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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.





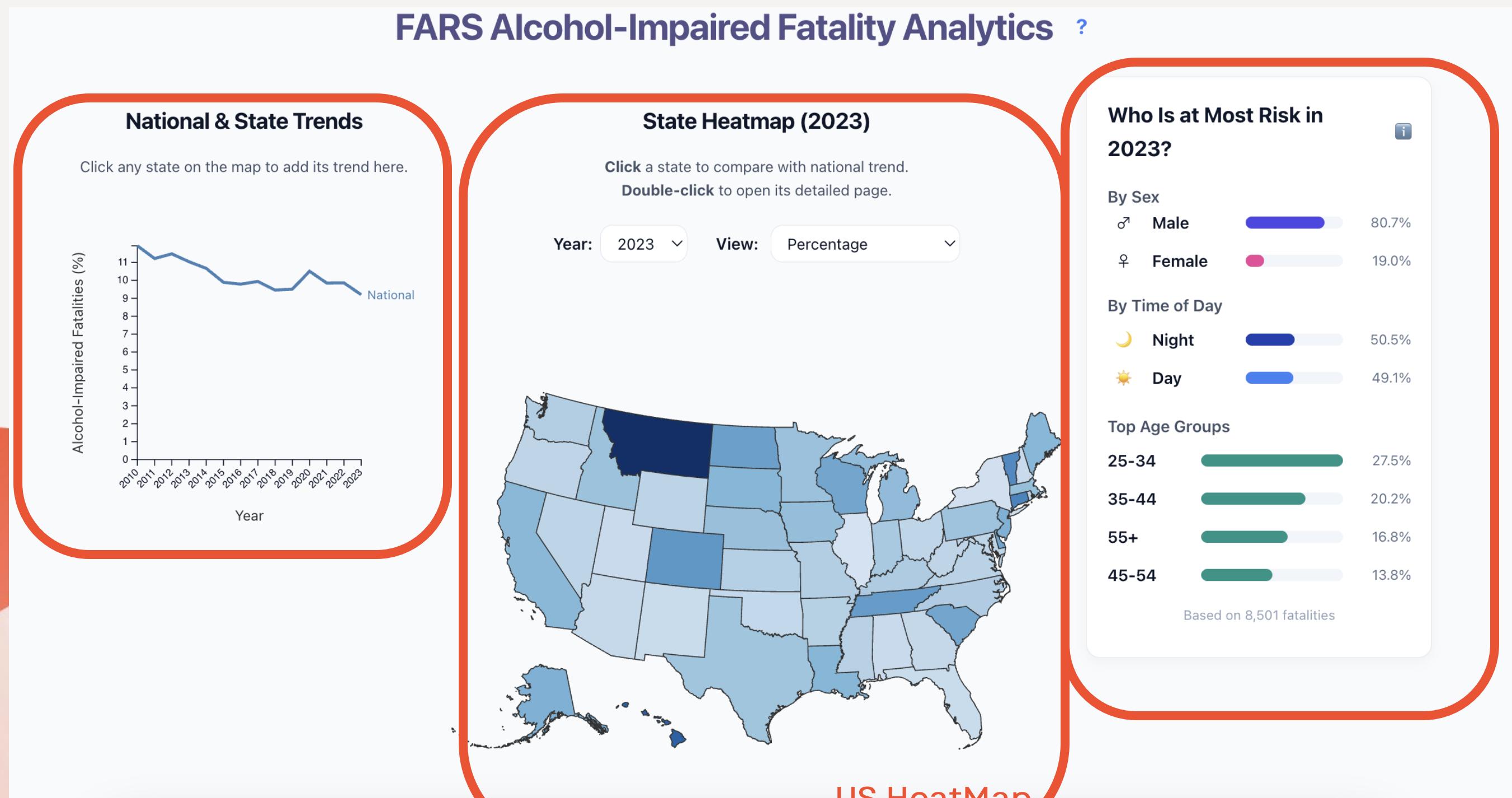
Data Source

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

Application Overview

3 main components:

