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24.11.2025.
Information Visualization

Interactive Visualization of Alcohol-Impaired Traffic Fatalities in the United States

Introduction

- Alcohol-impaired driving remains a major public safety problem
- A large portion of fatal crashes involve alcohol
- Goal: analyze long-term trends in alcohol-related crashes and identify high-risk states

Project Objective

The goal of this project is to develop an interactive web application that visualizes:

- National vs. state trends of alcohol-impaired fatal crashes (2010–2023)
- Geographic differences between U.S. states
- Risk profiles by age, sex, and time of day

Users can explore data dynamically, compare states, and analyze demographic factors that contribute to fatal crashes.

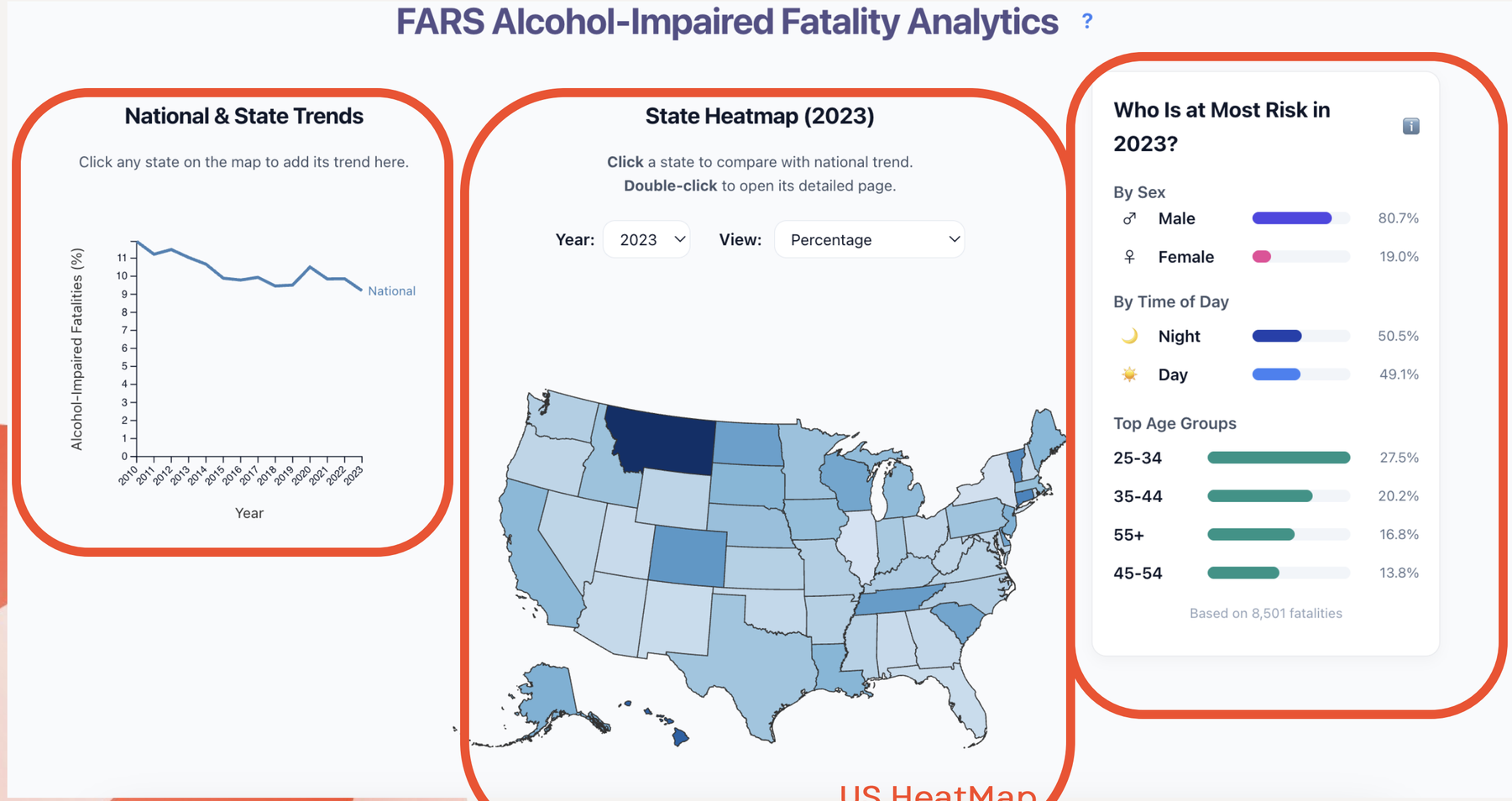
Data Source

- Dataset: Fatality Analysis Reporting System (FARS), NHTSA
- Annual nationwide reports of fatal road accidents
- Used years: 2010–2023
- Preprocessed to calculate alcohol-impairment fatality percentages and demographic breakdowns

