Analyzing the Consumption and Health Risk Factors of Alcohol in the United States

Methods of Advanced Data Engineering
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Introduction

Alcohol consumption is a significant public health concern due to its wide-ranging effects on individuals and communities. Excessive alcohol use is associated with numerous adverse health outcomes, including renal failure, cardiovascular issues, and an increased risk of accidents.

Understanding trends in alcohol consumption and its implications on public health is vital for policy-making and societal well-being. This analysis aims to investigate the changes in alcohol consumption across U.S. states in 2024 and compare them with 2014, focusing on gallons of ethanol consumed per capita. Additionally, we explore driving fatalities involving alcohol and excessive drinking rates to identify actionable insights.

Used Data

The data used in this analysis originates from two datasets:

1. **Chronic Disease Indicators (Disease Data Across the US, 2001-2016):**
    - URL: https://www.kaggle.com/datasets/cdc/chronic-disease/data
    - Description: CDC's (Centre of Disease Control) Division of Population Health provides a cross-cutting set of 124 indicators developed by consensus that allows states, territories, and large metropolitan areas to uniformly define, collect, and report chronic disease data that are important to public health practice and available for states, territories, and large metropolitan areas.
    - Structure and Quality: A variety of health-related questions were assessed at various times and places across the US. Data is provided with confidence intervals and demographic stratification. Data was compiled by the CDC.
    - Data Structure: Tabular format with columns

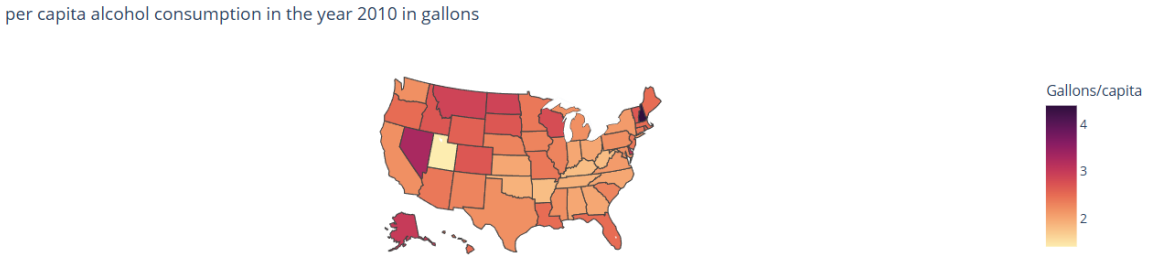
2. **Alcohol Consumption by State 2024**:
    - URL: https://www.kaggle.com/datasets/annafabris/alcohol-consumption-by-state-2024
    - Description: Contains state-level alcohol consumption measured in gallons of ethanol per capita, driving fatalities involving alcohol (percentage), and excessive drinking rates (percentage).

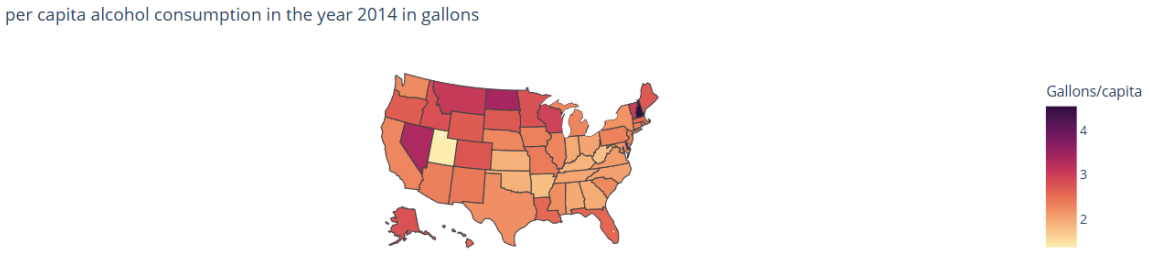
- Structure and Quality: This dataset compliments the primary dataset by providing the necessary information related to the year 2024 for alcohol consumption in the US.
- Data Structure: Tabular format with columns