National
and
State Trend
Chart

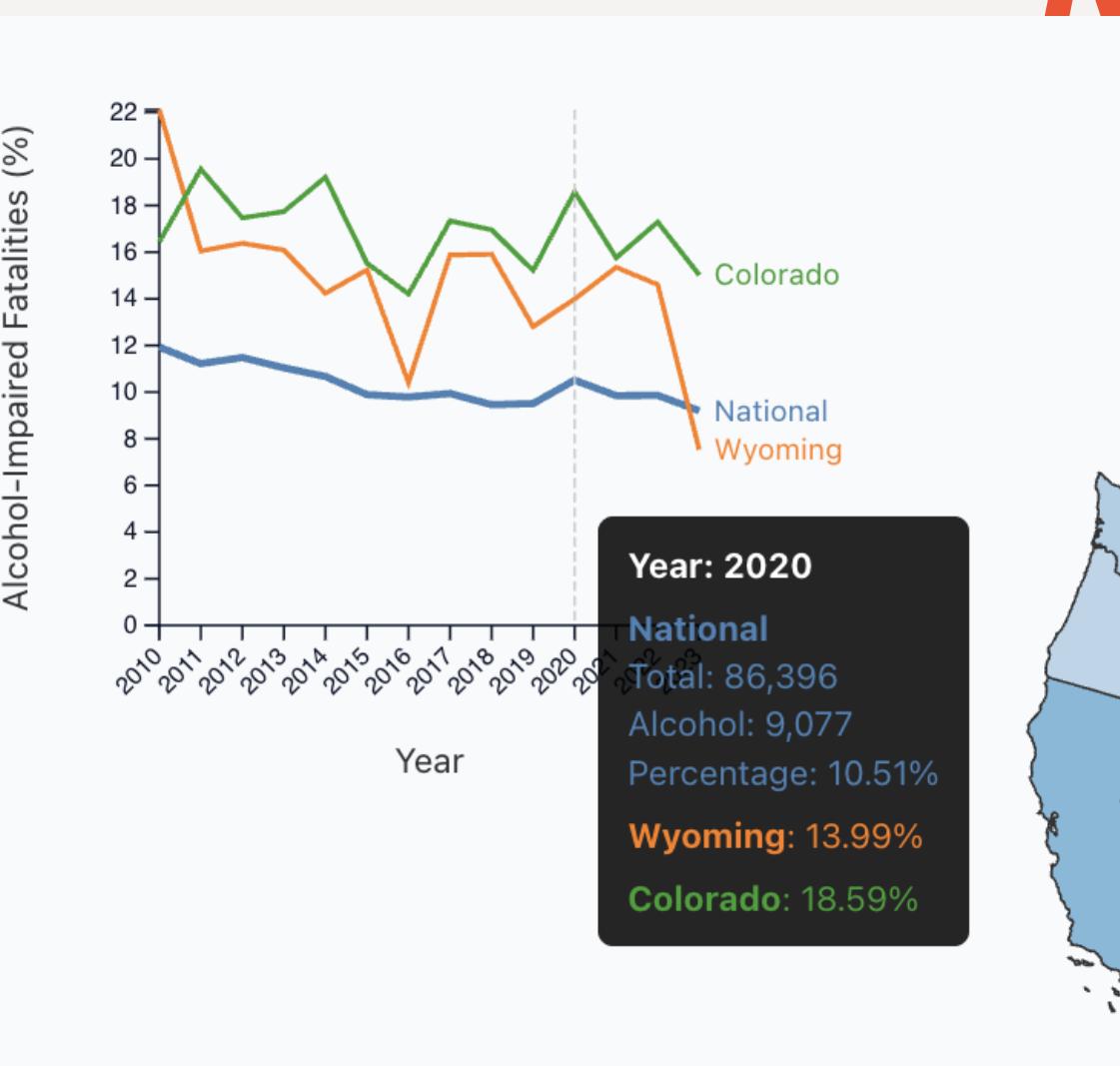
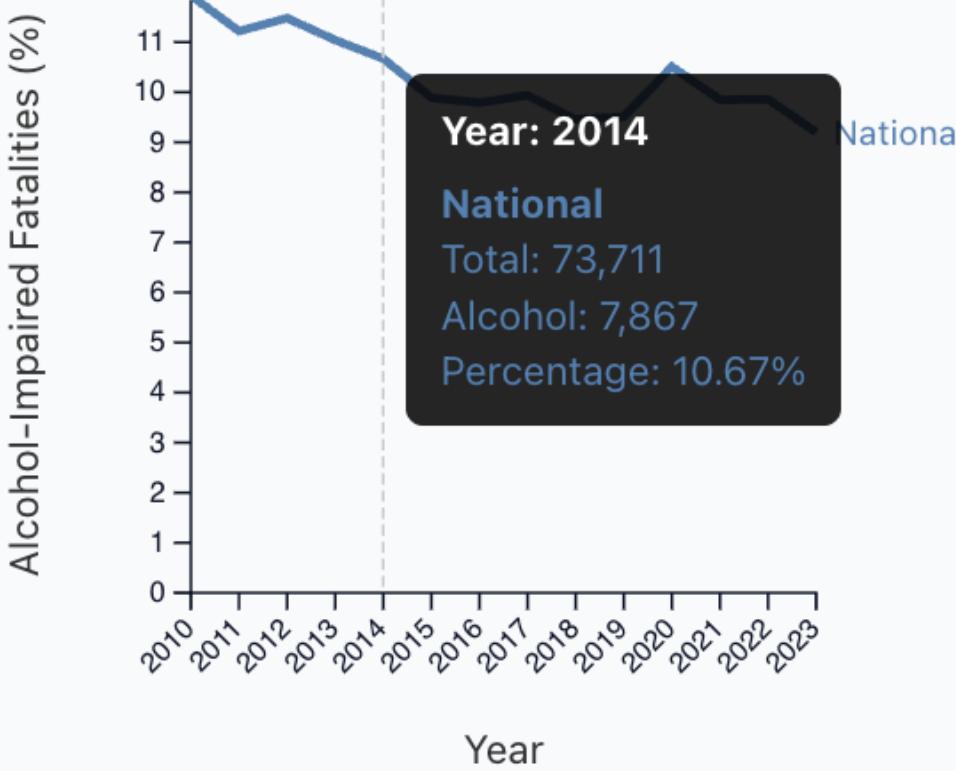


