Road Accident Analysis

By Daniel Ajayi

Problem Statement

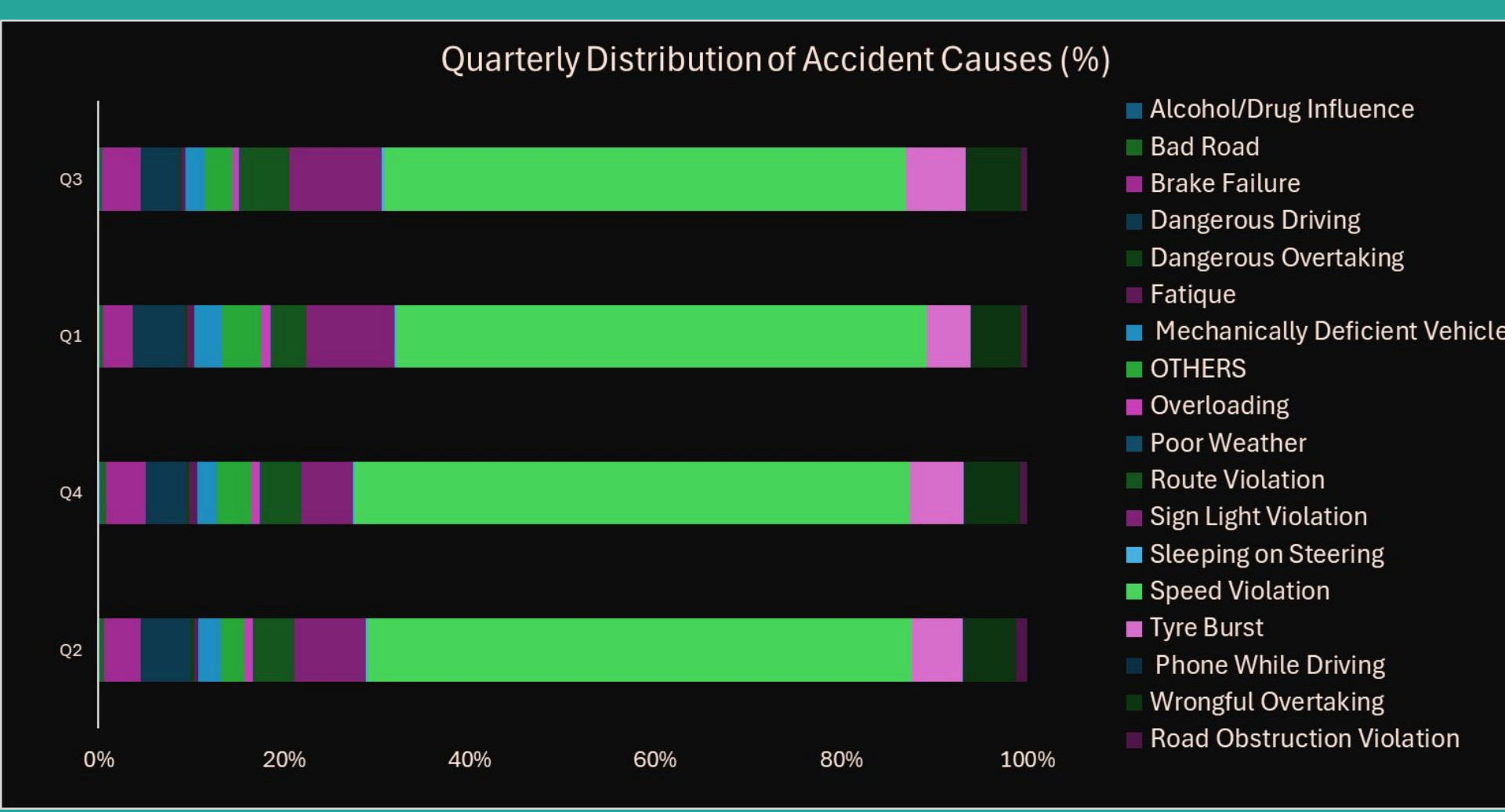
Road accidents are a persistent threat to public safety, resulting in significant casualties and economic losses. Understanding the underlying patterns, trends, and contributing factors to these accidents is paramount. The goal is to develop targeted strategies for accident prevention and mitigation, ultimately reducing fatalities, injuries, and societal costs associated with road accidents.

Data Collection and Preparation

The dataset, sourced from the Nigeria Bureau of Statistics, comprises road accident data for all 36 states in Nigeria for the four quarters of 2023. It includes information on accident occurrences, fatalities, injuries, and causes. To conduct the analysis, the individual quarterly tables were merged and concatenated with additional data detailing the causes of accidents in each state and quarter.

Exploratory Data Analysis

The second quarter recorded the highest number of accident cases while the first quarter recorded higher number of people killed by accidents, the 3rd quarter recorded the lowest amount of cases and deaths. They are also less occurence of minor accidents, majority of the accidents are either serious or fatal but in most cases fatal 60% of the time. Across all quarters over 70% of accidents occurrences are caused by speed violations , sign light violations , wrongful overtaking and tyre burst majority of the vehicles are commercial.


Quarterly Distribution of Accident Causes (%)
Q3
Q1
Q4
Q2
0%
20%
40%
60%
80%
100%
Alcohol/Drug Influence
Bad Road
Brake Failure
Dangerous Driving
Dangerous Overtaking
Fatique
Mechanically Deficient Vehicle
OTHERS
Overloading
Poor Weather
Route Violation
Sign Light Violation
Sleeping on Steering
Speed Violation
Tyre Burst
Phone While Driving
Wrongful Overtaking
Road Obstruction Violation

Click for more visuals

Accident Severity Analysis

Fatal Accidents

1. Among all the causes of accidents Speed Violation and Tyre Burst are strongly correlated with occurrence of fatal accidents which implies that speeding and tyre issues increases the likelihood of fatal accidents

2. Linear Regression model also revealed some significant contributors with strong impact such as Fatigue; with each unit increase associated with an estimated increase of 2.0178 fatal accidents

Serious Accidents

1. The Regression model shows a strong fit to the data with 95.2% of the variability explained by independent variable included in the model .

2. Several factors demonstrate significant effects on Serious accidents which are Speed Violation, Use of Phone While Driving , Dangerous Driving , Fatigue and Sign Light Violation.

Minor Accidents

1. The Regression model exhibit a strong fit to the data with 84% of the variability explained by independent variable included in the model .

2. Several factors demonstrate significant effects on Serious accidents which are Speed Violation, Mechanically Deficient vehicle, Brake Failure , Alcohol / Drug Influence and Sign Light Violation.

Click to Explore Severity Factors in Depth

Key Insights

Insight

The Analysis revealed that the severity of accident is caused by two factors either by the behaviour of the driver or an external factor, but largely in 2023 the factors that contributed the most are the behaviours of the driver.

Recommendations

- **Driver Education**:Implement driver education programs emphasizing safe driving practices and awareness of risky behaviors
- **Enforcement**: Strengthen enforcement of traffic laws to deter dangerous driving behaviors and ensure compliance.
- **Infrastructure Improvements**: Invest in road infrastructure upgrades and safety measures to mitigate accident severity.
- **Vehicle Safety**: Promote advanced vehicle safety technologies and regular maintenance to reduce accident impact.

- **Public Awareness**: Launch public awareness campaigns to educate road users and encourage responsible behavior.

Conclusion

In summary, this analysis highlights key areas for intervention to improve road safety. By addressing factors such as driver behavior, enforcement, infrastructure, vehicle safety, public awareness, and data-driven decision making, we can work towards reducing severe accidents and saving lives on the road."

Thank you!