

Qlik Analysis of Road Safety and Accident Patterns in India

Project Report

The main Problem Statement:

This project aims to examine road safety and accident trends in India by identifying primary accident factors and creating road safety enhancement strategies. The analysis will involve pinpointing high-risk zones, typical accident causes, and assessing the effectiveness of safety measures in reducing accidents. Additionally, the project will delve into the business aspects of road safety, including accident costs and potential savings from enhanced safety measures.

Specifying Business Problem:

The data uncovers various business challenges linked to road safety and accident patterns in India. These challenges encompass the substantial expenses tied to accidents, possible financial benefits from improved safety protocols, harm to reputation, adherence to regulations, and safeguarding employee well-being. Costly accidents may cause a drop in productivity, medical expenses, and legal obligations. By pinpointing high-risk zones and enforcing tailored safety measures, companies can diminish the frequency and severity of accidents, leading to sustained cost savings. Strict compliance with regulations is essential, as breaches can result in legal repercussions and penalties. Tackling these challenges with data-driven analysis and focused safety initiatives can assist companies in cutting costs, enhancing their reputation, ensuring compliance, and giving precedence to employee safety.

Addressing accident causes can lower insurance claims, repair costs, and boost productivity. Improved road safety can create a more efficient transportation network, helping businesses expand. This study, utilizing data analytics, aims to reduce road accident casualties in India and offer new business prospects.

Business Requirements:

The project's business requirements, based on the provided dataset, are as follows:

1. Data Analysis and Visualization: Businesses need thorough data analysis and visualization to comprehend road safety trends, identify high-risk areas, and prioritize safety measures effectively. Utilizing tools such as Qlik Sense can assist in creating interactive dashboards for better insights.
2. Cost-Benefit Analysis: Conducting a cost-benefit analysis of road safety measures is essential for businesses to evaluate the financial implications of accidents and the potential savings from implementing safety interventions. This analysis can inform decision-making on resource allocation for safety initiatives.
3. Compliance and Risk Management: Businesses must ensure compliance with road safety regulations and standards to mitigate legal risks and liabilities associated with accidents. Implementing robust risk management strategies based on data insights can help reduce accidents and their impact on the business.
4. Safety Training and Awareness Programs: Developing and implementing safety training programs for employees, especially those involved in road transportation, is crucial. Businesses

should also prioritize raising awareness about road safety among employees to foster a culture of safety within the organization.

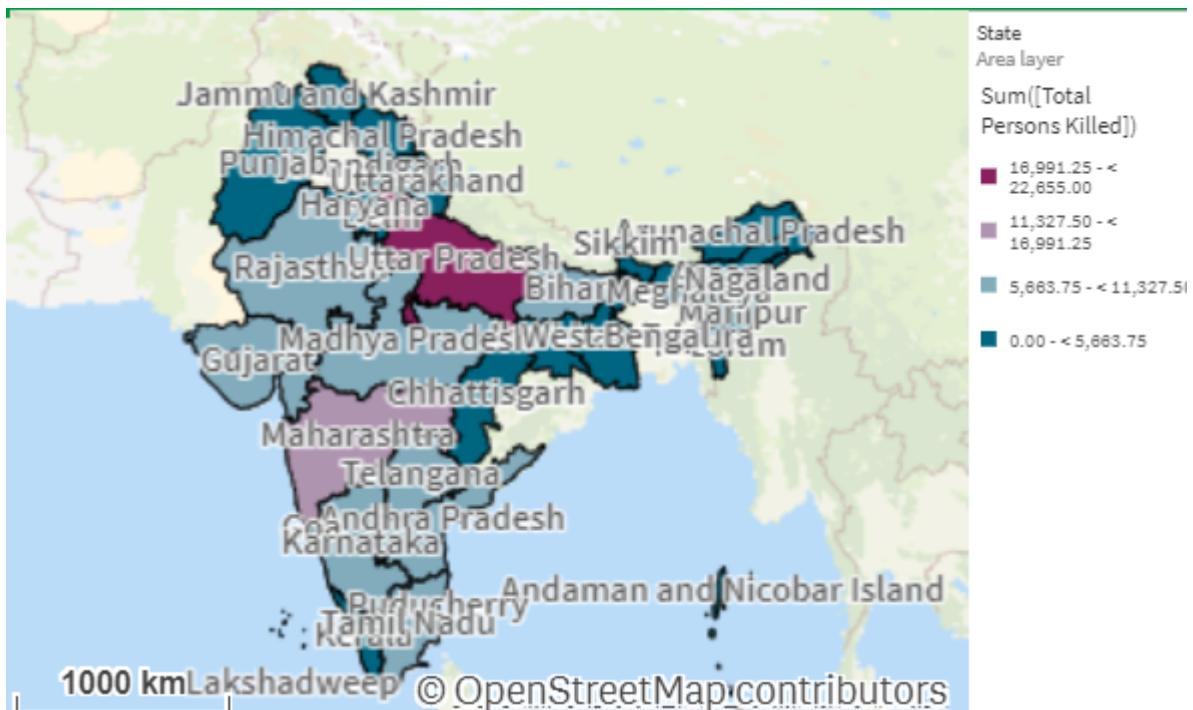
By addressing these business requirements, companies can improve road safety, lower costs related to accidents, enhance compliance, and prioritize the well-being of their employees.