Risk
Profile
Panel

National & State Trend Chart

National & State Trends

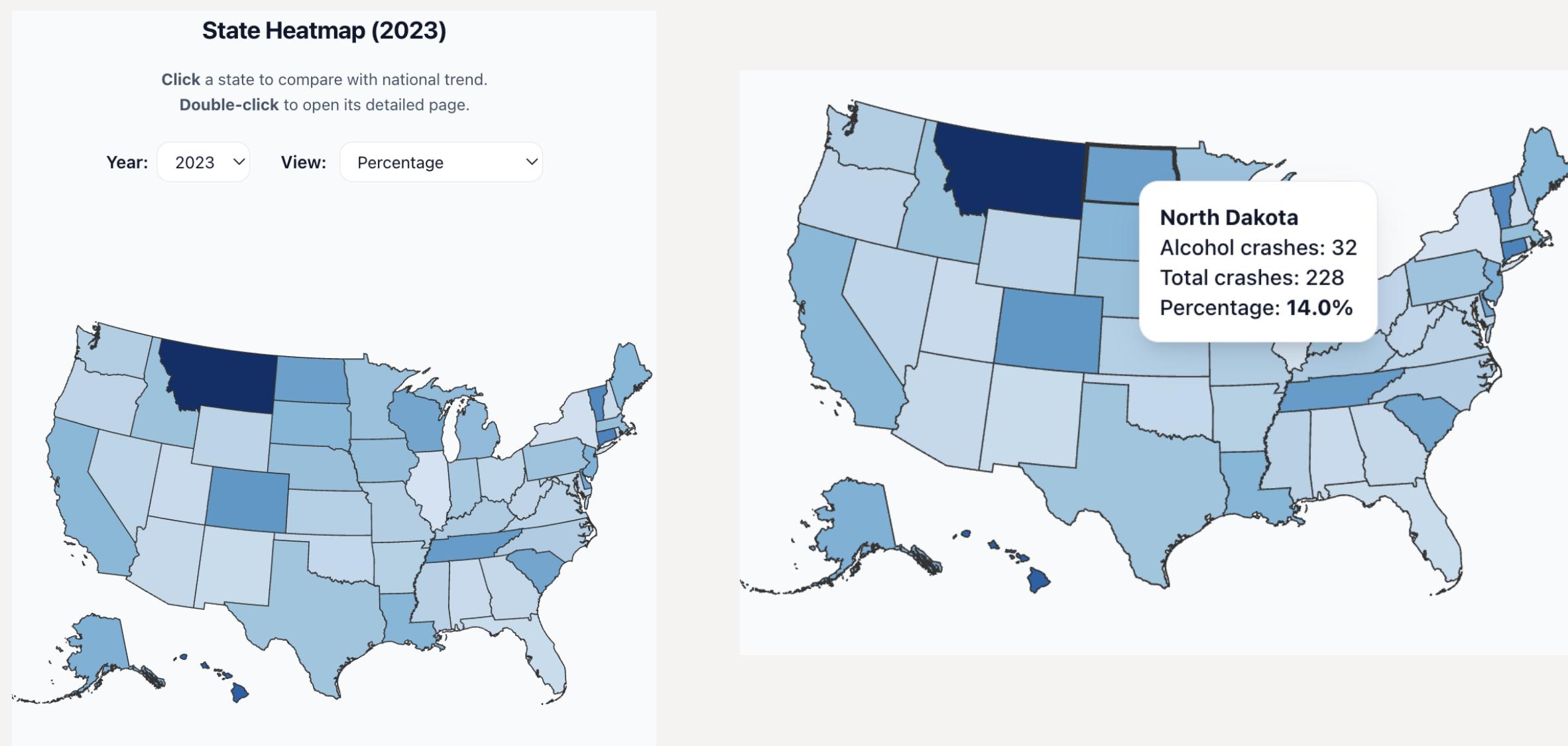
Click any state on the map to add its trend here.



