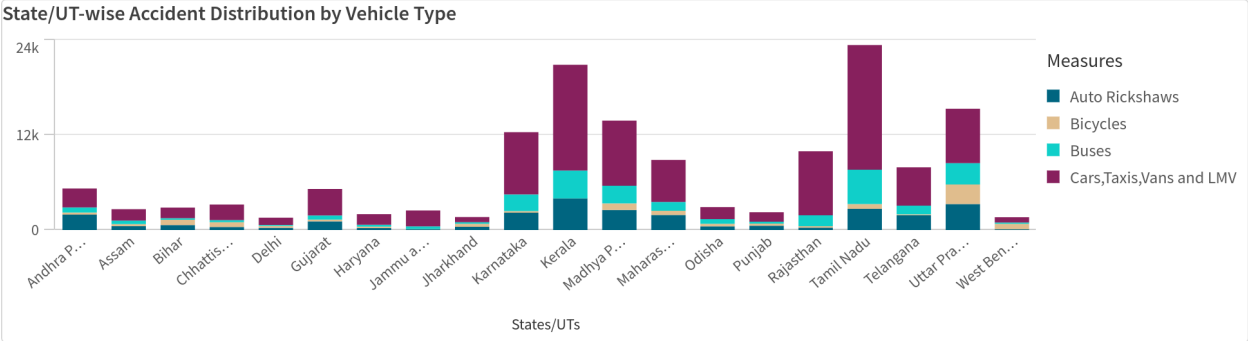
The map helps us see where more senior citizens are getting killed in road accidents in different places, helping to focus efforts on making those areas safer for older people.

5.1.3 Female Pedestrians killed

- MEASURES : Female Pedestrians killed

The KPI chart measures the count of female pedestrians killed, helping track and address safety concerns for women walking on roads.

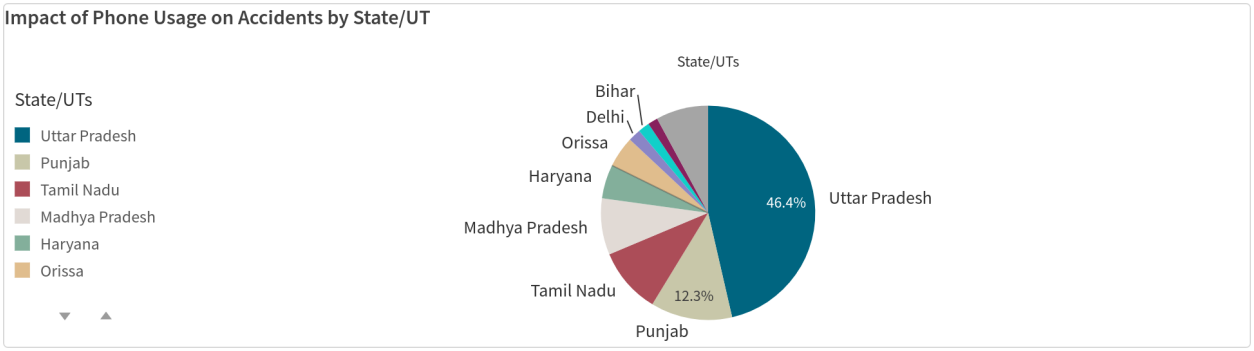
5.1.4 State/UT-wise Accident Distribution by Vehicle Type



- DIMENSION : States/Union Territories (States/UTs)
- MEASURES : Auto Rickshaws
  Bicycles
  Buses
  Cars, Taxis, Vans and LMV

The stacked bar chart shows the mix of accidents caused by Auto Rickshaws, Bicycles, Buses, and Cars across different States and Union Territories, helping to understand the transportation trends and needs in each region.