Literature survey: A literature survey for the Road Safety and Accident Patterns analysis would involve researching and reviewing previous studies, articles, reports and figures is as follows:

1. (Colagrande, S., 2022. A methodology for the characterization of urban road safety through accident data analysis. *Transportation research procedia*, 60, pp.504-511.) This paper outlines a method for assessing urban road safety through the analysis of accident data. The approach evaluates accidents using the Frequency-Severity Risk Index (FSRI) to focus on crucial road segments and prioritize safety interventions. Through the analysis of accident data, the study assesses road safety and proposes a risk index. The suggested methodology evaluates accidents and highlights critical road segments, assessing road safety via the Frequency-Severity Risk Index (FSRI). It identifies crucial areas and prioritizes interventions for enhancing road safety, aiding in determining operational changes to mitigate accident causes.
2. Soemitro, R.A.A. and Bahat, Y.S., 2005. Accident analysis assessment to the accident influence factors on traffic safety improvement. In *Proceedings of the Eastern Asia Society for Transportation Studies* (Vol. 5, pp. 2091-2105). This paper examines accident factors on the Palangka Raya - Tangkiling national road. The research investigates black spot locations, accident influencing factors, and measures for traffic safety enhancement. It also scrutinizes road geometric features, surface conditions, land use, traffic volume, and driver characteristics. The study reveals that the location of black spots is influenced by road conditions, which in turn impact driver awareness. Factors such as traffic volume, land use, and driver characteristics play a significant role in determining accident rates. Additionally, the study finds that black spot locations affect both driver awareness and the likelihood of accidents, while land use, traffic volume, and driver characteristics have a substantial impact on accident occurrence.
3. Vaiana, R., Perri, G., Iuele, T. and Gallelli, V., 2021. A comprehensive approach combining regulatory procedures and accident data analysis for road safety management based on the European Directive 2019/1936/EC. *Safety*, 7(1), p.6. This study assesses road safety by examining inspections and analyzing accident data. It identifies infrastructure problems that affect the frequency and severity of accidents. Existing studies suggest that Road Safety Audits (RSAs) could potentially reduce crashes by 50-70%. The findings show a connection between RSAs results and accident data for creating a prediction model. Road safety inspections help pinpoint infrastructure issues that influence the occurrence and seriousness of accidents. The research quantitatively examines the links between infrastructure deficiencies and accidents. The presence of road markings and driveways has a significant impact on accident frequency. Predictive mathematical models use infrastructure factors to forecast accidents. The study proposes a methodology for predicting accidents and enhancing road safety.
4. Masirin, M.I.M., Al-Bargi, W.A., Prasetijo, J. and Daniel, B.D., 2016. Road Accident Analysis: A Case Study of Federal Route FT024 Yong Peng-Parit Sulong. In *MATEC web of conferences* (Vol. 47, p. 03004). EDP Sciences. This paper study on road accidents along FT 024, focusing on causes. Speed, volume, road geometry impact accidents; safety index development recommended. Previous studies lacked comprehensive sections, unlike this research. Global road accidents statistics highlight the severity of the issue. Speed and access point increase lead to more road accidents. Traffic volume does not have a strong relationship with accidents. Road safety index is effective for evaluating road safety

conditions.

Social Impact:

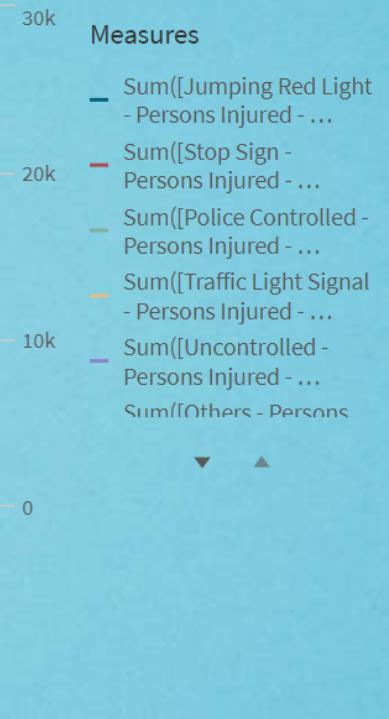


Graph 1: Total people killed in that state

The above map graph shows how state wise variation in the no. of deaths due to accidents. We see that places with more population like Uttar Pradesh, Maharashtra, Gujarat, etc have led to increase in rate of accidents and hence the severity of accidents has increased. Different states based on their road quality, weather, etc impacts.

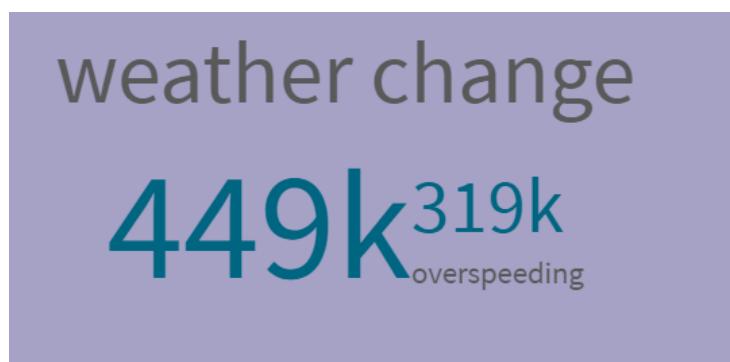
Traffic Control Type -State Accidents

... X



Graph 2: Severity of accidents in different areas of traffic control.