- 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

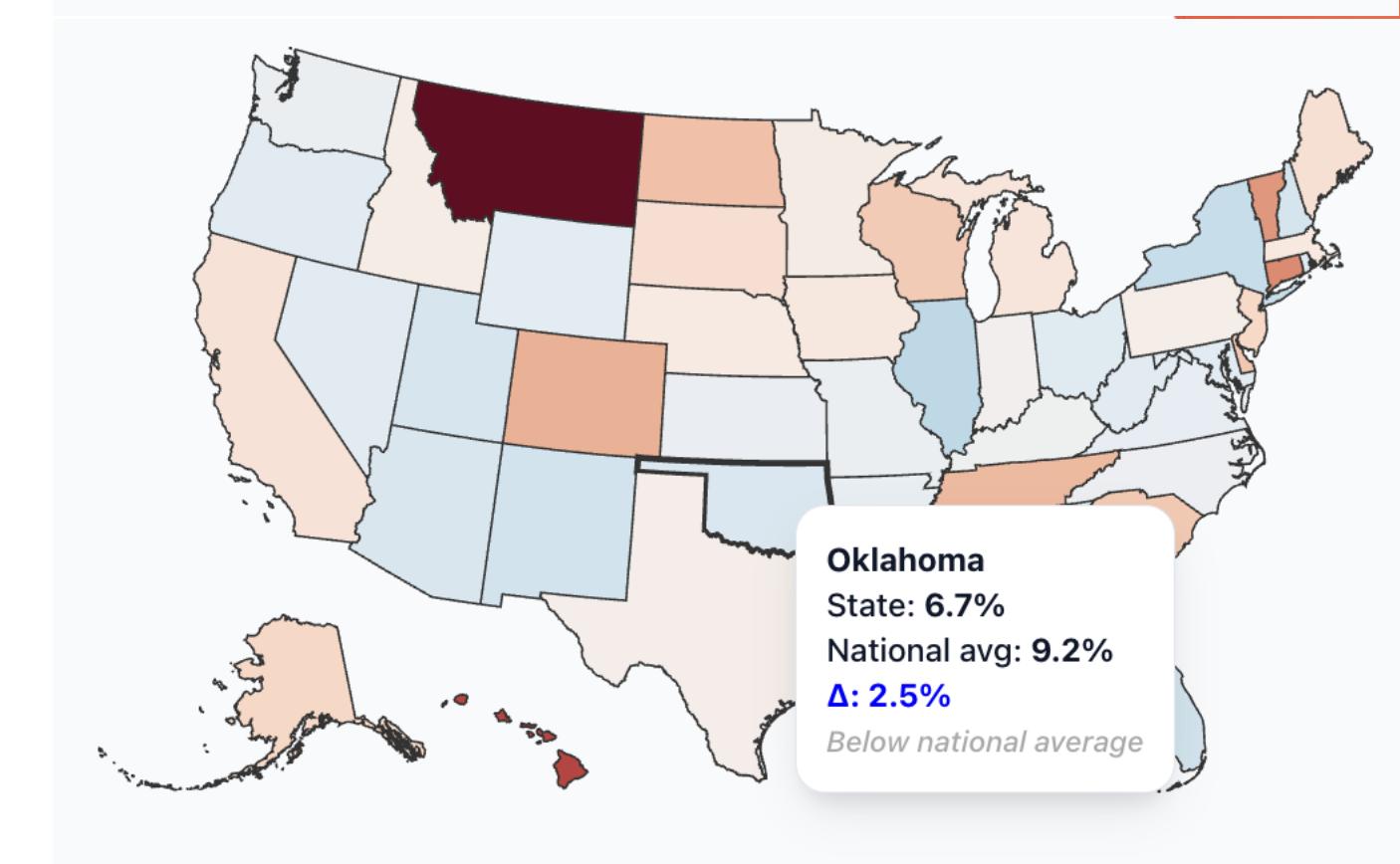