Application Overview

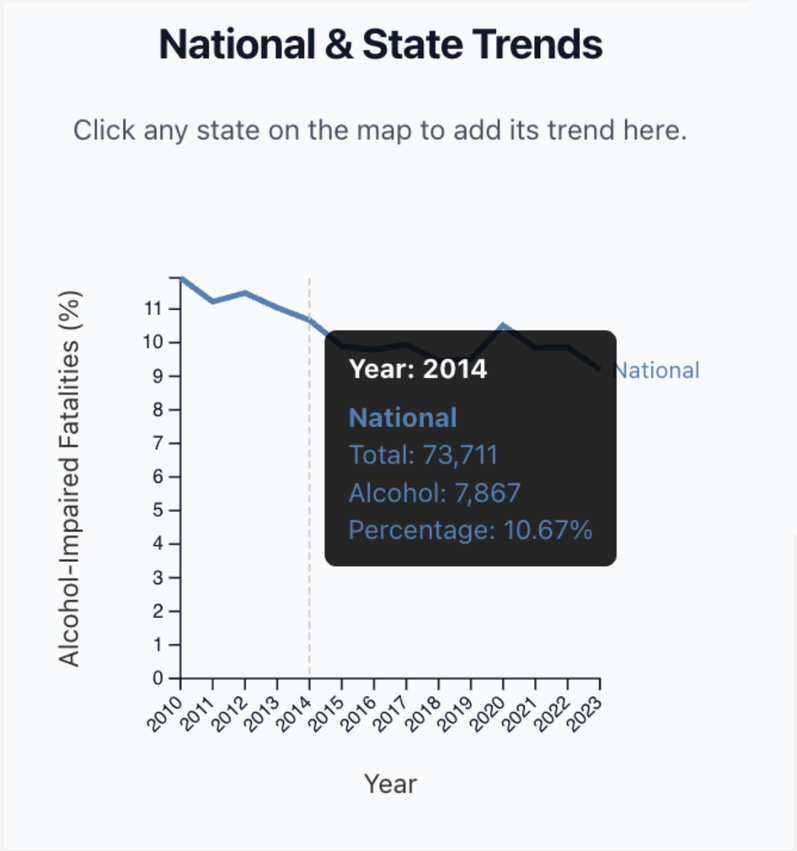
3 main components:

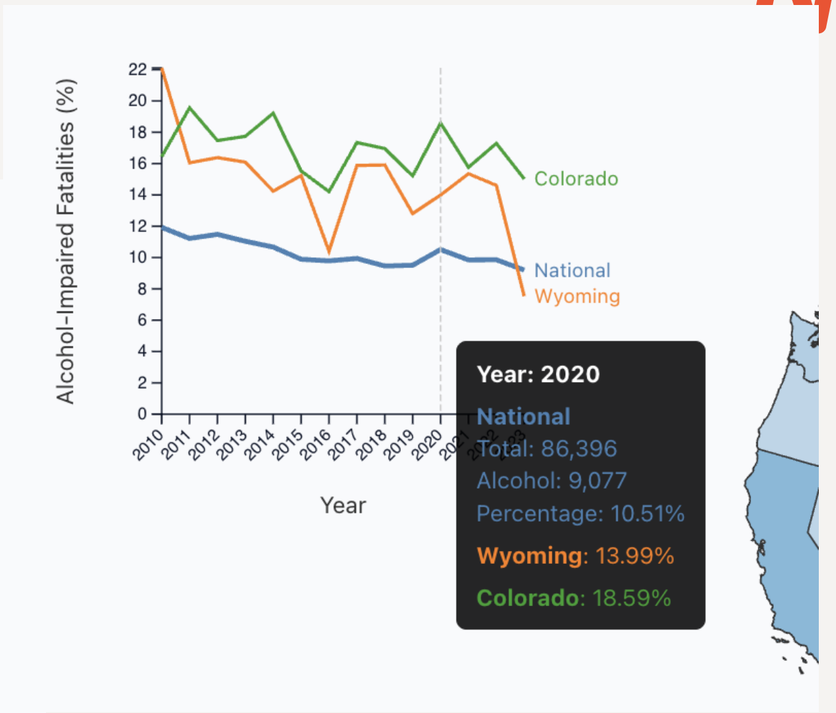
National and State Trend Chart



Risk Profile Panel

National & State Trend Chart

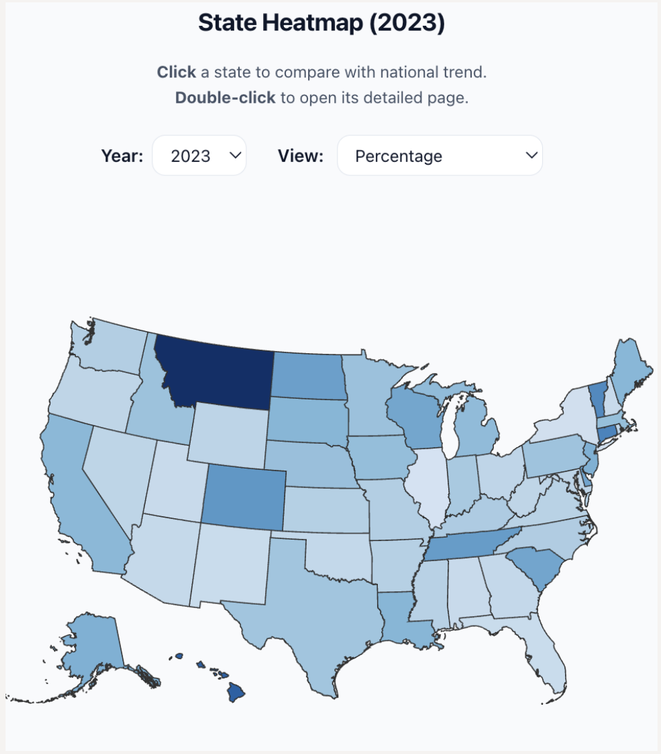


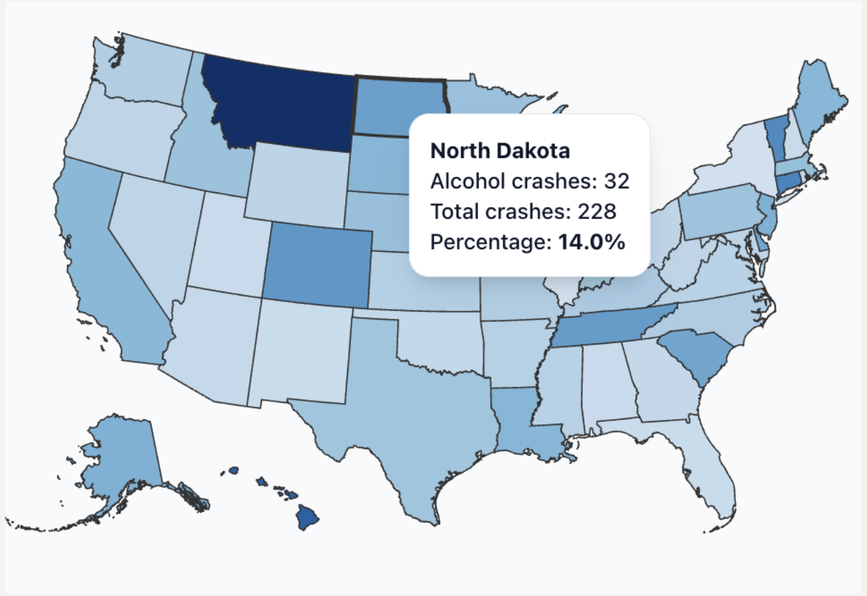


- Shows the percentage of alcohol-impaired fatalities over time (2010–2023)
- National trend displayed as baseline
- Users can click states to add or remove their trend lines for comparison
- Includes tooltips, hover details, legends, and interactive highlighting