Here, we see that how the traffic control impacts accidents like Jumping in red light has caused major accidents in almost all of the states, specially in states like Karnataka, Kerala, Madhya Pradesh, Maharashtra, etc. Hence, understanding importance of traffic control is very crucial as it will lead to reduce accidents and deaths.



- The Total accidents cause of the weather changes is 449k.
- The top Over-Speeding - Number of Accidents - Number is 46878 with Total accidents cause of the weather changes that is 12.7% of the total.
- 77.8% of Total accidents cause of the weather changes is represented by top 10 Over-Speeding - Number of Accidents - Number.
- The bottom 18 Over-Speeding - Number of Accidents - Number produce 3.9% of Total accidents cause of the weather changes.
- 230 items in Total accidents cause of the weather changes are not associated with Over-Speeding - Number of Accidents - Number. This may indicate a data quality issue.

Calculated measure (KPI)

- The count of Count([Over-Speeding - Number of Accidents - Number]) is 36.

Comparison

- Comparison: total Sum([Total accidents cause of the weather changes]) is 449k and count of Count([Over-Speeding - Number of Accidents - Number]) is 36.

Mutual information

- The mutual dependence between Over-Speeding - Number of Accidents - Number and Total accidents cause of the weather changes is 99.96%.

Calculated measure (KPI)

- The total Female killed is 5.17k.

Ranking

- The top States-UTs-State-UT is Maharashtra with Female killed that is 9.8% of the total.
- 79.8% of Female killed is represented by top 12 States-UTs-State-UT.

Comparison

- Comparison: total Female killed is 5.17k and total Male Killed is 20.68k.

Mutual information

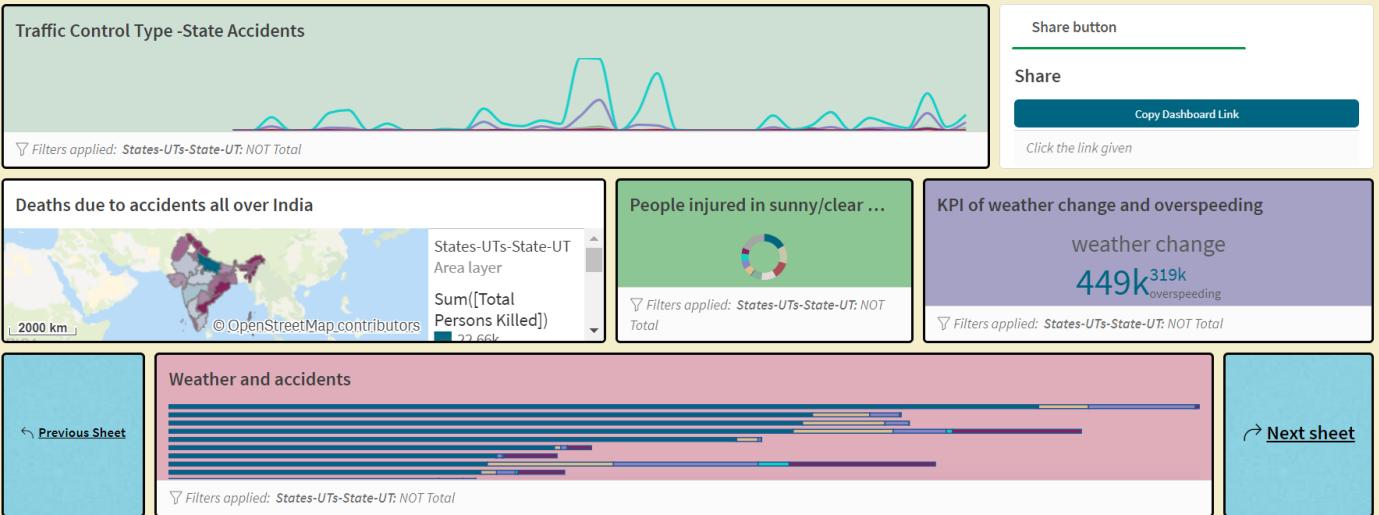
- The mutual dependence between Total- Pedestrian- Female killed and Total- Pedestrian- Male killed is 99.94%.

Correlation

- Correlation: Total- Pedestrian- Female killed and Total- Pedestrian- Male killed have a 92.81% correlation.