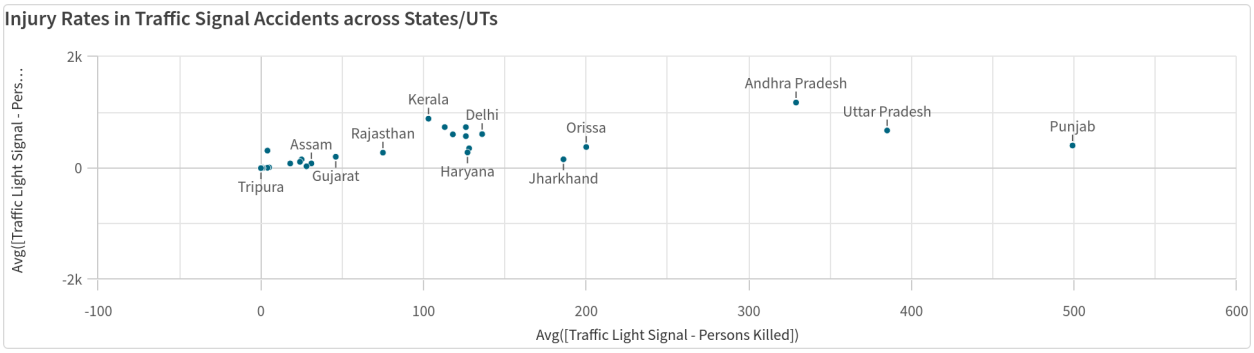
5.1.5. Impact of Phone Usage on Accidents by State/UT



- ➤ DIMENSION : States/Union Territories (States/UTs)
- ➤ MEASURES : Use of Mobile Phone - Number of Accidents

The chart shows the number of accidents caused by mobile phone usage in each State and Union Territory, helping to identify regions where distracted driving is a major safety concern.

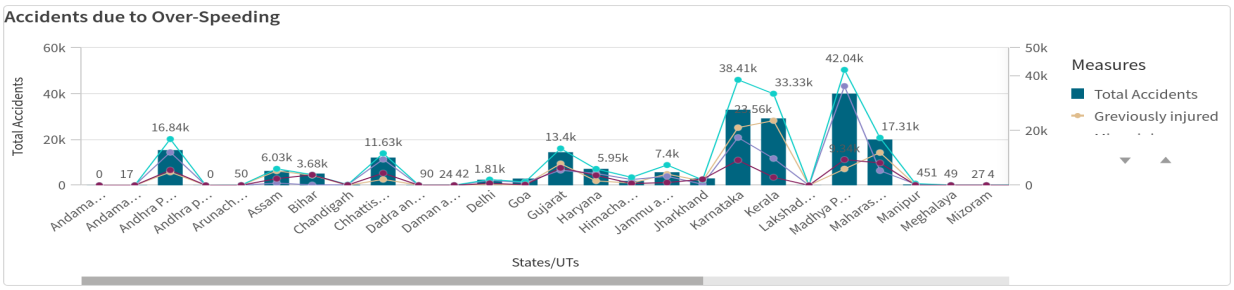
5.1.6 Injury Rates in Traffic Signal Accidents across States/UTs



- ➤ DIMENSION : States/Union Territories (States/UTs)
- ➤ MEASURES : X - axis - Persons killed
  Y - axis - Persons injured

The scatter plot shows the number of people killed and injured in traffic signal accidents across different States and Union Territories, helping to identify regions with high injury rates and the need for improved traffic safety measures.

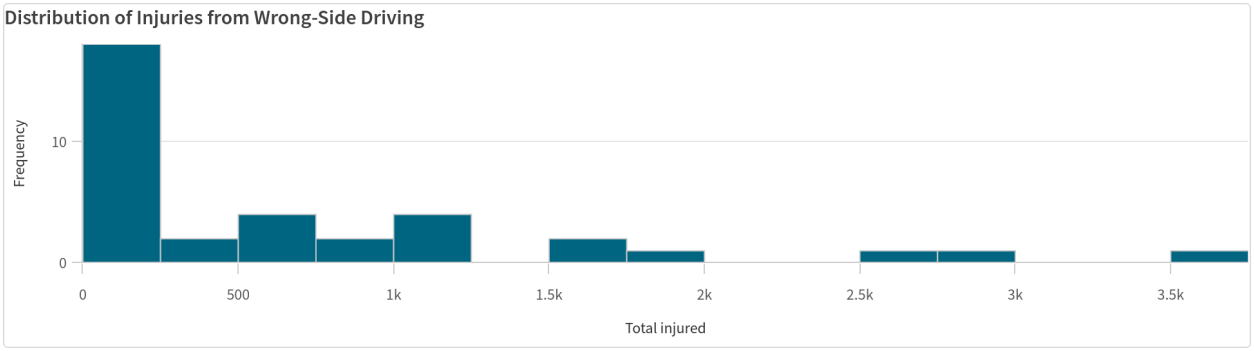
5.1.7 Accidents due to Over-Speeding



- ➤ DIMENSION : States/Union Territories (States/UTs)
- ➤ MEASURES : Length of bars - Total Accidents
  Height of line - Greviously injured
  Minor injury
  Total injured
  Persons killed

The combo chart shows how many accidents happen because of speeding in each state, using bars for the total accidents and lines for the number of injuries and deaths, giving a clear picture of where speeding causes the most harm.

