Review on Data Analysis of Road Accidents

Introduction

Road traffic accidents are a major concern worldwide, causing significant loss of life and property. Despite numerous safety measures and awareness campaigns, the number of accidents remains high in many cities. This project aims to delve deeper into this issue by analyzing data related to car accidents in a specific city.

The objective is to identify patterns and factors that contribute to these accidents. By understanding these elements, we can gain valuable insights into why accidents occur and what can be done to prevent them. The ultimate goal is to propose effective strategies to reduce the number of car accidents, thereby making our roads safer for everyone.

This report will present a comprehensive analysis of the data, discuss the findings, and suggest practical solutions based on the results. The hope is that this work will contribute to the ongoing efforts to improve road safety and save lives.

Literature Review

Road traffic accidents are a significant public health concern, resulting in an estimated 1.2 million deaths and 50 million injuries worldwide each year[4]. The goal of this project is to analyze data related to car accidents to identify patterns and influential factors, with the aim of proposing solutions to reduce them.

A comprehensive study by Fisa et al. provides an overview of systematic reviews on the effects of interventions for preventing road traffic crashes[1]. The study found strong evidence that random breath testing, selective breath testing, and sobriety checkpoints were effective in reducing alcohol-related crashes and associated fatal and nonfatal injuries[1]. Other reviews found that sobriety checkpoints reduced the number of crashes by 17%[1]. Road safety campaigns were found to reduce the numbers of RTCs by 9%[1]. Converting intersections to roundabouts was associated with a reduction of 30 to 50% in the number of RTCs resulting in injury and property damage[1].

Another study focused on road accident analysis in India, where the rate of road crashes is more than the critical limit[2]. The study highlighted the objective of the study, methodology, and accidental data of a case study on Dahod to Jhalod section of N.H.113[2].

In conclusion, the literature suggests that various interventions can be effective in reducing road traffic crashes. However, the effectiveness of these interventions can vary depending on the specific context and conditions. Therefore, it is crucial to conduct a thorough analysis of car accident data to identify the most influential factors and propose the most effective solutions.

Methodology

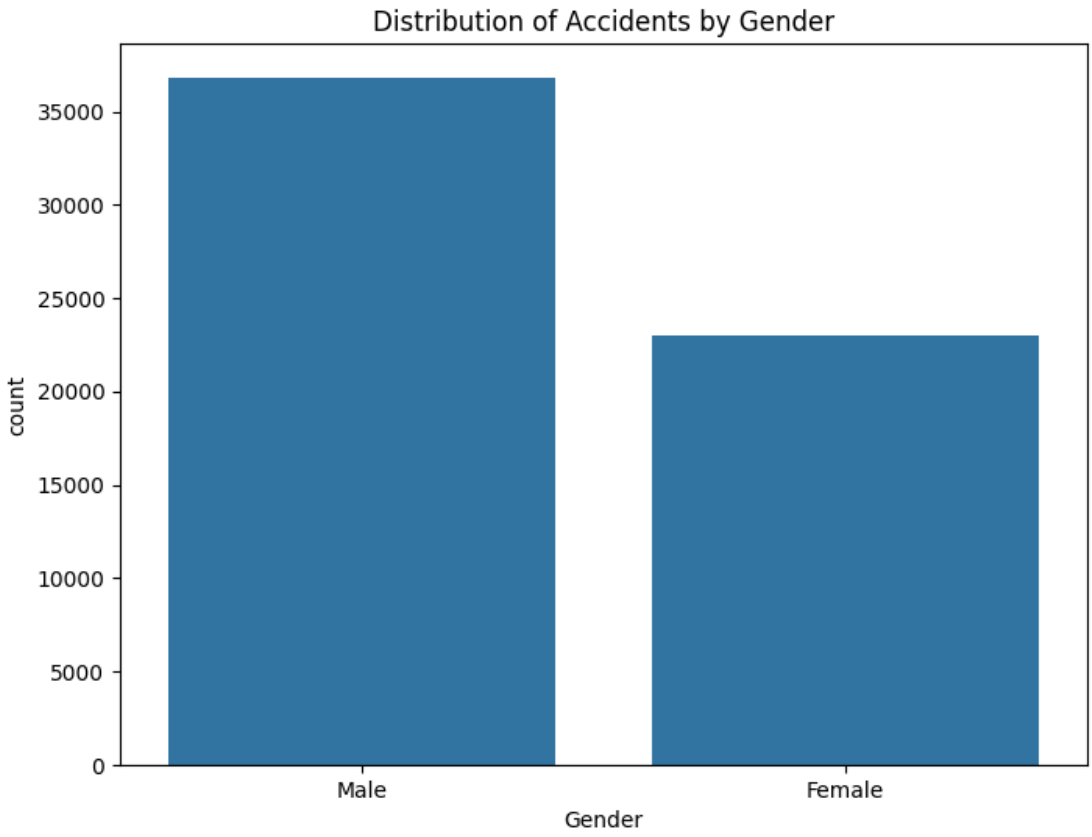
Methodology consists of review of the data analysis based on the road accidents data set. The data set was cleaned and described first, then the effective elements and factors were identified that include; Age, Gender, Area, Vehicle Type, Casualty Type and severity.

