# Road Accident Analysis Report

## 1. Problems and Background

Road accidents are a leading cause of injury and death worldwide, affecting both urban and rural populations. This dashboard visualizes data on **417,883 total casualties**, segmented by casualty severity, vehicle type, location, road type, surface condition, and period. The increasing number of casualties, especially **slight (351,436)** and **serious (59,312)**, highlights the urgent need for targeted road safety measures and infrastructure planning.

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## 2. Solution

To address the rising number of road casualties, this project provides:

1. **Data Analysis**: Breakdown of casualties by road conditions, vehicle types, accident timing, and more.

2. **Data-Driven Insights**: Identification of key accident contributors such as road type, lighting, and surface condition.

3. **Stakeholder Engagement**: Informs urban planners, transport departments, and road safety agencies for policy and strategy development.

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## 3. Project Scope

**Objective**:
Identify key causes and trends in road accident casualties to support preventive strategies and reduce fatalities.

**Process**:

- **Data Collection**: Accident data categorized by severity, vehicle, time, road conditions, and location.

- **Data Cleaning**: Ensured consistency in vehicle categories and surface/lighting definitions.

- **Exploratory Data Analysis (EDA)**: Utilized dashboard visualizations for real-time trend analysis.
- **Predictive Modeling (optional extension)**: Forecasting future trends based on past patterns.
- **Strategy Development**: Use insights for targeted interventions (e.g., improve lighting or signage in rural areas).

**Timeline**:

- Week 1: Data Collection and Understanding
- Week 2–3: Data Cleaning and Visualization
- Week 4: Analysis and Report Preparation

**Stakeholders**:

- **Internal**: Data analysts, transport authorities
- **External**: Government agencies, traffic control departments, public safety organizations

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## 4. Methodology

**Data Sources**:

- Local traffic databases
- Department of Transport records (2021–2023)
- Possibly scraped historical data and accident reports

**Data Wrangling**:

1. Cleaned duplicates and normalized categories (e.g., lighting conditions)
2. Merged datasets across years

3. Converted dates for time-series analysis
4. Categorized vehicle types and severity levels

**Data Analysis**:

- Temporal patterns (monthly trends)
- Risk factors (road type, surface, lighting)
- Vehicle-wise and region-wise contribution

**Data Visualization**:

- Power BI interactive dashboard with filter panels and dynamic visuals

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## 5. Goals and KPIs

| KPI | Value | Goal |
|---|---|---|
| **Total Casualties** | 417,883 | Reduce annually by 10% |
| **Fatal Casualties** | 7,135 (1.71%) | Keep below 1.5% |
| **Serious Casualties** | 59,312 (14.19%) | Reduce by 5% |
| **Slight Casualties** | 351,436 (84.1%) | Improve reporting & preventive action |
| **Urban vs Rural** | 255.9K vs 162.0K | Improve rural safety |
| **Lighting Condition (Darkness)** | 305.0K | Enhance street lighting |
| **Vehicle Casualties** | Cars: 33.6K, Bikes: 33.4K | Focus awareness campaigns on high-risk drivers |
| **Road Surface – Wet/Snow** | 115.3K | Improve road drainage and gritting operations |

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## 6. Technical Processes

- **VLOOKUP / Data Merge**: Used to combine accident reports by year and vehicle ID.
- **Pandas Cleaning**: Removed null values and standardized column headers.
- **Schema Design**: Accident tables structured for severity, vehicle type, surface, and lighting.

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## 7. Business Concepts Used

- **Market Understanding**: Accidents more frequent on single carriageways and in urban areas.
- **Customer Demographics**: Indirectly via vehicle types and location distribution.
- **Customer Behavior**: Focus on vehicle categories such as two-wheelers and personal cars.
- **Retention Equivalent**: Instead of customer retention, reducing repeat accident zones.
- **New Strategy Development**: Promote better road infrastructure in urban areas, especially dry but high-traffic zones.

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## 8. Recommended Analysis

**Key Drivers of Road Accidents**:

- **Road Type**: Single carriageway is most dangerous (309.7K casualties)
- **Surface Conditions**: Wet roads are riskier (115.3K incidents), highlighting drainage issues.
- **Lighting**: Most accidents happen in **darkness** (305.0K), stressing need for better lighting.
- **Urban Areas**: Account for **255.9K casualties**, demanding traffic policy updates.

**High-Risk Zones and Recommendations**:

- **Rural Roads**: Though less in number, need targeted awareness and speed control.

- **Road Surface Improvements**: Snow/Ice-related accidents, though low, require seasonal planning.
- **Vehicle Focus**: Cars and bikes together contribute over 67K casualties – consider mandatory road safety training and better helmet/seatbelt compliance checks.

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## 9. Customer Status Percentages :

- Fatal: 1.71%
- Serious: 14.19%
- Slight: 84.10%

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## 10.Casualties by Light Condition

- **Darkness**: 305.0K
- **Daylight**: 112.9K

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## 11. Casualties by Road Type

- Single Carriageway: 309.7K
- Dual Carriageway: 67.4K
- Roundabout: 26.8K
- One-way Street: 7.4K
- Slip Road: 4.7K

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## 12. Project Owner

- **Name**: Ranu Rathod
- **Date**: 13-07-2025