5.1.8 Accidents due to Over-Speeding



- ➤ FIELDS : Total injured due to Wrong-Side driving

The histogram shows injuries from wrong-side driving in over-speeding accidents, revealing the extent and seriousness of this risky behavior.

5.1.9 Highlighting State-Level Road User Deaths

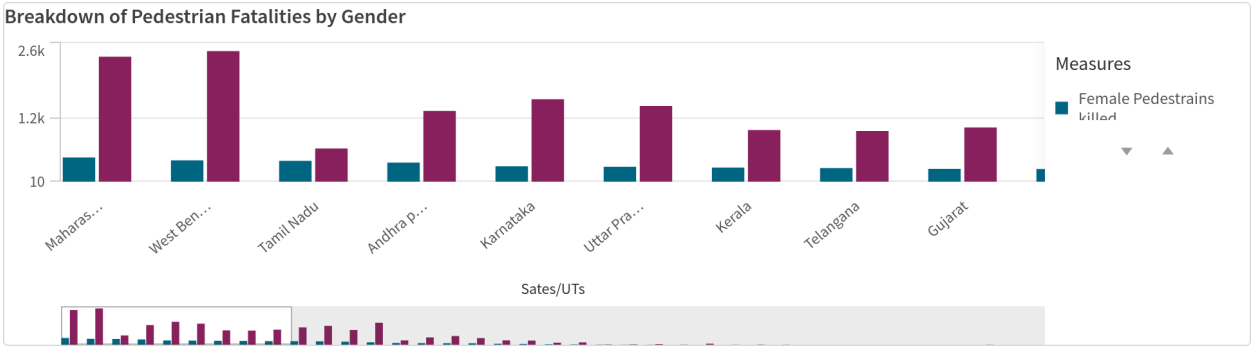
Highlighting State-Level Road User Deaths

States/UTs	Total Road Users Killed
Andhra Pradesh	7984
Assam	3208
Bihar	7205
Chhattisgarh	5003
Delhi	1463
Gujarat	7390
Haryana	5057

- DIMENSION : States/Union Territories (States/UTs)
- MEASURES : Total Road Users killed

The pivot table highlights the number of road user deaths at the state level, offering a clear breakdown of fatalities by region and aiding in targeted road safety interventions.

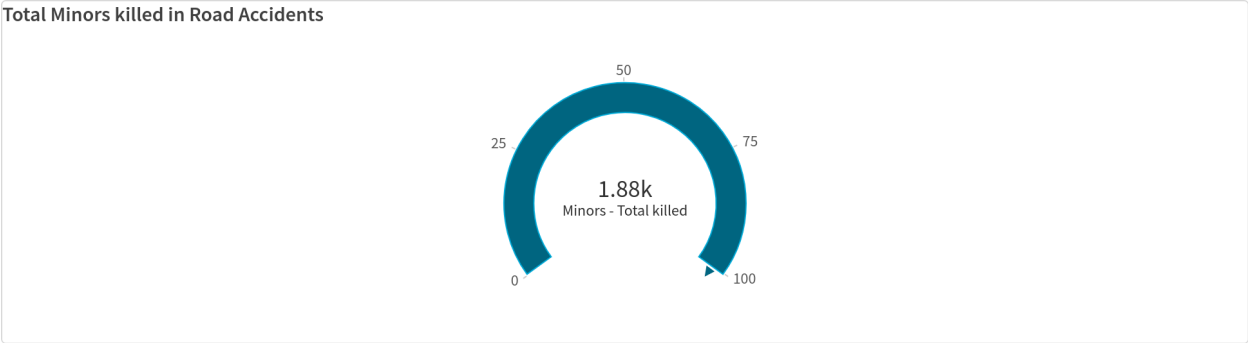
5.1.10 Breakdown of Pedestrian Fatalities by Gender



- DIMENSION : States/Union Territories (States/UTs)
- MEASURES : Female Pedestrians killed
  Male Pedestrians killed

The grouped bar chart compares male and female pedestrian fatalities across different States and Union Territories, offering a clear visual comparison.