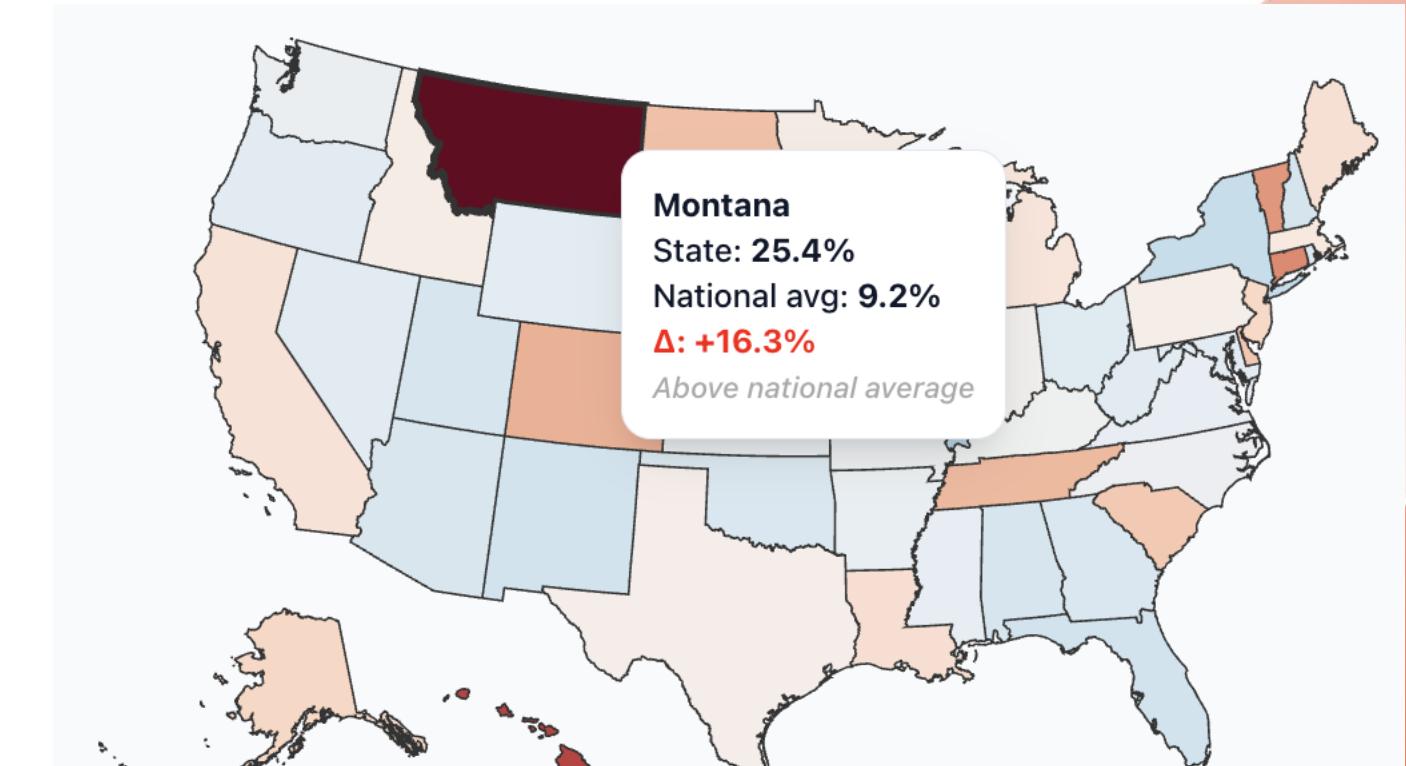
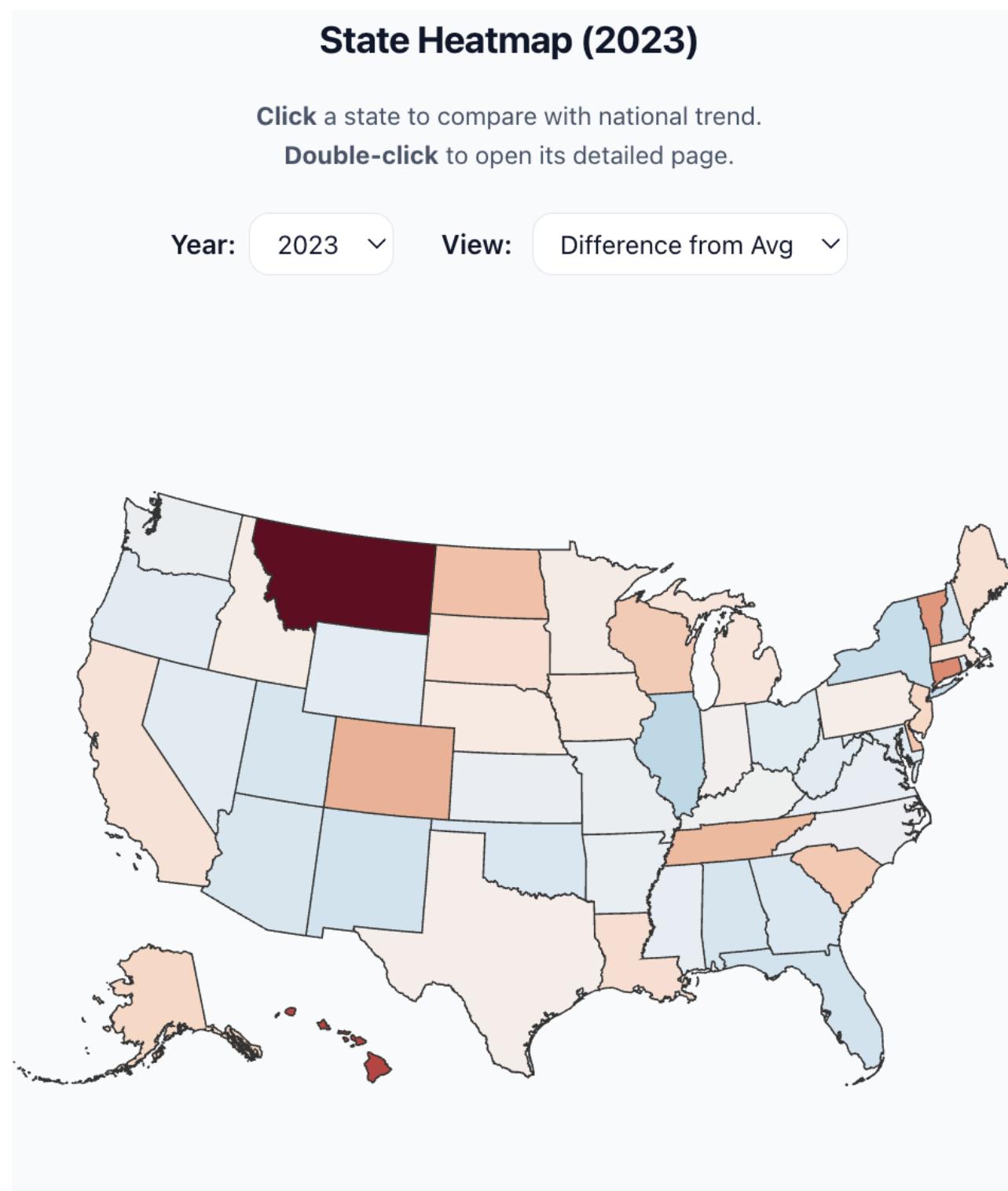
US HEATMAP