US HEATMAP

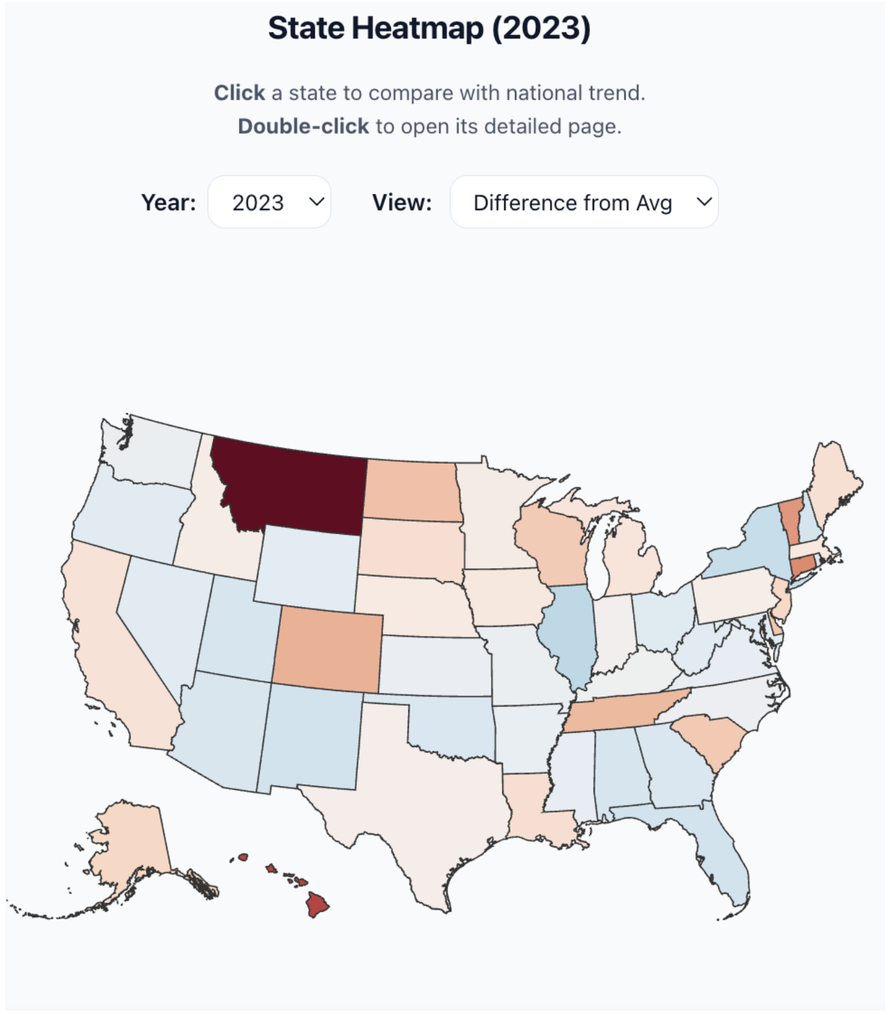
- Visualizes alcohol-impaired fatal crash percentages by state for a selected year
- Color gradient indicates severity level
- Selectable data view: Percentage vs. Difference from National Average