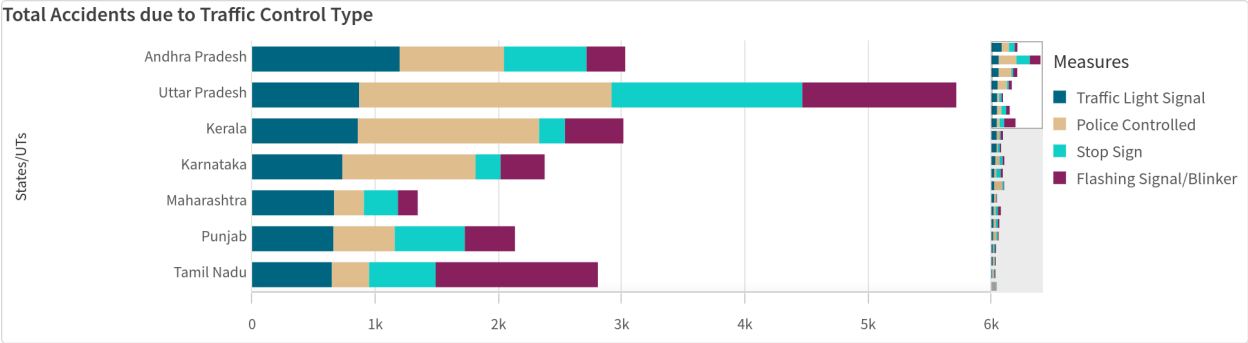
5.1.11 Total Minors killed in Road Accidents



- MEASURES : Total Minors killed

This highlights child fatalities in road accidents, emphasizing the urgency of protecting minors on roads.

5.1.12 Total Accidents due to Traffic Control Type



- DIMENSION : States/Union Territories (States/UTs)
- MEASURES : Traffic Light Signal
  Police Controlled
  Stop Sign
  Flashing Signal/Blinker

The stacked bar chart displays the total number of accidents caused by different traffic control methods like traffic lights, police control, stop signs, and flashing signals across various states.

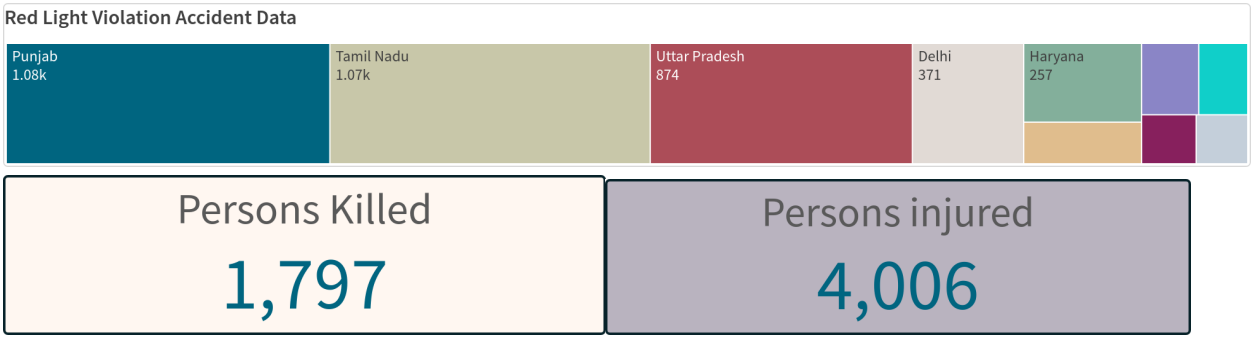
6. DASHBOARD

A dashboard in data visualization is a graphical interface that displays key data and

metrics in an easy-to-read format. It uses charts, graphs, and other visual elements to provide an overview of important information.