Visualisations and dashboards:

Social Impact



DASHBOARD 1

Dashboard 1

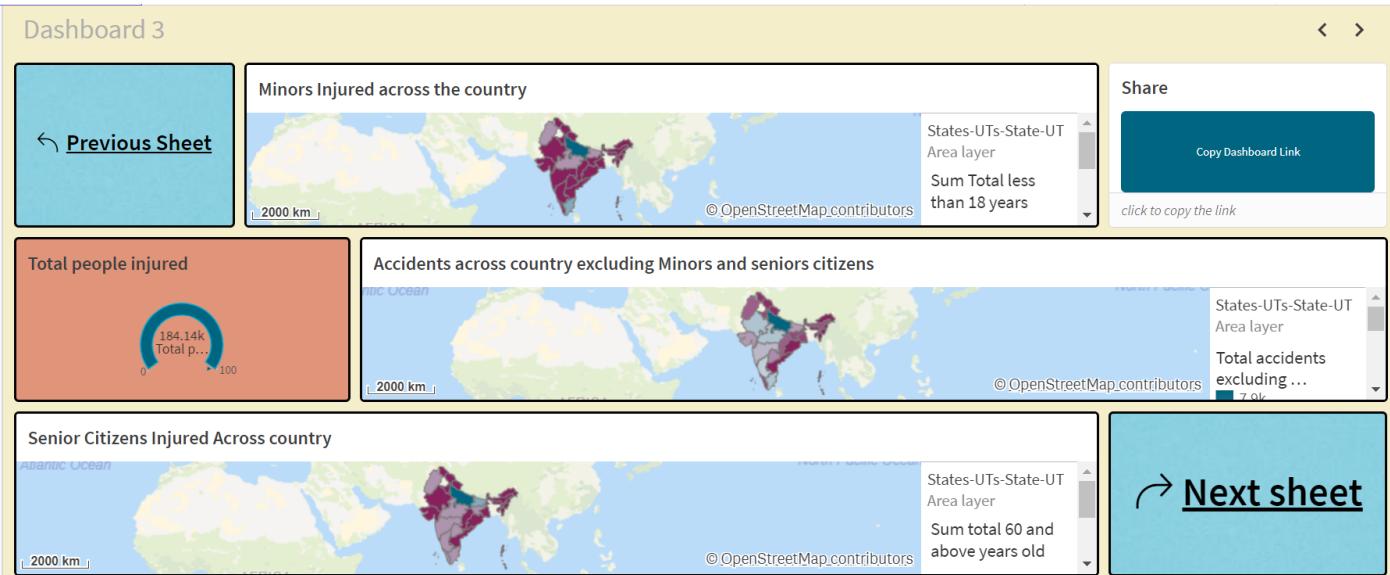


DASHBOARD 2

Dashboard 2



DASHBOARD 3



DASHBOARD 4

Dashboard 4

Total killed vs drunken drive person killed cases

Ranking

- The total Sum([Drunken Driving/ Consumption of alcohol and drug- Persons Killed]) is 5.33k.
- The top Total Persons Killed is 22655 with Sum([Drunken Driving/ Consumption of alcohol and drug - Persons Killed]) that is 41.8% of the total.
- 78.8% of Sum([Drunken Driving/ Consumption of alcohol and drug- Persons Killed]) is represented by top 4 Total Persons Killed.

Mutual information

- The mutual dependence between Drunken Driving/ Consumption of alcohol and drug - Persons Killed and Total Persons Killed is 99.9%.

Correlation

- Correlation: Drunken Driving/ Consumption of alcohol and drug - Persons Killed and Total Persons Killed have a 63.39% correlation.

Button for 1st page

[First sheet](#)

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Word cloud

Total accidents cause of use of mobile phones in age 18 to 25

173
107
217
10
6
50
100
118
130
134
194
66
98
27
67
418
8
99
3

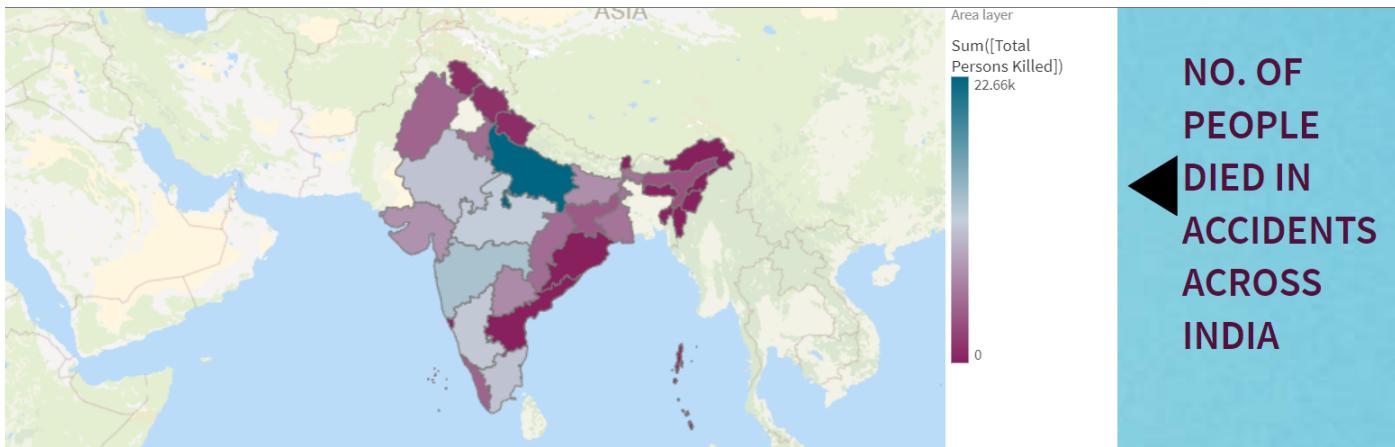
Correlation - Speeding and Number of accidents