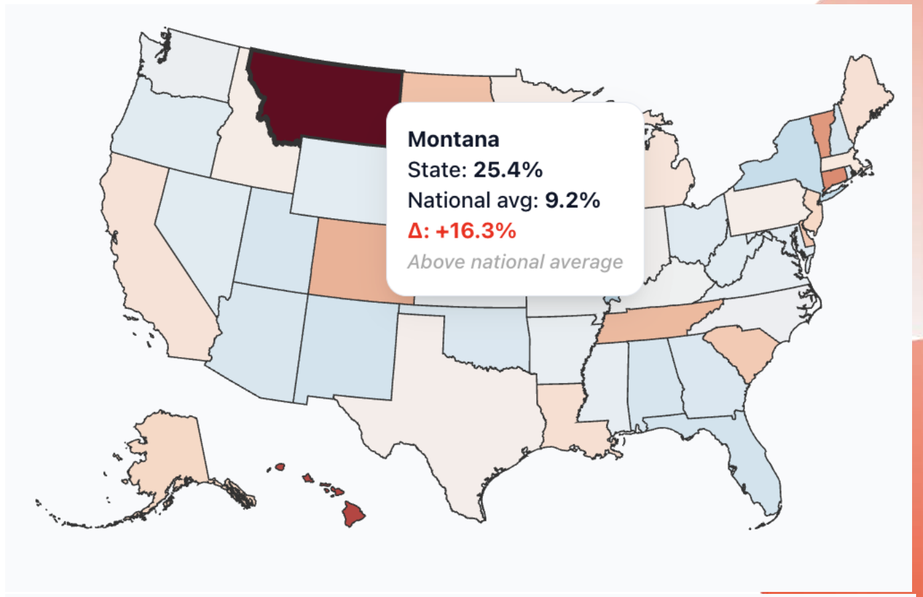


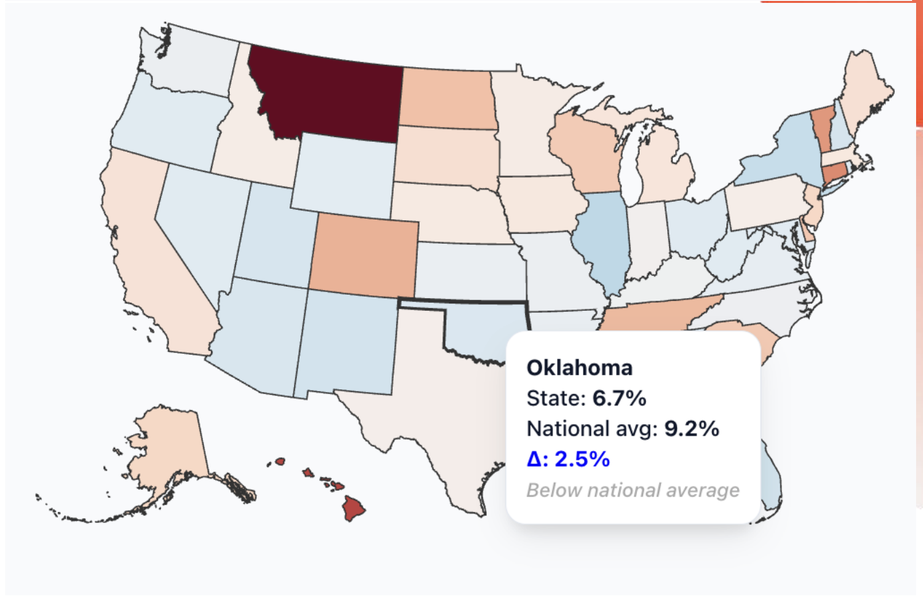


US HEATMAP

- Difference from National Average

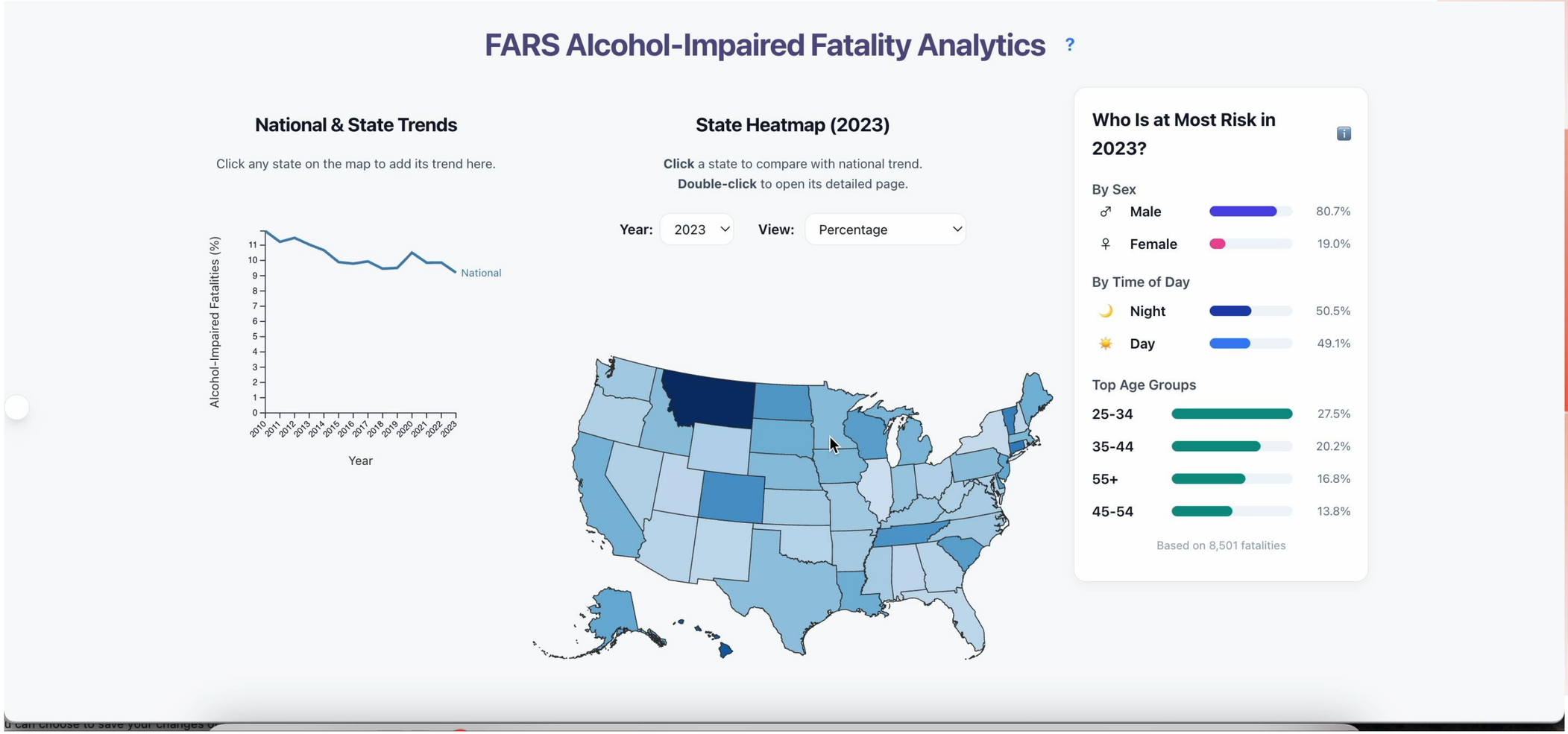