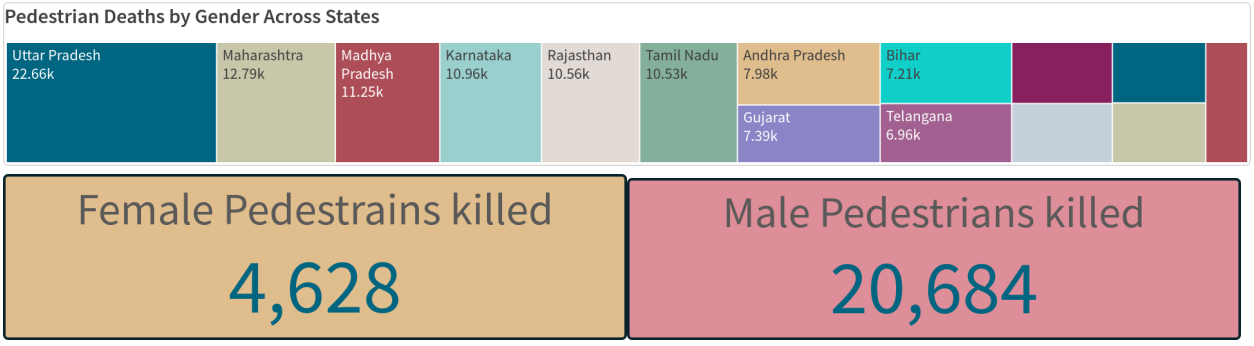
6.1 Responsive And Design Of Dashboard

6.1.1 Red Light Violation Accident Data



This dashboard shows data on accidents caused by running red lights. It uses a Mekko chart to display the number of accidents for each state or union territory. There are also key performance indicators (KPIs) that show the number of people killed and injured due to red light violations. The visual format makes it easy to see which areas have the most accidents and the impact on people's lives, helping to highlight the severity of red light violations.

6.1.2 Pedestrian Deaths by Gender Across States



This dashboard presents pedestrian deaths by gender across states and union territories. A Mekko chart visualizes total road user fatalities in each area, while KPIs highlight male and female pedestrian deaths. It facilitates straightforward comparisons of pedestrian fatalities by gender and location, underscoring the varied impact of road

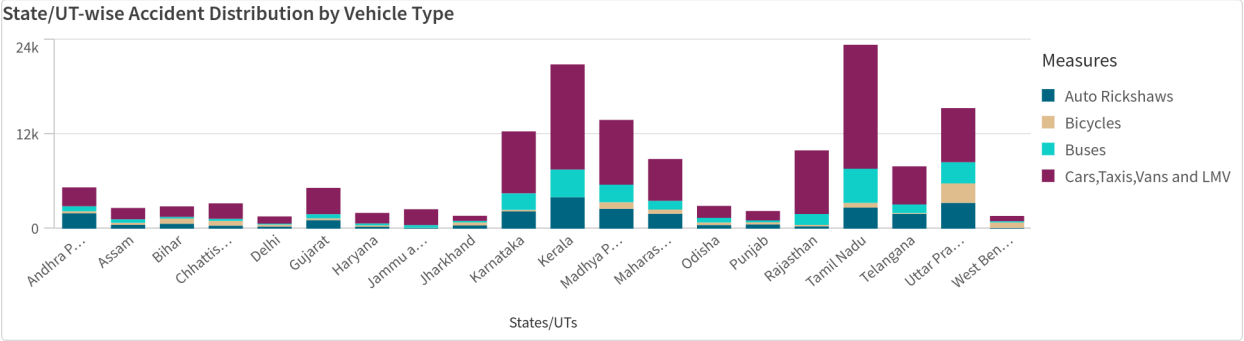
accidents.

7. PERFORMANCE TESTING

7.1 Application Of Data Filters

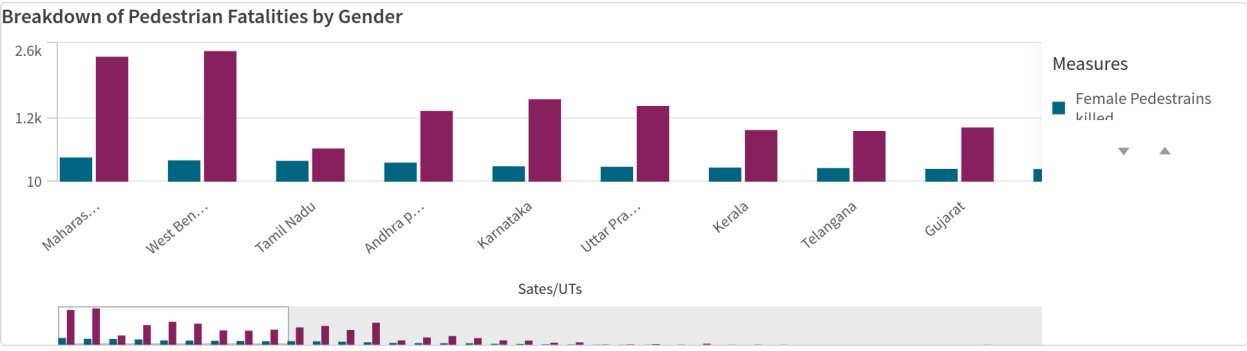
Applying data filters lets users narrow down the information they see based on specific criteria. You can pick certain values to show or hide, like focusing on data from a particular state or time period. You can also set up more complex filters to match detailed conditions, helping you find exactly what you need in your data.