Filters applied: States-UTs-State-UT: NOT Total

[Previous Sheet](#)

DASHBOARD 5

STORIES:



Ranking

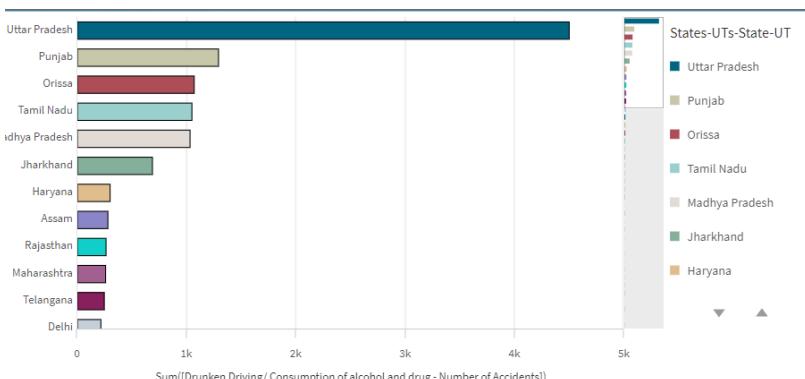
- The top States-UTs-State-UT is Maharashtra with Female killed that is 9.8% of the total.
- 79.8% of Female killed is represented by top 12 States-UTs-State-UT.

Comparison: total Female killed is 5.17k and total Male Killed is 20.68k.



NO. OF PEOPLE INJURED ACROSS INDIA

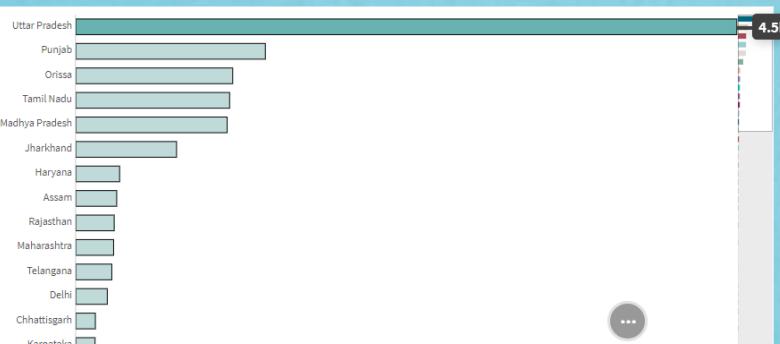
STORY 1



Ranking

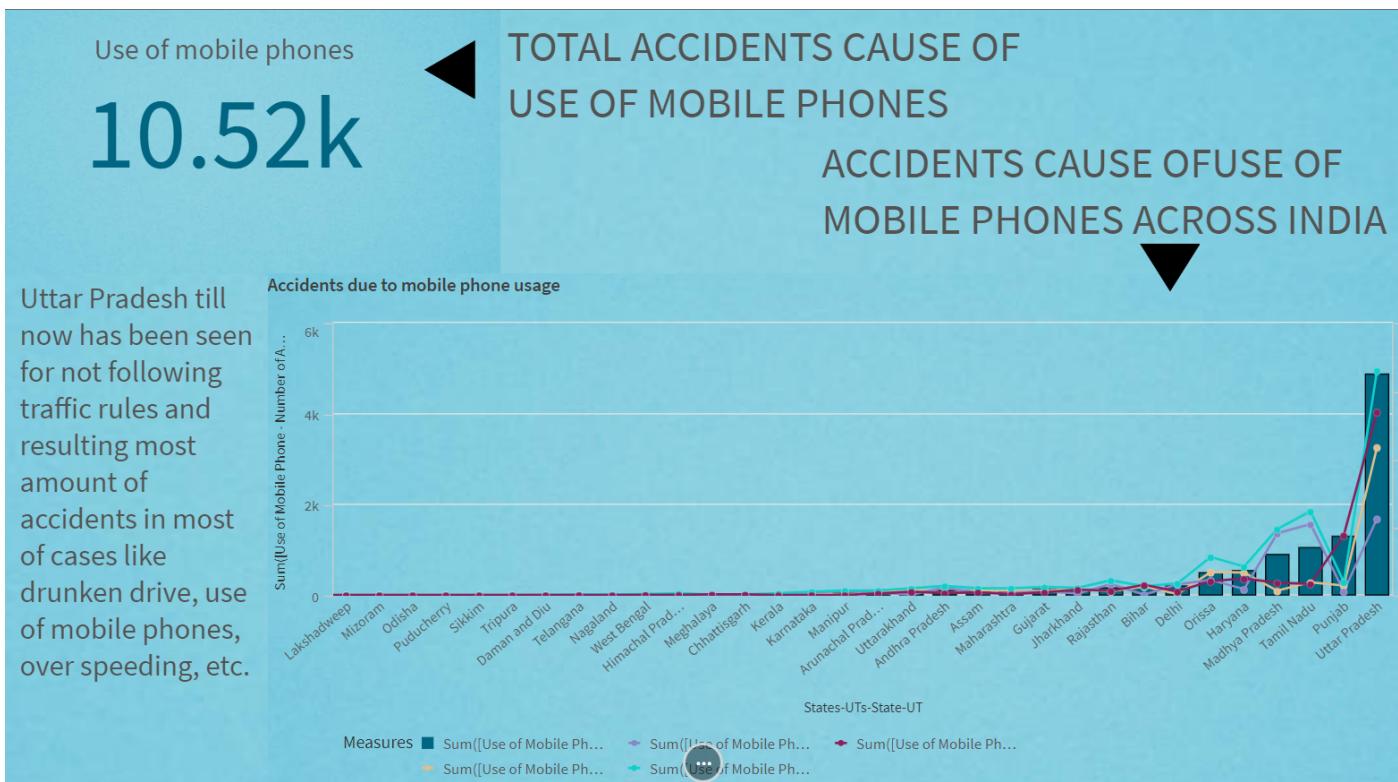
- The total Sum([Drunken Driving/ Consumption of alcohol and drug - Persons Killed]) is 5.33k.
- The top Total Persons Killed is 22655 with Sum([Drunken Driving/ Consumption of alcohol and drug - Persons Killed]) that is 41.8% of the total.
- 78.8% of Sum([Drunken Driving/ Consumption of alcohol and drug - Persons Killed]) is represented by top 4 Total Persons Killed.