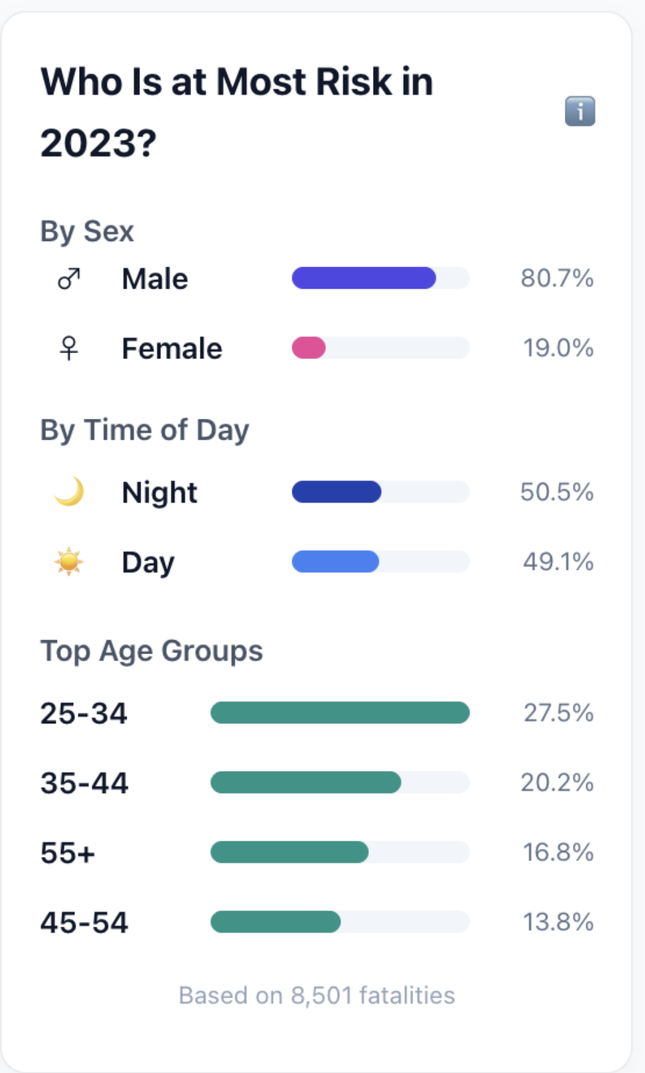
US HEATMAP

- Double Click on a state - automatically opens its detailed analysis page
- One click on a state – adds the state to the trend graph