7.1.1 State/UT-wise Accident Distribution by Vehicle Type



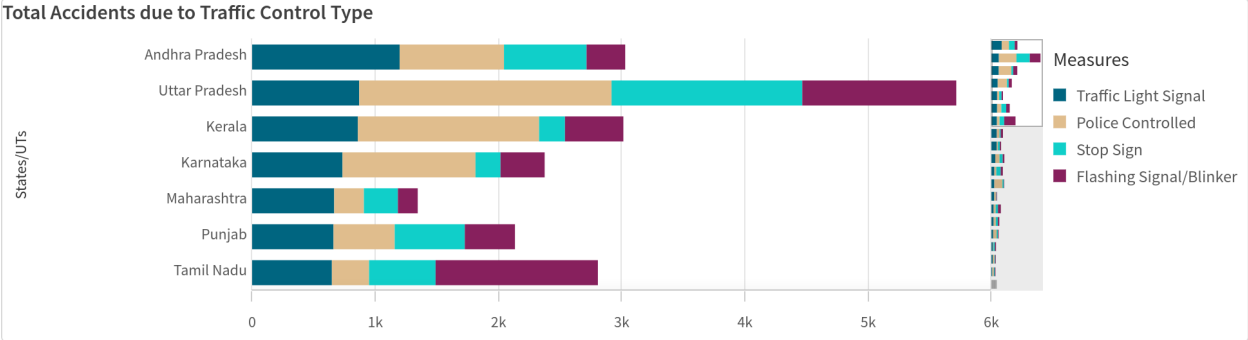
Applying data filters to the state/UT-wise accident distribution by vehicle type visualization enhances the analytical depth and usability of the data. Users can narrow their focus to specific states or union territories and particular vehicle types, such as Auto Rickshaws or Bicycles, to gain a clearer understanding of localized trends.

7.1.2 Breakdown of Pedestrian Fatalities by Gender



Applying data filters to the breakdown of pedestrian fatalities by gender visualization makes it easier to understand and analyze the data. Users can filter by specific states or union territories to focus on regions of interest. They can also filter by gender to see fatalities for either male or female pedestrians exclusively.

7.1.3 Total Accidents due to Traffic Control Type



Using data filters on the visualization of total accidents by traffic control type makes the data more understandable and useful. Users can filter by specific states or union territories to focus on regions of interest, providing a clearer picture of local traffic safety issues. Filtering by traffic control type, such as traffic lights or stop signs, allows users to isolate and analyze the impact of each method on accident rates.

7.2 Use Of Master Items/Calculated Fields

Qlik Sense lets you create reusable filter objects, like Master Items and Calculated Fields, making it easier to apply the same filters across multiple charts and dashboards. This simplifies the process and ensures consistency in your data analysis.

7.2.1 Female Pedestrains killed

Expression : Sum([18-25 Years - Killed - Female])+Sum([25-35 Years - Killed - Female])+Sum([35-45 Years - Killed - Female])+Sum([45-60 Years - Killed - Female])+Sum([60 and Above - Killed - Female])+Sum([Age not known - Killed - Female])+Sum([Less than 18 years - Killed - Female])

7.2.2 Male Pedestrains killed

Expression : Sum([18-25 Years - Killed - Male])+Sum([25-35 Years - Killed -

Male])+Sum([35-45 Years - Killed - Male])+Sum([45-60 Years - Killed - Male])+Sum([60 and Above - Killed - Male])+Sum([Age not known - Killed - Male])+Sum([Less than 18 years - Killed - Male])

7.2.3 Minors - Total killed

Expression : Sum([Less than 18 years - Killed - Female])+Sum([Less than 18 years - Killed - Male])