- 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



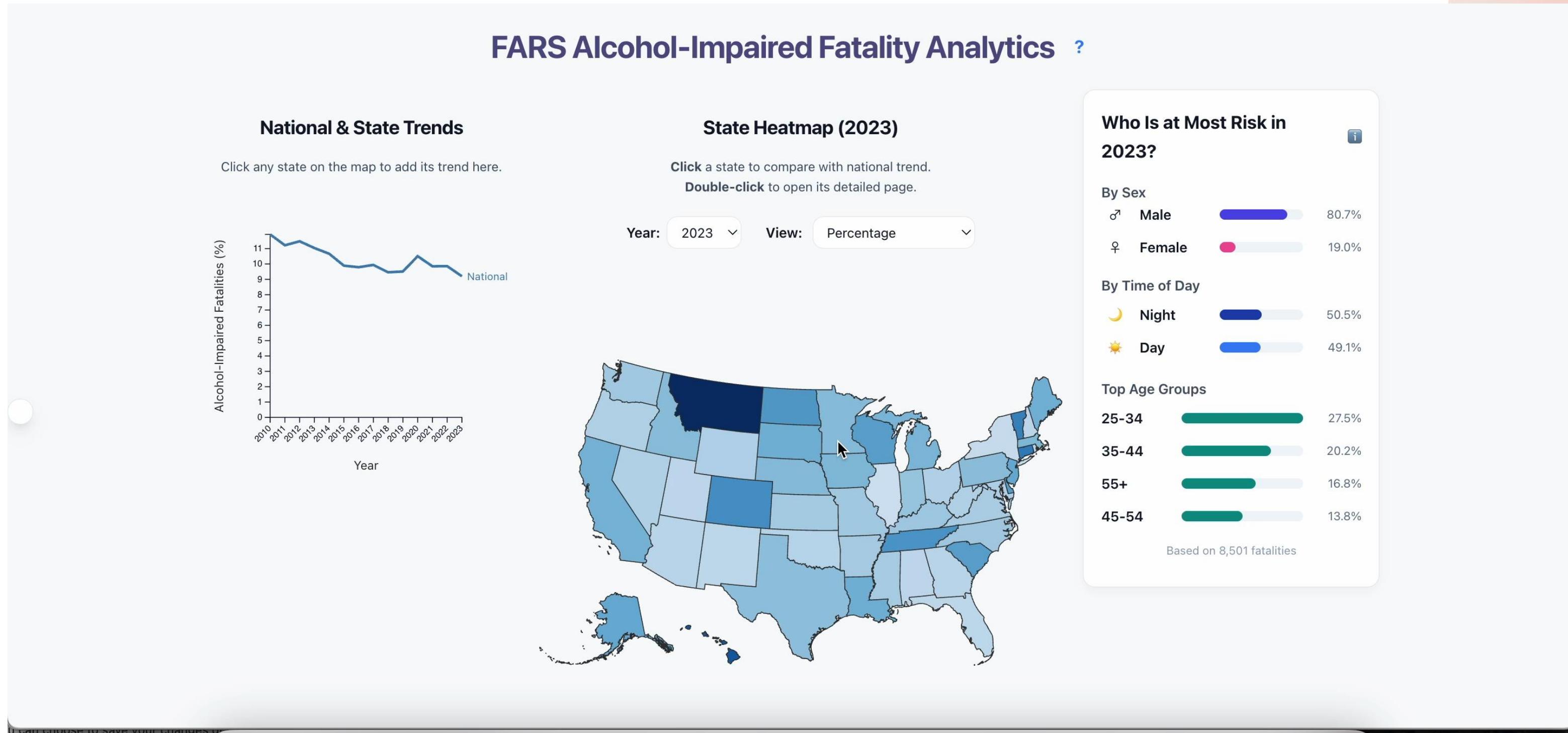
US HEATMAP

- 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

Who Is at Most Risk in 2023?