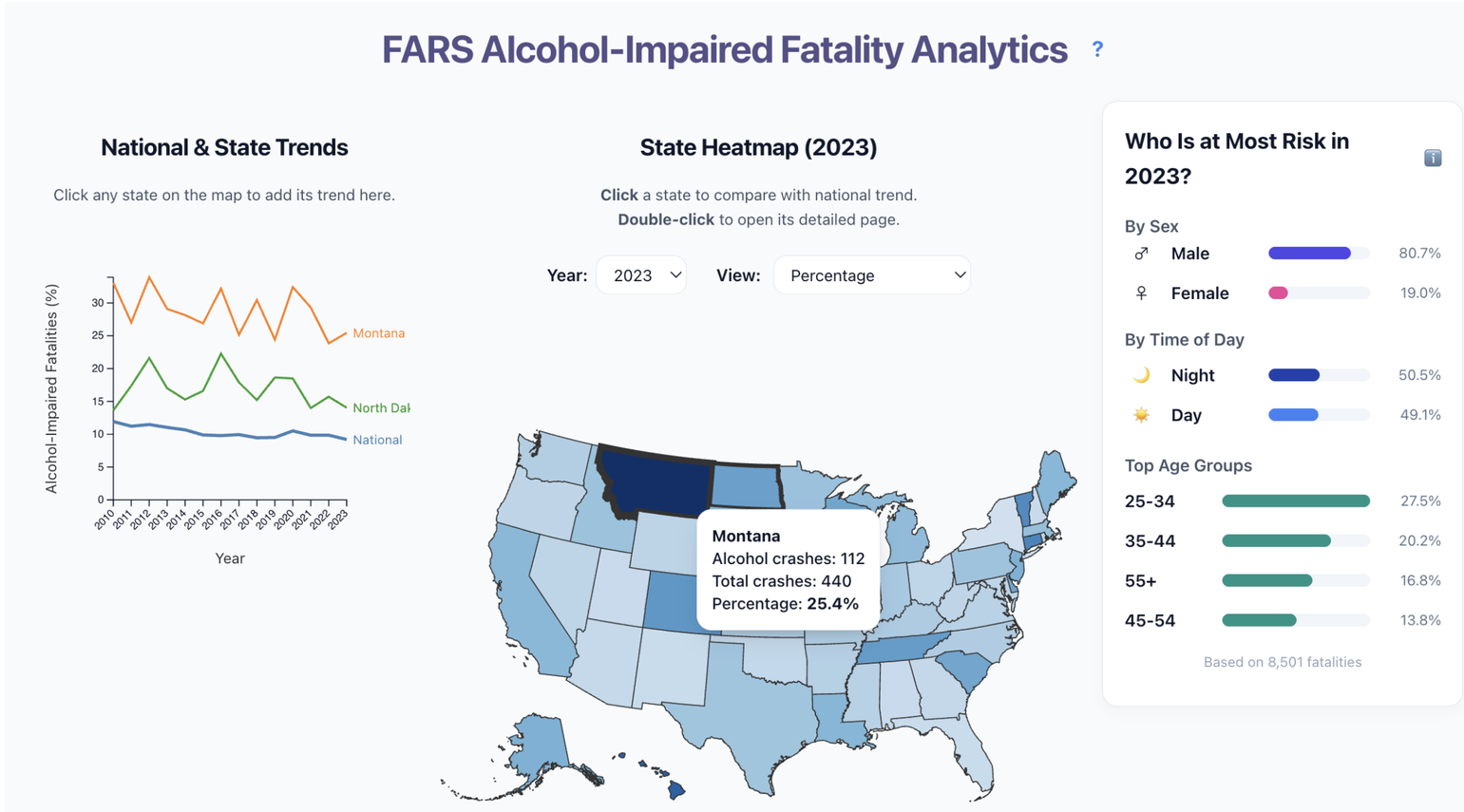
Risk Profile Panel

- Breakdown of victims by sex, age group, and time of day
- Responds to selected year or selected state
- Allows demographic filtering on the state page



Example Use Case

- Using the interactive dashboard, users can answer questions such as:
  - How does a selected state compare to the national trend?
  - Which states have the highest percentages of impaired-driving fatalities in 2023?
  - Which demographic group is most at risk within a selected state?



STATE PAGE

Montana

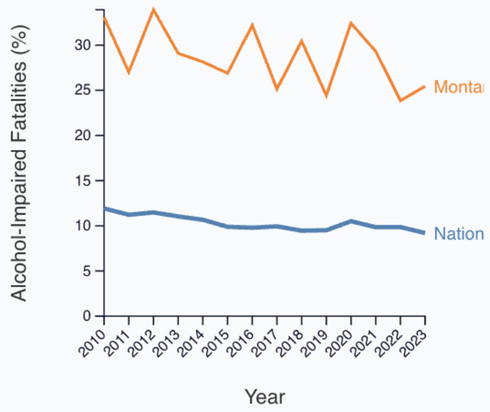
← Back

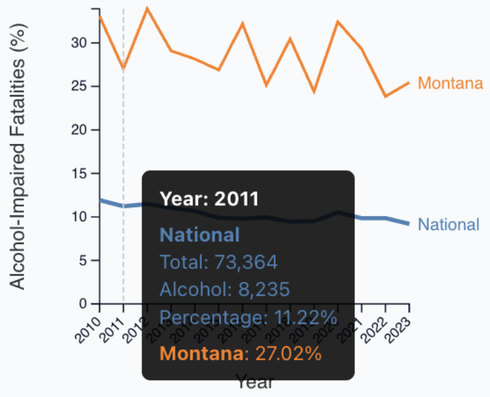
Select Year: 2023

2010–2023 (Total)	2023 (Selected Year)	2023 (No filters)
Alcohol: 1,641	**Alcohol:** 112	Alcohol Fatalities: **112**
All Crashes: 5,725	**All Crashes:** 440	No demographic filters
	Alcohol Share: 25.4%	

Min Age | Max Age | Sex: All | Apply | Clear

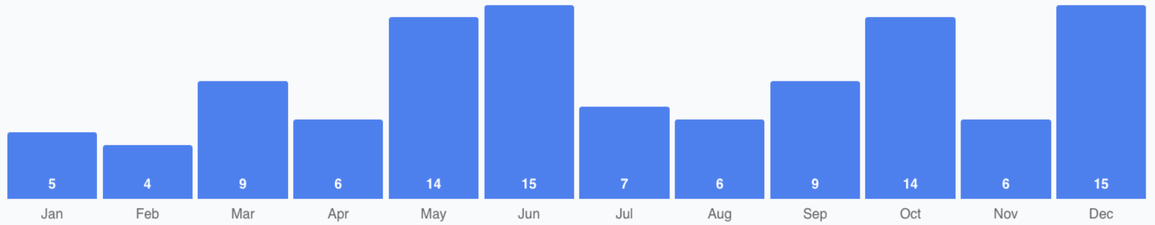
Trend Over Time (All Persons)





group

Fatalities by Month (2023)



Who Is at Most Risk in 2023?