7.2.4 Total Road Users Killed

Expression : Sum([Auto Rickshaws - Total])+Sum([Bicycles - Total])+Sum([Buses - Total])+Sum([Cars, taxies Vans andLMV - Total])+Sum([Other non Motor vehicles(E-Rickshaw) - Total])+Sum([Others - Total])+Sum([Pedestrian - Total])+Sum([Trucks/Lorries - Total])+Sum([Two Wheelers - Total])

7.2.5 Weather - Total Accidents

Expression : Sum([Foggy and Misty - Total Accidents])+Sum([Hail/Sleet - Total Accidents])+Sum([Others - Total Accidents])+Sum([Rainy - Total Accidents])+Sum([Sunny/Clear - Total Accidents - Number])

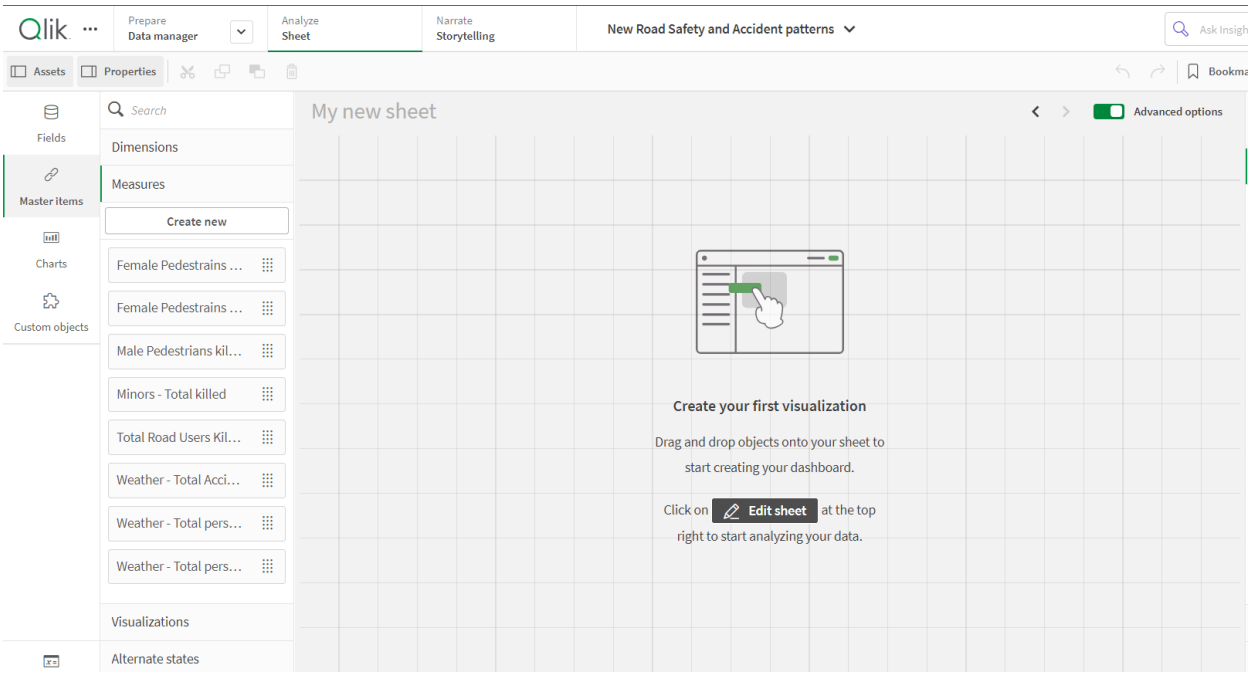
7.2.6 Weather - Total persons injured

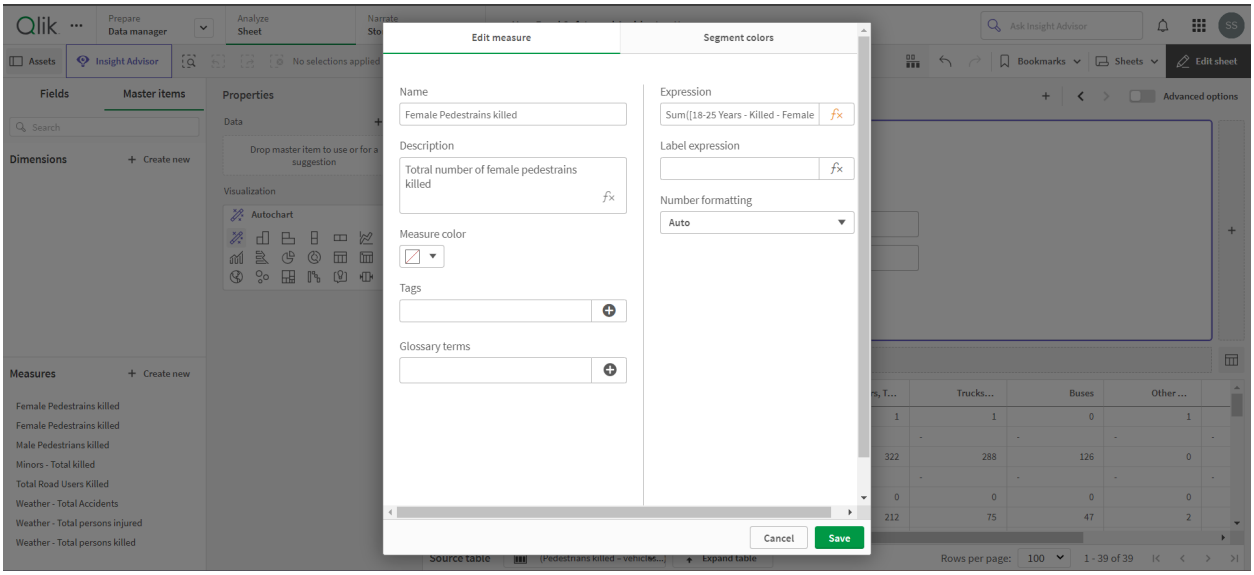
Expression : Sum([Foggy and Misty - Persons Injured - Total Injured])+Sum([Hail/Sleet - Persons Injured - Total Injured])+Sum([Rainy - Persons Injured - Total Injured])+Sum([Sunny/Clear - Persons Injured - Total Injured])+Sum([Weather.Others - Persons Injured - Total Injured])

7.2.7 Weather - Total persons killed

Expression : Sum([Foggy and Misty - Persons Killed])+Sum([Hail/Sleet - Persons Killed])+Sum([Rainy - Persons Killed])+Sum([Sunny/Clear - Persons Killed - Number])+Sum([Weather.Others - Persons Killed])

Snapshots showing Master items:


Prepare
Data manager
Analyze
Sheet
Narrate
Storytelling
New Road Safety and Accident patterns
Assets
Properties
Fields
Master items
Charts
Custom objects
Search
Dimensions
Measures
Create new
Female Pedestrains ...
Female Pedestrains ...
Male Pedestrians kil...
Minors - Total killed
Total Road Users Kil...
Weather - Total Acci...
Weather - Total pers...
Weather - Total pers...
Visualizations