The results were excluded from the data set using plots from matplotlib.pyplot in python.

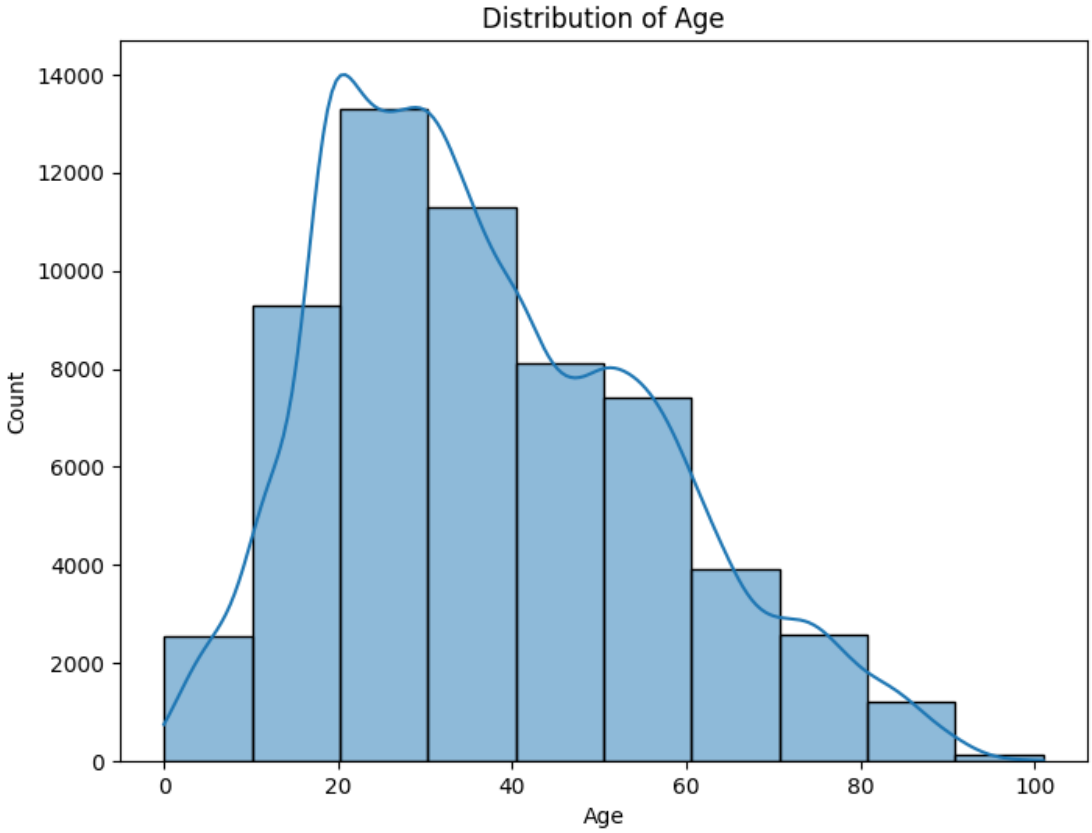
Analysis Results

Results that were included from the analysis are shown in the figures below

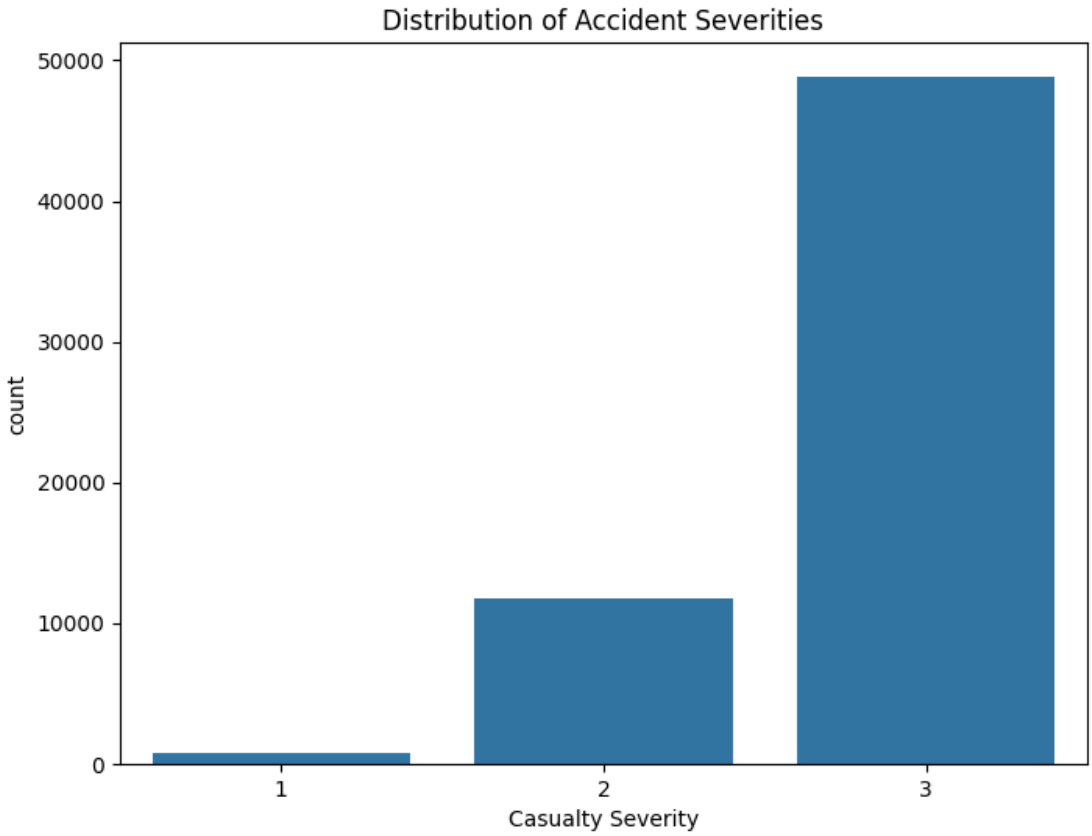
Distribution of accidents by gender:



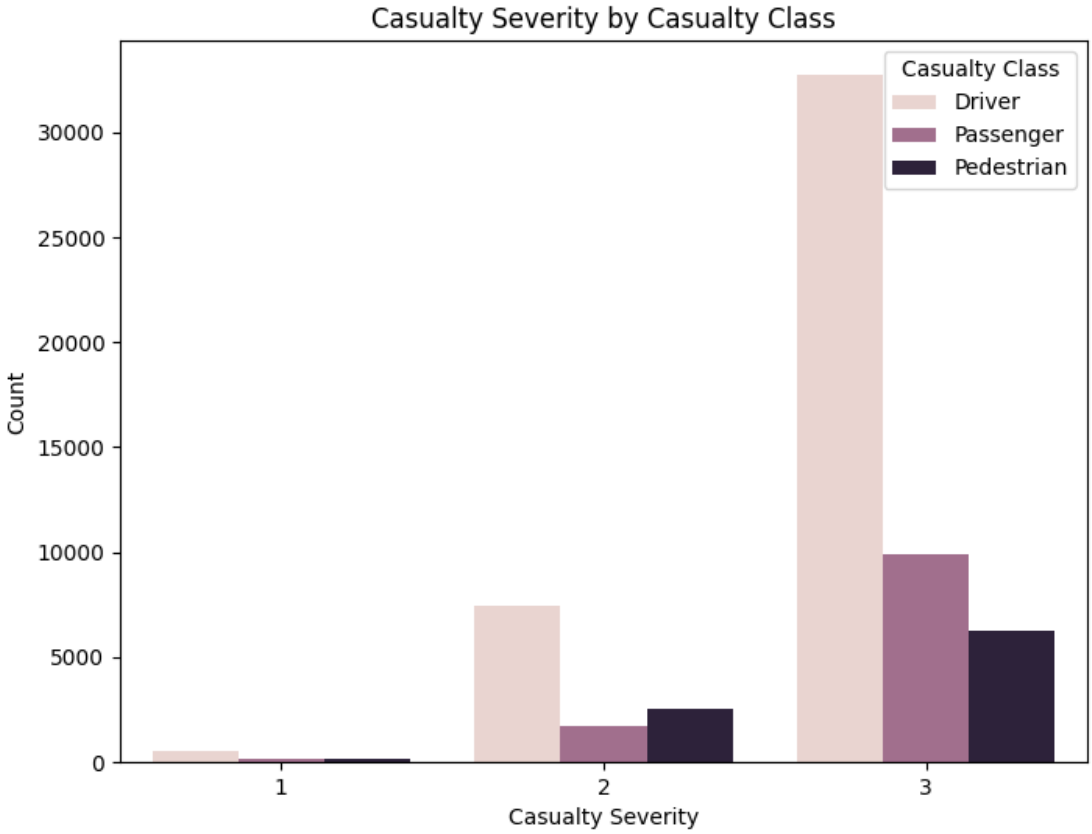
Distribution of accidents by age:


Distribution of Age
Count
Age
0
2000
4000
6000