By Sex

♂ Male  80.7%

♀ Female  19.0%

By Time of Day

🌙 Night  50.5%

☀️ Day  49.1%

Top Age Groups

25-34  27.5%

35-44  20.2%

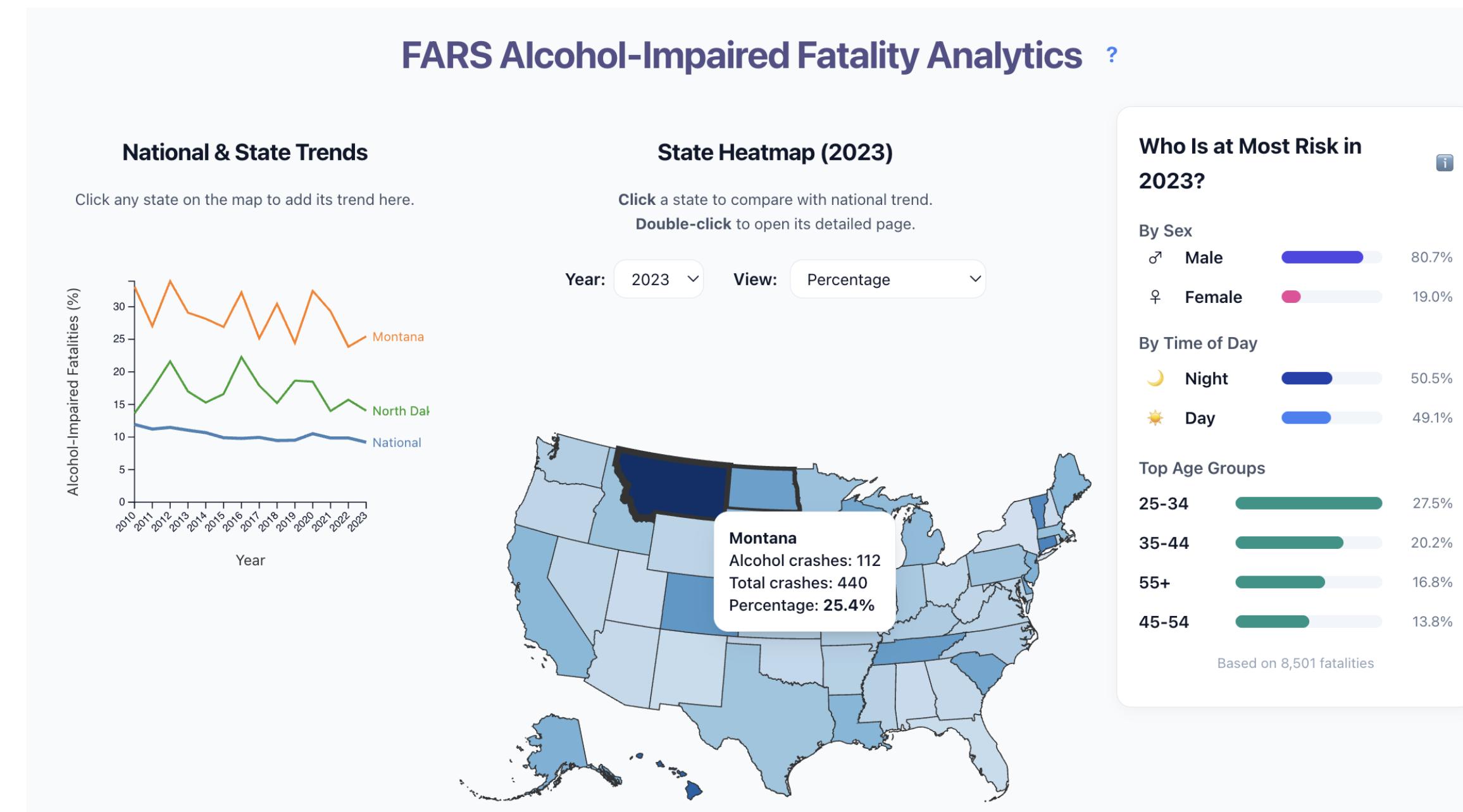
55+  16.8%

45-54  13.8%

Based on 8,501 fatalities

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

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 (No filters)

Alcohol Fatalities: 112

No demographic filters

← Back

Fatalities by Month (2023)



Min Age

Max Age

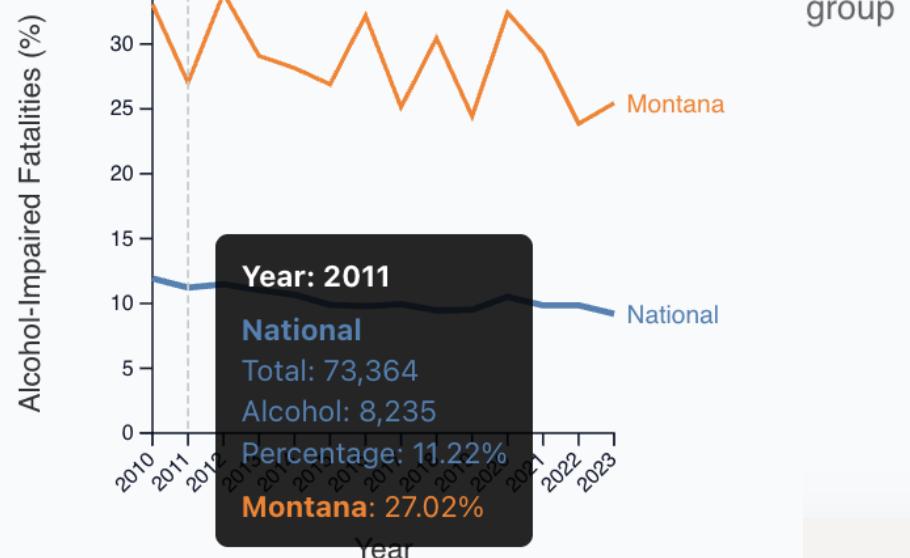
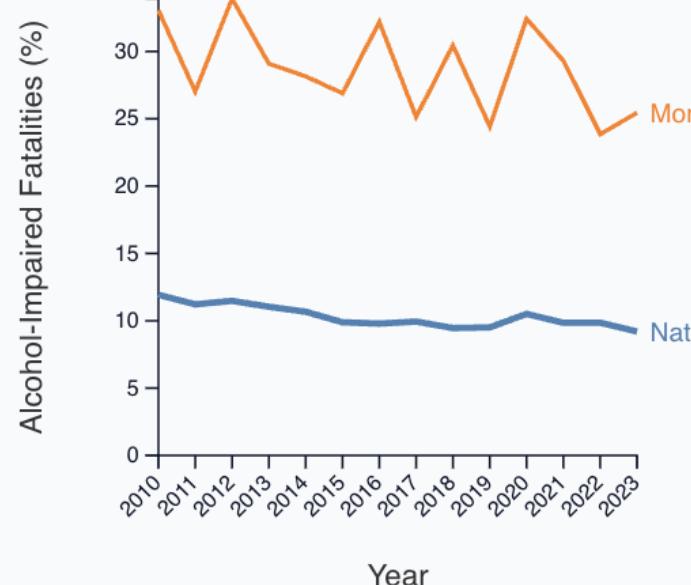
Sex

All

Apply

Clear

Trend Over Time (All Persons)



Who Is at Most Risk in 2023?