Alternate states
My new sheet
Advanced options
Create your first visualization
Drag and drop objects onto your sheet to start creating your dashboard.
Click on Edit sheet at the top right to start analyzing your data.


Edit measure
Segment colors
Name
Female Pedestrains killed
Description
Totral number of female pedestrains killed
Measure color
Tags
Glossary terms
Expression
Sum([18-25 Years - Killed - Female
Label expression
Number formatting
Auto
Cancel
Save

7.3 Number Of Graphs/ Visualizations

1. Weather Conditions and Accident Frequency
2. Senior citizens killed in road accidents
3. Female Pedestrians killed
4. State/UT-wise Accident Distribution by Vehicle Type
5. Impact of Phone Usage on Accidents by State/UT
6. Injury Rates in Traffic Signal Accidents across States/UTs
7. Accidents due to Over-Speeding
8. Accidents due to Over-Speeding
9. Highlighting State-Level Road User Deaths
10. Breakdown of Pedestrian Fatalities by Gender
10. Breakdown of Pedestrian Fatalities by Gender
12. Total Accidents due to Traffic Control Type

8. CONCLUSION

The "Qlik Analysis of Road Safety and Accident Patterns in India" project is a vital initiative aimed at tackling the pressing issue of road safety in India. By harnessing data from various sources and utilizing advanced analytics, the project aims to uncover valuable insights to reduce road accidents effectively. These insights will inform data-driven decisions, shape policy reforms, and enhance safety measures, ultimately saving lives. The project is poised to make a meaningful social impact by improving road safety and fostering safer communities.