IMPACTS CAUSE OF DRUNKEN DRIVING

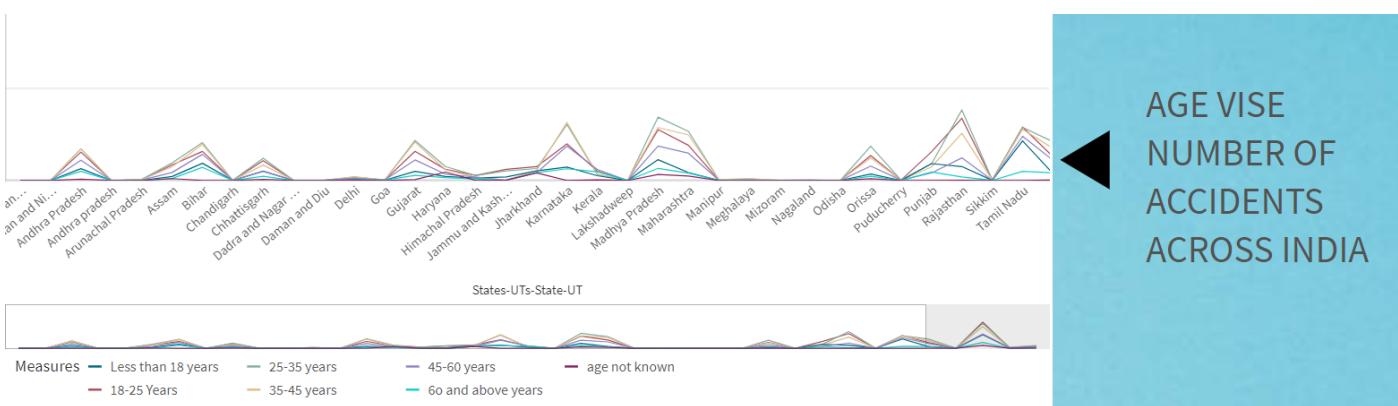


Highest amount of accidents after drinking and driving are seen in Uttar Pradesh

STORY 2

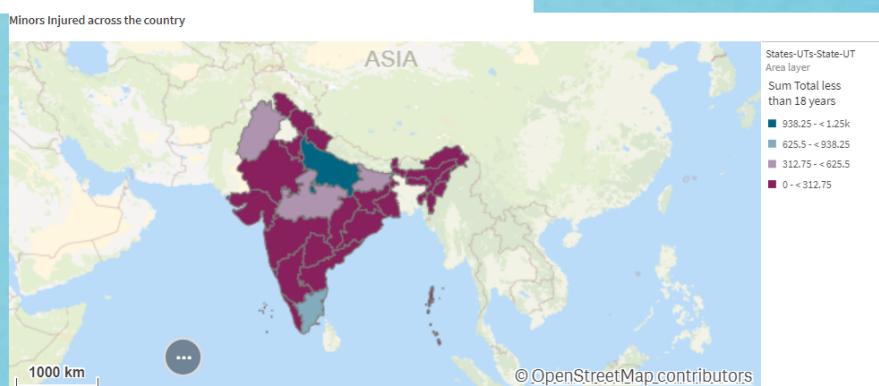


STORY 3

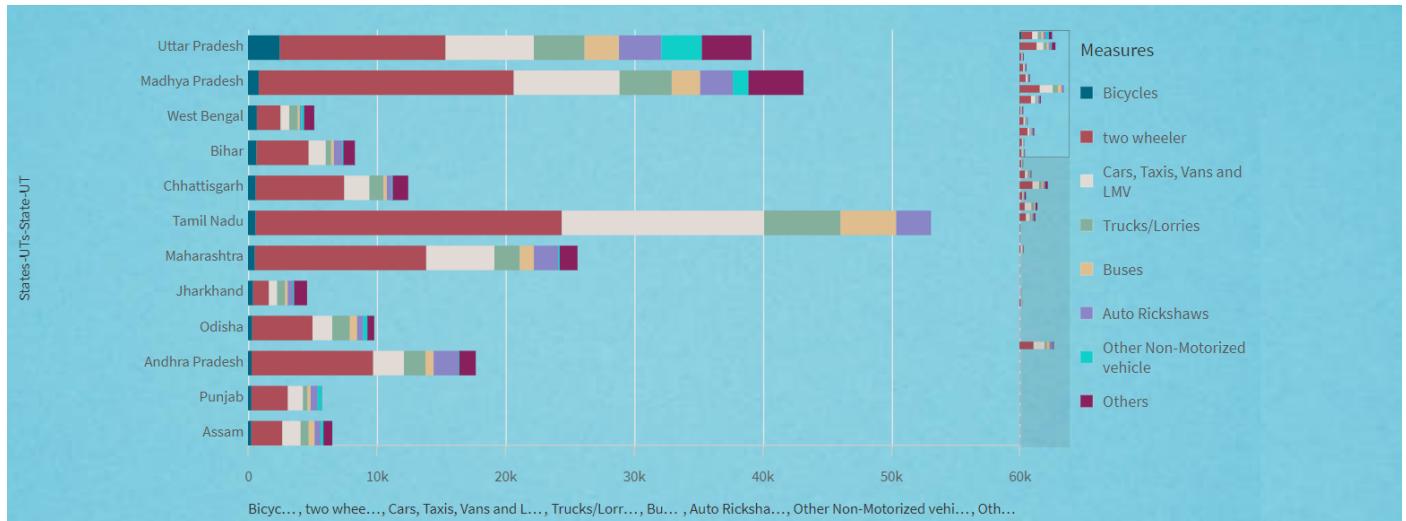


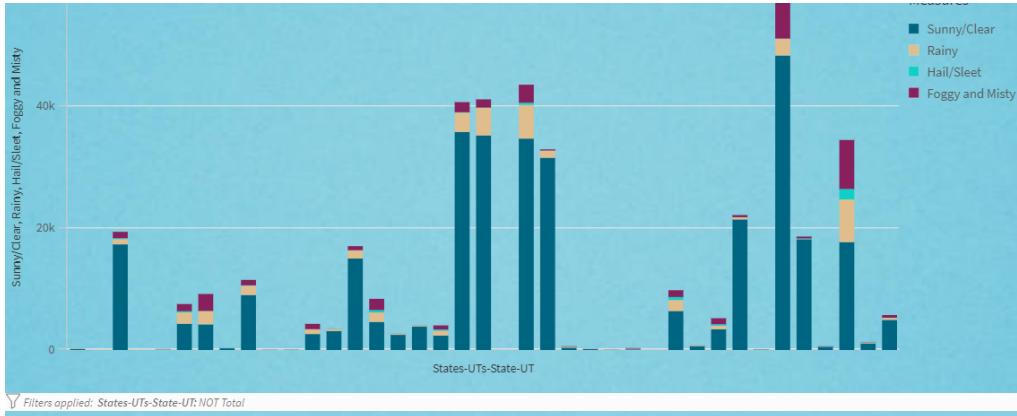
AGE VISE NUMBER OF ACCIDENTS ACROSS INDIA

MINORS GETTING INJURED STATEWISE



STORY 4





Calculated measure (KPI)

- The total Sunny/Clear is 660.6k.

Ranking

- The top States-UTs-State-UT is Total with Sunny/Clear that is 50% of the total.
- 78.1% of Sunny/Clear is represented by top 6 States-UTs-State-UT.

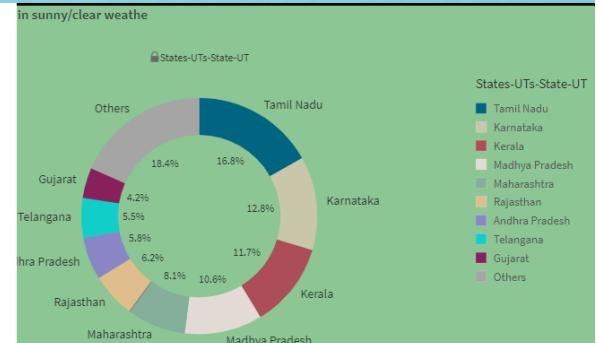
Mutual information

- The highest mutual dependence is between Sunny/Clear - Total Accidents - Number and Rainy - Total Accidents at 100%.
- The lowest mutual dependence is between Sunny/Clear - Total Accidents - Number and Hail/Sleet - Total Accidents at 0%.