By Sex



By Time of Day



Top Age Groups



Based on 112 fatalities

STATE PAGE -

filtering

Montana

Select Year: 2023 ▾

← Back

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)

The chart displays two data series: 'Montana' (orange line) and 'National' (blue line). The Y-axis represents the percentage of alcohol-impaired fatalities, ranging from 0 to 35%. The X-axis shows years from 2010 to 2023. The 'Montana' series starts around 32% in 2010, fluctuates between 24% and 32%, and ends around 24% in 2023. The 'National' series starts around 12% in 2010, fluctuates between 9% and 12%, and ends around 9% in 2023.

Year	Montana (%)	National (%)
2010	32	12
2011	28	11
2012	33	12
2013	29	11
2014	28	10
2015	27	10
2016	32	10
2017	26	10
2018	30	9
2019	25	9
2020	32	10
2021	29	10
2022	24	9
2023	24	9

Alcohol-Impaired Fatalities (%)

Year

Trend Over Time (Filtered Group)

This chart shows the trend for the 'Filtered' group, which includes the 'Alcohol' category from the selected year. The Y-axis is labeled 'Alcohol-Impaired (%)' and ranges from 0 to 55. The X-axis shows years from 2010 to 2023. The data series is a blue line that starts at approximately 56% in 2010, drops to about 48% in 2011, rises to a peak of 56% in 2012, and then generally declines with some fluctuations, ending at approximately 33% in 2023.

Year	Alcohol-Impaired (%)
2010	56
2011	48
2012	56
2013	45
2014	49
2015	43
2016	45
2017	45
2018	38
2019	39
2020	45
2021	42
2022	38
2023	33

Alcohol-Impaired (%)

Year

Montana

← Back

Select Year: 2023 ▾

2010–2023 (Total)

Alcohol: 1,641

All Crashes: 5,725

2023 (Selected Year)

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2023 (Filtered)

Alcohol Fatalities: 39

Based on applied filters

Min Age 18

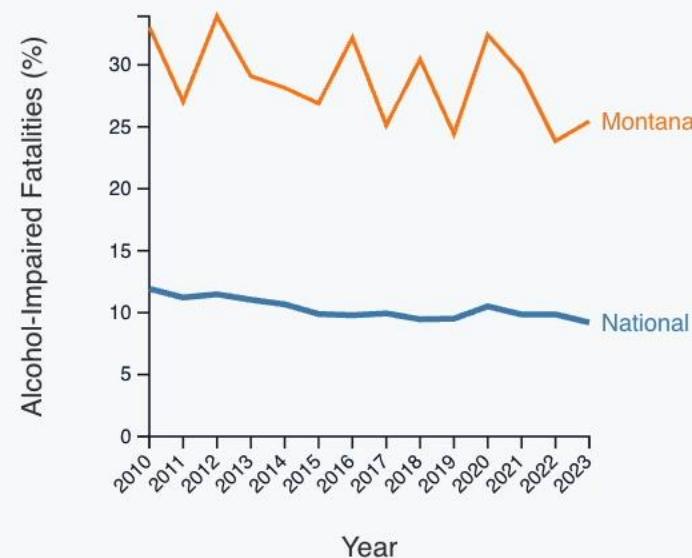
Max Age 40

Sex Male ▾

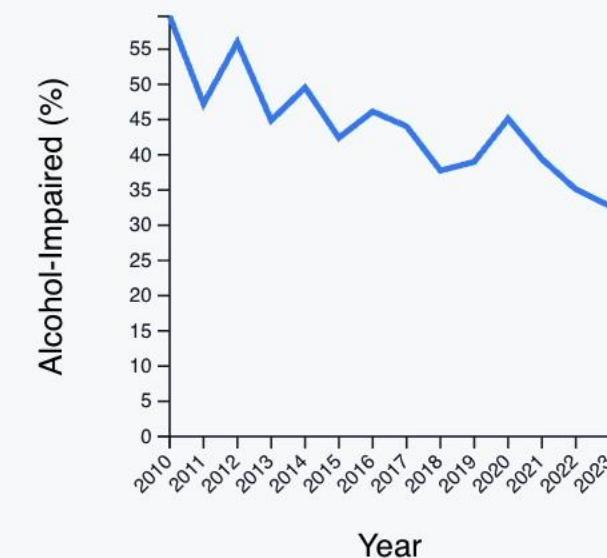
Apply

Clear

Trend Over Time (All Persons)



Trend Over Time (Filtered Group)



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