8000
10000
12000
14000
0
20
40
60
80
100

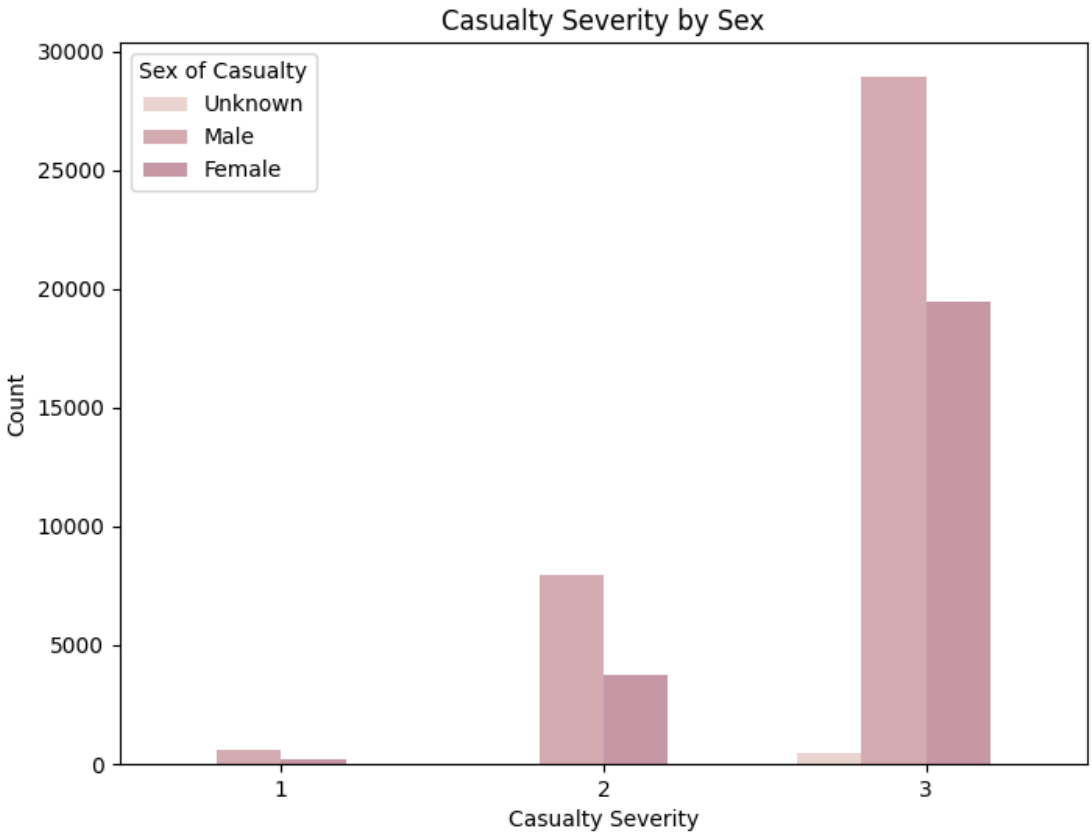
Distribution of accidents by severity:



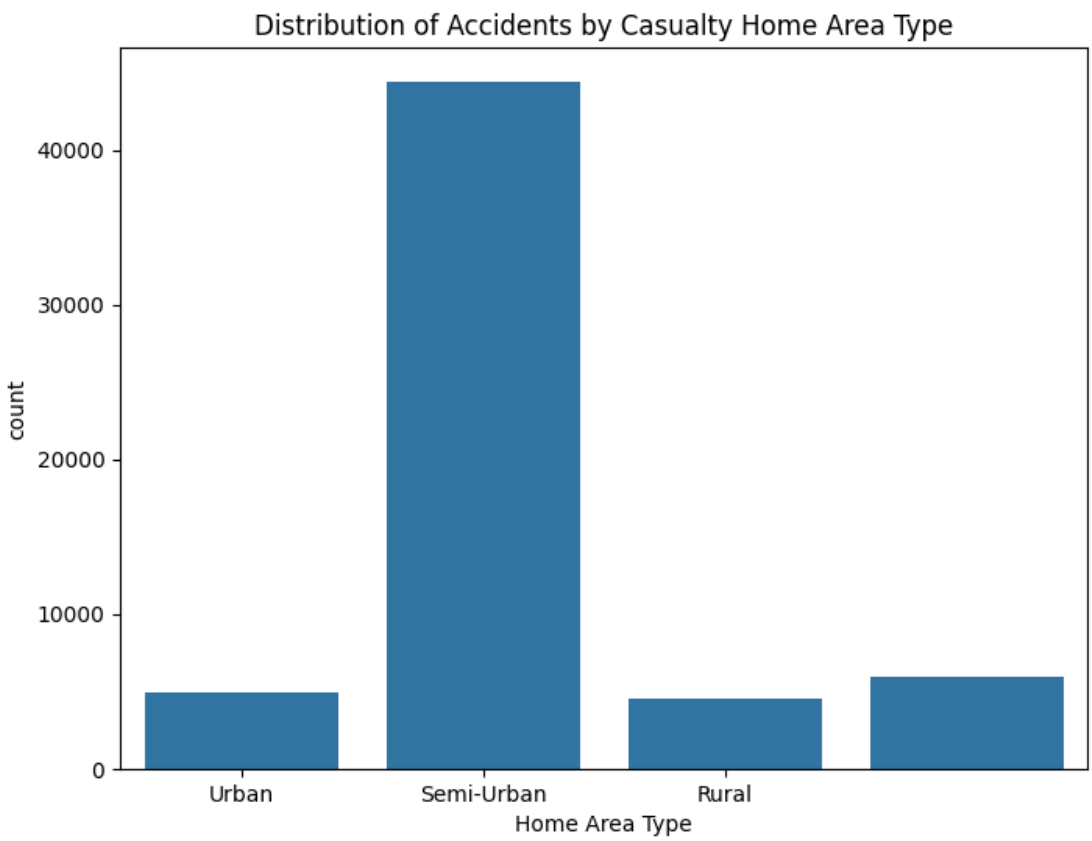
Accident severity by casualty class:



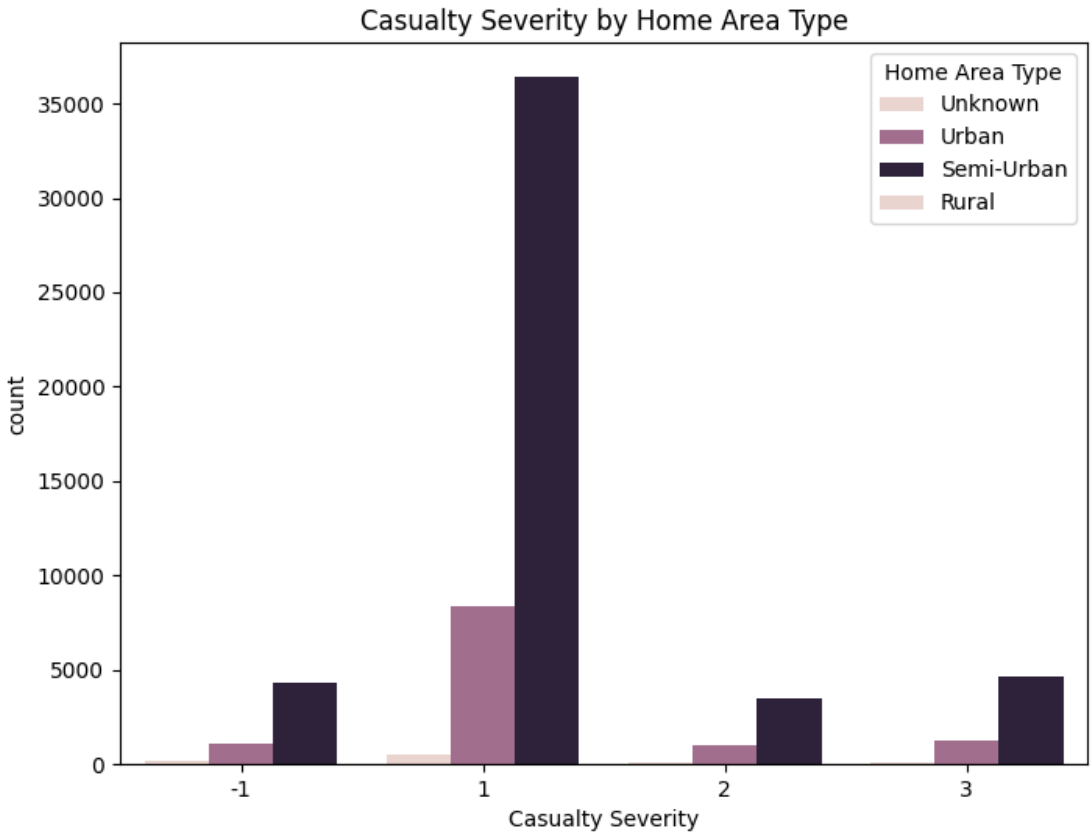
Accident severity by gender:



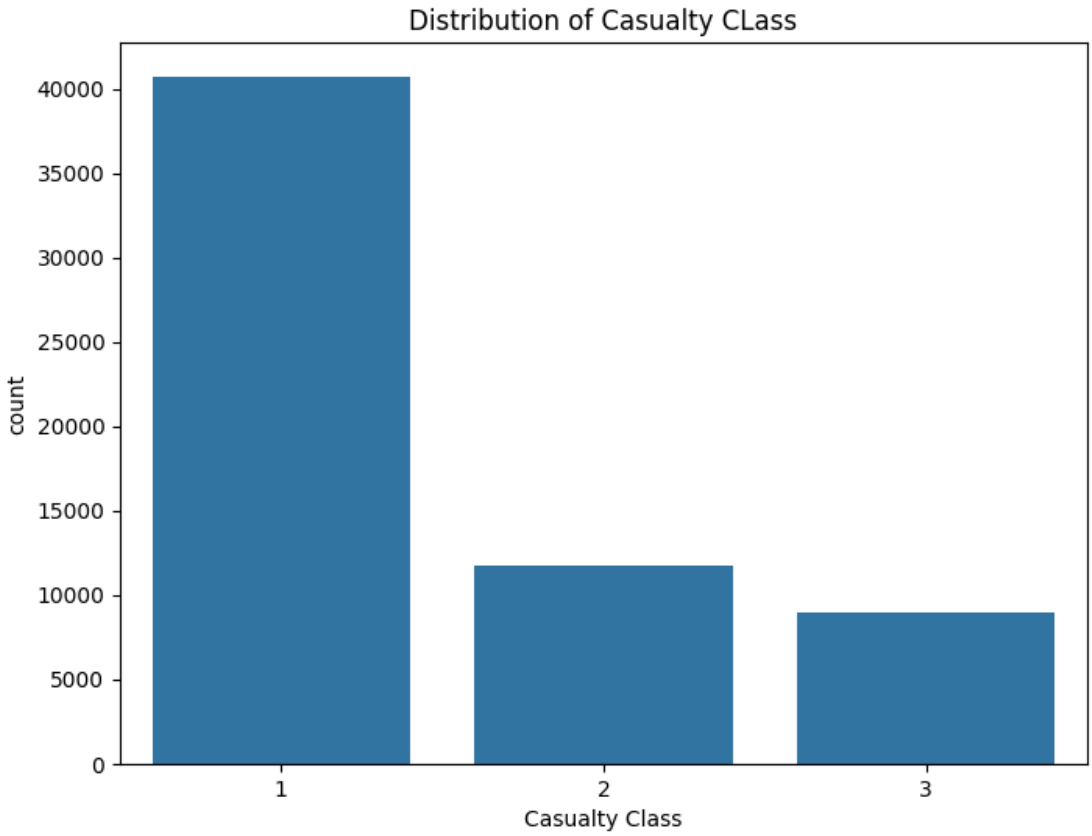
Distribution of accidents by home area:



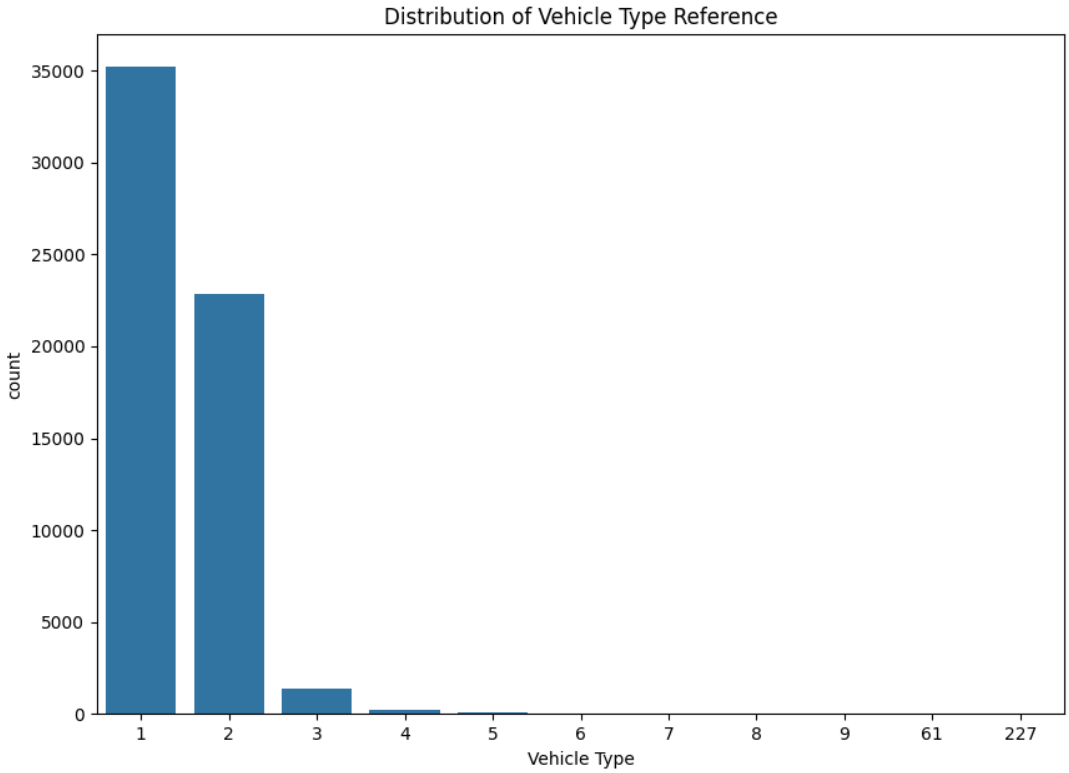
Accident severity by home area type:



Distribution of Accidents by casualty class:



Distribution of accidents by vehicle type:



Discussion and Conclusion

The analysis of the road accident dataset has provided valuable insights into the factors contributing to car accidents in the city. It has highlighted the importance of age, vehicle type, and area deprivation (IMD decile) among other factors. The patterns identified suggest that targeted interventions could significantly reduce the number of accidents. However, it's important to note that the effectiveness of these interventions may vary based on the specific context and conditions. Therefore, continuous monitoring and analysis are crucial to assess the impact of these interventions and make necessary adjustments. This study underscores the potential of data analysis in informing policy decisions and improving road safety.

By looking at the graphs we can indicate what is causing the most danger and road accidents and determine the risk factors that are effective in the process.

The danger inducing factors that cause most incidents are:

1. Vehicle type 1 and 2
2. Semi-Urban home area types

3. Drivers induce most injuries but passengers are injured more severely
4. Severe injuries are more common and happen a lot more than other types of injuries.
5. Ages from 15 to 45 are more prone to accident and injuries

Recommendations

Based on the data analysis, the recommendations for the government authorities are:

1. Vehicle Type 1 and 2: If certain types of vehicles are more prone to accidents, consider implementing safety measures specific to these vehicles. This could include stricter regulations for these vehicles, specialized driver training, or modifications to the vehicles themselves to enhance safety.
2. Semi-Urban Home Area Types: If accidents are more common in semi-urban areas, consider implementing traffic calming measures such as speed bumps, roundabouts, or lower speed limits. Improved street lighting and pedestrian crossings could also enhance safety.
3. Driver and Passenger Injuries: Since drivers induce most injuries but passengers are injured more severely, consider implementing safety measures for both drivers and passengers. This could include promoting the use of seat belts and airbags, implementing stricter penalties for reckless driving, and encouraging safe driving practices through awareness campaigns.
4. Severe Injuries: If severe injuries are more common, focus on preventative measures to reduce the impact of accidents. This could include improving emergency response times, enhancing vehicle safety features, and promoting the use of protective gear such as helmets for motorcyclists.
5. Ages 15 to 45: If individuals aged 15 to 45 are more prone to accidents and injuries, consider targeted interventions for this age group. This could include driver education programs, awareness campaigns about the risks of reckless driving, and stricter licensing requirements for younger drivers.

Source

(1) Traffic Accident Literature Review | ipl.org - Internet Public Library. https://www.ipl.org/essay/Traffic-Accident-Literature-Review-F3SPU4NFJE86.

(2) Effects of interventions for preventing road traffic crashes: an .... https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-12253-y.

(3) Literature Review on Road Accident Analysis a Case Study on Dahod to .... https://www.academia.edu/33913945/Literature_Review_on_Road_Accident_Analysis_a_Case_Study_on_Dahod_to_Jhalod_Section_of_N_H_113.

(4) Self-reporting traffic crashes – a systematic literature review .... https://etrr.springeropen.com/articles/10.1186/s12544-018-0301-0.

(5) Automotive Collision Avoidance System: A Review | SpringerLink. https://link.springer.com/chapter/10.1007/978-3-030-94102-4_1.