By Sex

Male	72.3%
Female	27.7%

By Time of Day

Night	50.0%
Day	48.2%

Top Age Groups

45-54	20.5%
35-44	17.9%
25-34	17.9%
55+	15.2%

Based on 112 fatalities

STATE PAGE - filtering

Montana

← Back

Select Year: 2023

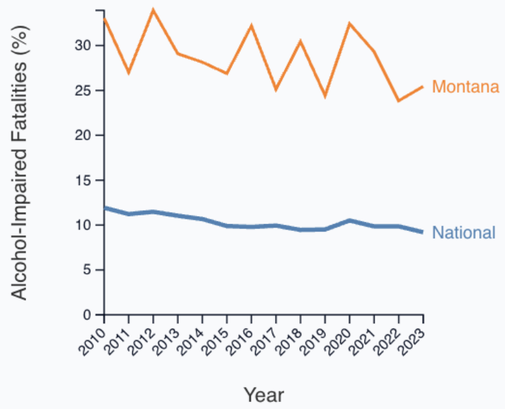
2010–2023 (Total)
Alcohol: 1,641
All Crashes: 5,725

2023 (Selected Year)
Alcohol: 112
All Crashes: 440
Alcohol Share: 25.4%

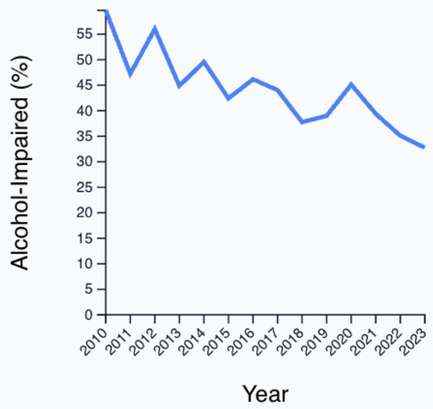
2023 (Filtered)
Alcohol Fatalities: **39**
Based on applied filters

Min Age 18 Max Age 40 Sex Male **Apply** **Clear**

Trend Over Time (All Persons)



Trend Over Time (Filtered Group)



Montana

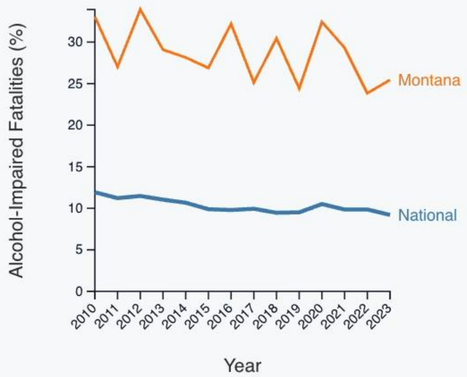
← Back

Select Year: 2023

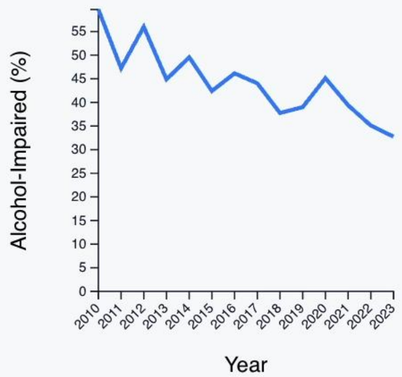
2010–2023 (Total)	2023 (Selected Year)	2023 (Filtered)
Alcohol: 1,641	**Alcohol:** 112	Alcohol Fatalities: **39**
All Crashes: 5,725	**All Crashes:** 440	**Based on applied filters**
	Alcohol Share: 25.4%	

Min Age 18 Max Age 40 Sex Male **Apply** **Clear**

Trend Over Time (All Persons)



Trend Over Time (Filtered Group)



Filtered Fatalities by Month (2023)

CONCLUSION

- Provides an interactive platform to explore traffic accident data.
- Makes complex data accessible and actionable through visualizations.
- Reveals patterns in demographics and high-risk groups.
- Supports informed, data-driven decisions for traffic safety.
- Demonstrates the power of real-time analytics in transforming raw data into insights.

THANK YOU