

Executive Summary – Road Accident Analysis Dashboard (2021–2022)

Project Objective

The Road Accident Analysis Dashboard was developed to provide actionable insights into accident-related casualties across the years 2021 and 2022. The dashboard equips government bodies, enforcement agencies, and transport operators with a comprehensive, data-driven tool to monitor accident trends, evaluate severity, and identify focus areas for road safety interventions.

Key Highlights

1. Primary KPIs

- **Total Casualties: 417,858** people were recorded as casualties in the analyzed period.
- **Accident Severity Breakdown:**
 - **Fatal:** 7,135 (≈1.7%)
 - **Serious:** 59,306 (≈14.2%)
 - **Slight:** 351,417 (≈84.1%)
- **Maximum Casualties by Vehicle Type:**
 - Cars accounted for the **highest proportion (≈333,463 or ~80%)**, followed by two-wheelers (33,672), vans (33,469), buses (12,798), and agricultural vehicles (1,032).
 - This highlights cars as the primary contributor to accident casualties.

2. Secondary KPIs

- **Casualties by Vehicle Type Distribution:**

While cars dominate, the substantial counts from bikes and vans emphasize the risk to both individual riders and light commercial transport sectors.
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3. Trend Analysis

- **Monthly Casualty Trends:**

Comparative monthly trends between 2021 and 2022 reveal seasonal fluctuations, with peaks aligning with high mobility periods (likely festivals, holidays, or seasonal traffic surges). This enables year-on-year tracking to identify whether safety measures have had measurable impact.
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4. Road & Environmental Factors

- **Maximum Casualties by Road Type:**

Casualties were concentrated on **major roads (A-roads and motorways)**, reflecting both traffic density and speed factors.

- **Distribution by Road Surface:**

The analysis identified higher casualties on **dry surfaces** (due to traffic volumes) but also highlighted risks on wet/icy roads where accident severity tends to escalate.

- **Area & Time Patterns:**

Casualties were more frequent in **urban areas during daytime**, reflecting commuting and traffic congestion. Night-time accidents, although fewer, were associated with higher severity.

Stakeholder Relevance

- **Ministry of Transport & Road Safety Corps:** Insights for national road safety strategies and investment in infrastructure.
 - **Police & Emergency Services:** Enables resource allocation for accident-prone areas and times.
 - **Traffic Management Agencies & Transport Operators:** Identifies critical vehicle categories (cars, bikes) for policy and awareness campaigns.
 - **Public & Media:** Transparency in accident trends and targeted awareness campaigns.
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Strategic Insights

1. **High-risk vehicle group:** Cars represent the bulk of casualties, requiring stricter enforcement, awareness, and technological interventions (speed control, collision avoidance systems).
 2. **Urban & daytime risks:** Emphasize traffic management in city areas and during commuting hours.
 3. **Severity patterns:** Although fatal accidents are a small percentage, they require continuous focus on road safety audits and rapid emergency response.
 4. **Data-driven monitoring:** Yearly comparisons provide a measurable basis for assessing policy effectiveness.
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Strategic Recommendations & Action Plan

1. Vehicle-Specific Interventions

- **Cars (≈80% of casualties):**
 - Enforce stricter speed regulation and monitoring through automated speed cameras and AI-based traffic systems.
 - Incentivize adoption of advanced driver-assistance systems (ADAS) such as lane-keeping, collision warnings, and emergency braking.

- Launch nationwide campaigns promoting seatbelt use for all occupants.
 - **Two-Wheelers (Bikes, 33,672 casualties):**
 - Mandate helmet compliance with higher penalties for violations.
 - Dedicated **bike lanes** in urban areas to segregate vulnerable riders from heavy vehicles.
 - Promote affordable insurance plans tied to safety compliance (helmets, reflective gear).
 - **Commercial Transport (Vans & Buses):**
 - Strict enforcement of driver rest-hour regulations to reduce fatigue-related accidents.
 - Regular training and certification for professional drivers.
 - Deploy GPS-based monitoring for fleet operators to track driver behavior (speeding, sudden braking, etc.).
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2. Road Infrastructure & Environment

- **High-Risk Road Types (A-roads & Motorways):**
 - Introduce **intelligent traffic management systems** (smart signals, variable speed limits) in accident-prone stretches.
 - Improve road lighting, signage, and lane markings.
 - Regular road safety audits to identify blind spots and black spots.
 - **Surface Conditions:**
 - Enhance road drainage systems to minimize wet/icy surface risks.
 - Seasonal awareness campaigns for drivers about adapting to wet/icy conditions.
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3. Time & Area-Based Safety Measures

- **Urban Areas (Daytime Peaks):**
 - Deploy traffic police and cameras during peak commuting hours.
 - Encourage staggered office timings to reduce congestion.
 - **Night-time Accidents:**
 - Expand reflective road markers and street lighting.
 - Introduce sobriety checkpoints to deter drunk driving.
 - Increase visibility campaigns for two-wheelers (reflective jackets, mandatory headlights).
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4. Emergency Response & Post-Accident Care

- Reduce response time with:
 - **Integrated command centers** connecting police, ambulance, and fire services.
 - AI-driven accident detection through CCTV/IoT to alert emergency units instantly.
 - Public awareness campaigns on bystander intervention and emergency first aid.
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5. Data-Driven Monitoring & Policy

- Create a **National Accident Database** updated in real-time by police, hospitals, and transport departments.
 - Expand the dashboard to include **predictive analytics** (forecasting hotspots based on historical patterns).
 - Publish quarterly accident reports for transparency and accountability.
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Necessary Steps to Implement

1. Short-Term (0–6 months):

- Launch targeted safety awareness campaigns (helmets, seatbelts, speeding).
- Deploy increased enforcement (checkpoints, speed cameras) in accident-heavy areas.
- Begin black-spot mapping using dashboard insights.

2. Medium-Term (6–18 months):

- Upgrade infrastructure in high-casualty zones (lighting, signage, drainage).
- Implement stricter regulations for commercial vehicle drivers.
- Integrate dashboard with **emergency response systems** for live monitoring.

3. Long-Term (18+ months):

- Nationwide rollout of **smart traffic management systems** with AI/IoT.
- Establish continuous driver training and certification frameworks.
- Evaluate policies yearly with dashboard data and refine safety strategies accordingly.