Analysis

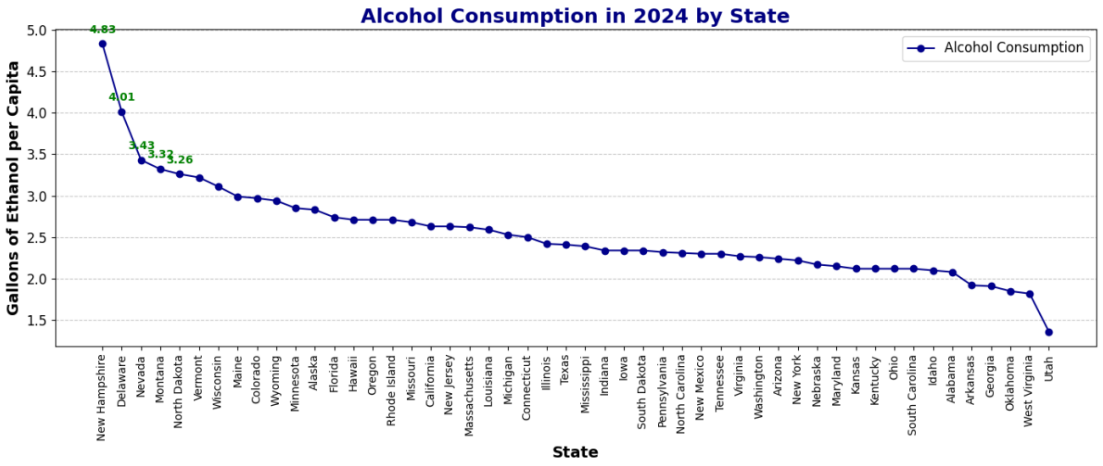
1) Trend Over Years and across States

- The visualizations of per capita alcohol consumption in the years 2010, 2014, 2024 provide insights into the geographic distribution and trends of alcohol consumption across the United States. The maps indicate that northern states, such as New Hampshire and Wisconsin, consistently exhibit higher alcohol consumption rates compared to the national average. These states show consumption levels exceeding 4 gallons of ethanol per capita, reflecting significant alcohol use patterns within their populations.
  On the other hand, states in the southern regions, such as Utah and West Virginia, consistently report lower alcohol consumption rates, typically under 2 gallons per capita. This disparity highlights potential cultural, economic, and policy-driven factors influencing alcohol use behaviors regionally.





- Further, the analysis of alcohol consumption per capita across U.S. states in 2024 reveals significant regional disparities. The top five states, led by **New Hampshire** with 4.83 gallons per capita, demonstrate substantially higher consumption levels compared to others, highlighting possible cultural, social, or economic influences.



Top 5 States by Alcohol Consumption in 2024

State Name	Gallons of Ethanol per Capita (2024)
New Hampshire	4.83
Delaware	4.01
Nevada	3.43
Montana	3.32
North Dakota	3.26

2) Alcohol-related different kind of fatalities recorded over the years:
   - <u>Correlation between alcohol consumption and renal failure cases:</u> The analysis examines the correlation between increases in per capita alcohol consumption and renal failure across various U.S. states. The first visualization highlights states with significant growth in alcohol consumption in gallons per capita, with darker shades indicating higher increases. The second visualization focuses on the percentage increase in renal failure among the population, also represented with darker shades for higher rates. The overlapping states from both analyses suggest potential areas of concern where rising alcohol consumption might contribute to health complications like renal failure, warranting further investigation into causality and preventive measures.

increase in per capita alcohol consumption in gallons

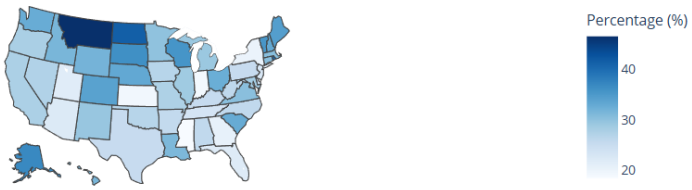
increase in renal failure as % of the population

Top 5 States by Increase in Alcohol Consumption and Renal Failure

State Abbreviation	Gallons/capita Increase	Renal Failure % Increase
IA	1.2	0.51
MA	1.1	0.49
OR	0.9	0.4
KY	0.9	0.35
HI	0.9	0.19

- Driving Fatalities in 2024: Further for the analysis for 2024, from the graph, it is evident that northern and western states, such as **Montana**, **North Dakota**, and **Alaska**, exhibit the highest percentages of alcohol-related driving fatalities, with **Montana** leading at 46.4%. These findings could reflect factors such as rural road conditions, longer travel distances, and potentially less stringent enforcement of DUI laws in these areas.

Alcohol-Related Driving Fatalities by State in 2024



Top 5 States by Alcohol-Related Driving Fatalities in 2024

State Name	Alcohol-Related Driving Fatalities (%)
Montana	46.4
North Dakota	41.4
Rhode Island	40.3
Alaska	36.9
South Dakota	36.1

Conclusion

The analysis highlights distinct geographic patterns of alcohol consumption in the United States, with northern states like New Hampshire and Wisconsin consistently reporting higher per capita consumption than southern states such as Utah and West Virginia. This disparity may reflect cultural, economic, or policy-driven factors influencing regional behaviors. Furthermore, the correlation between increased alcohol consumption and adverse health outcomes, such as renal failure, underscores the need for further investigation into causality.

While the analysis successfully identifies patterns and correlations, limitations include the lack of causal proof and demographic-specific data, which restricts deeper insights into individual-level behaviors and preventive measures. Future research should aim to integrate demographic and socioeconomic data to address these limitations.