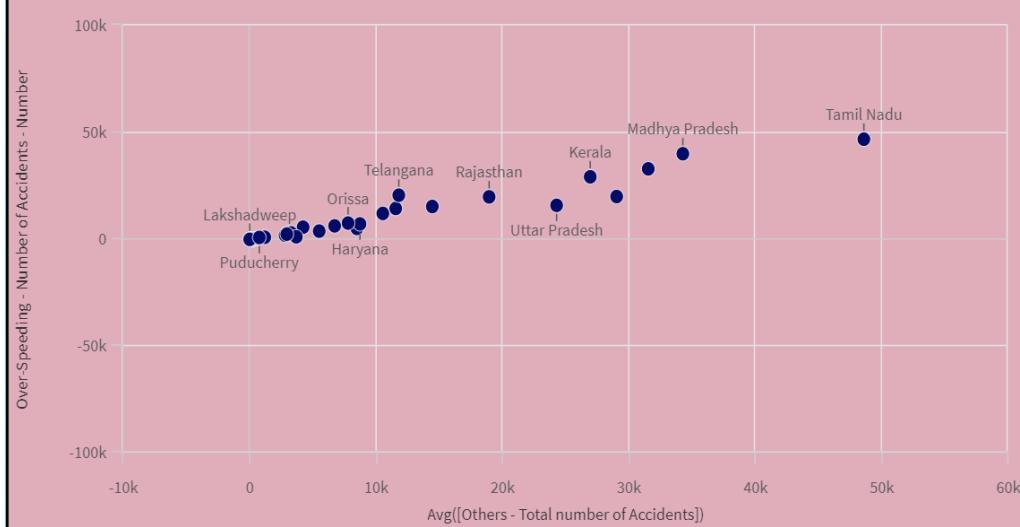
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ACCIDENTS IN INDIA DUE TO CHANGE IN WEATHER

TOTAL INJURIES IN SUMMER/CLEAR ATMOSPHERE



Correlation - Speeding and Number of accidents



KPI OF NUMBER OF DEATHES AND WEATHER CHANGE AND OVERSPEEDING

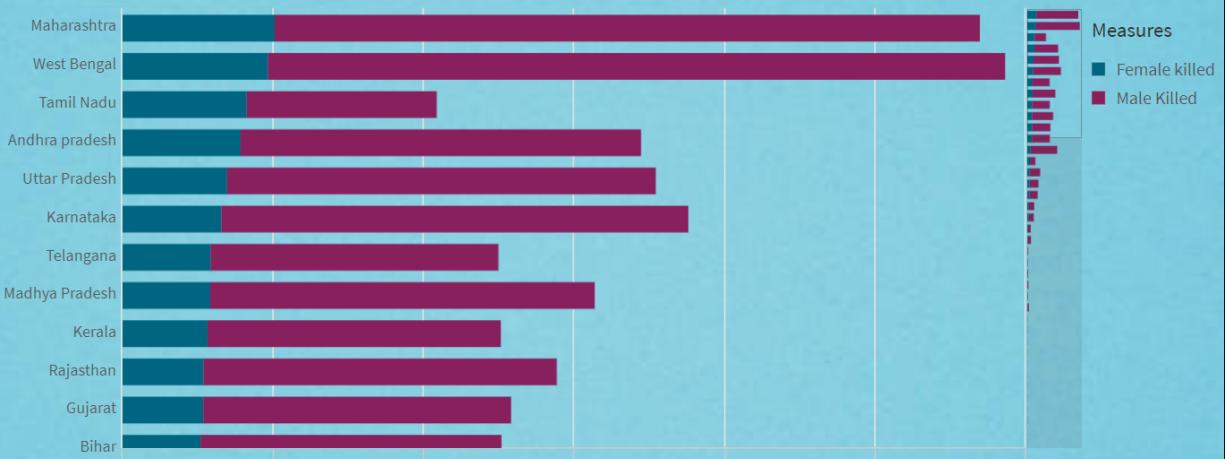
Major accidents occur due to over speeding, out of which Tamil Nadu, Madhya Pradesh, and Kerela are few top states where accident rate is very high cause of over speeding.

weather change

449k^{319k}_{overspeeding}

STORY 7

The total Female killed is 5.17k.



Mutual information

- The mutual dependence between Total- Pedestrian- Female killed and Total- Pedestrian- Male killed is 99.94%.

Correlation

- Correlation: Total- Pedestrian- Female killed and Total- Pedestrian- Male killed have a 92.81% correlation.

STORY 8

CONCLUSION:

The examination of road safety and accident trends in India using the provided dataset has uncovered several key findings and conclusions. The data indicates that most accidents occur in sunny/clear weather, resulting in a significant number of fatalities and injuries. This underscores the necessity for enhanced road safety measures, such as improved traffic control and enforcement, to mitigate accidents under these circumstances. Additionally, the analysis demonstrates a connection between speeding and accident frequency, particularly in sunny/clear weather. This indicates that speeding plays a crucial role in accidents and underscores the importance of focused interventions like speed limit enforcement and public awareness initiatives to reduce accidents. Moreover, the data suggests that speeding is the primary cause of accidents, followed by drunk driving and non-compliance with traffic regulations. This underscores the importance of stricter enforcement of traffic laws and rules to minimize accidents. The analysis also reveals that the majority of accident victims are males aged 18 to 44, emphasizing the necessity for targeted safety measures and awareness campaigns tailored to this demographic. Furthermore, the data shows that two-wheelers and four-wheelers are the most commonly involved vehicle types in accidents. This implies that safety measures, such as helmet enforcement and vehicle safety inspections, should be given priority for these vehicle categories. In conclusion, the analysis underscores the requirement for a comprehensive approach to enhancing road safety in India, encompassing improved traffic control, stringent enforcement of traffic laws, targeted safety measures, and public awareness initiatives.

