

Impact of climate-related weather events on public support for action against climate change in the United States

Disclaimer: LLMs like ChatGPT were used for grammar and spelling checks

Introduction

Climate change is a global issue, and large emitters like the U.S. play a critical role in addressing it. However, political division complicates action, as major parties have opposing views on climate change. The median voter's stance varies significantly, especially in economically depressing times the priorities of the public seem to shift, and many people seem to deprioritize climate change action. On the other hand, while climate change and weather are two different concepts, climate change influences frequency and intensity of certain weather events. Hence, weather events and their consequences (e.g. damage) show temporary peaks of public interest in action against global warming. Therefore, what factors promote interest in action against climate change is not yet fully clear. This project aims to explore whether individuals living in areas that are more affected by said consequences and casualties of climate-related events (e.g., tornadoes, storms, floods; and weather / storm events which are increased in their frequency by climate change) are more likely to prioritize climate change as a personal and political concern.

This project analyzes the relationship between the casualties caused directly and indirectly by weather events (e.g. storms) and the respective public opinion about the importance of action against climate change as a political topic per U.S state.

Therefore, the research question is: Are people living in states with more casualties caused by climate-related events more likely to support countermeasures against climate change?

Used Data

Two datasets were used to analyze whether people in states with higher casualties from weather events are more likely to support climate countermeasures. The datasets are:

1. Storm Events Database 2020: Published by the National Centers for Environmental Information (NOAA), this dataset provides structured statistics on injuries, fatalities, and financial damages caused by weather events in 2020, categorized by U.S. state. The data is publicly available under U.S. government open data policies (CC0, see data report for further explanation for the source of this claim).
2. Yale Climate Change Opinion Map 2020: This dataset, published by Yale University, summarizes public opinion on climate change-related topics, including support for countermeasures, awareness, and perceived importance, aggregated by state and county. It is well-structured and freely usable under an MIT license.

Both datasets are high-quality, well-documented, and suitable for a comprehensive analysis. The data was prepared for analysis with Jayvee and is provided as two sqlite databases (political_opinion.sqlite, weather_event_damages.sqlite). The following describes the data itself which was used for the analysis, highlights the relevant data and outlines the data that was kept in the analysis for technical reasons.

Database	Column name	Description
political_opinion.sqlite	GeoName	Name of the U.S. State

	AverageOpinionTrend	Average percentage of the public to be in favor of action against climate change per state (averaged over multiple different items)
weather_event_damages.sqlite	STATE	Name of the U.S. State
	TOTAL_CASUALTIES	The total number of deaths and injuries caused indirectly and directly by weather events per state

The following columns are present in the output files but not relevant for the analysis. They are present due to the capabilities of Jayvee (no deletion of columns possible after Transformation and TableInterpreter Stages). Nonetheless, all these columns were necessary for summarizing / averaging the resulting variables or to filter the data.

Database	Column name	Description
political_opinion.sqlite	GeoType	Type of data entry (State, county, etc.). Necessary for filtering data (only state level).
	CO2limits, CO2limitsOppose, drilloffshore, ... (all others)	Average percentage of the public to be in favor of a specific action against climate change per state. Oppose is the item in reversed.
weather_event_damages.sqlite	INJURIES DIRECT	Injuries directly caused by weather events
	INJURIES INDIRECT	Injuries indirectly caused by weather events
	DEATHS DIRECT	Deaths directly caused by weather events
	DEATHS INDIRECT	Deaths indirectly caused by weather events

Analysis

In this analysis, the relationship between political opinion trends and the impact of weather-related events was investigated. To determine whether there is a relationship between those two variables, a quantitative correlation analysis was chosen. The objective was to determine whether a statistical correlation exists between average opinion trend (a measure of political sentiment towards action against climate change) and total casualties (aggregated impacts of weather events).

Methodology

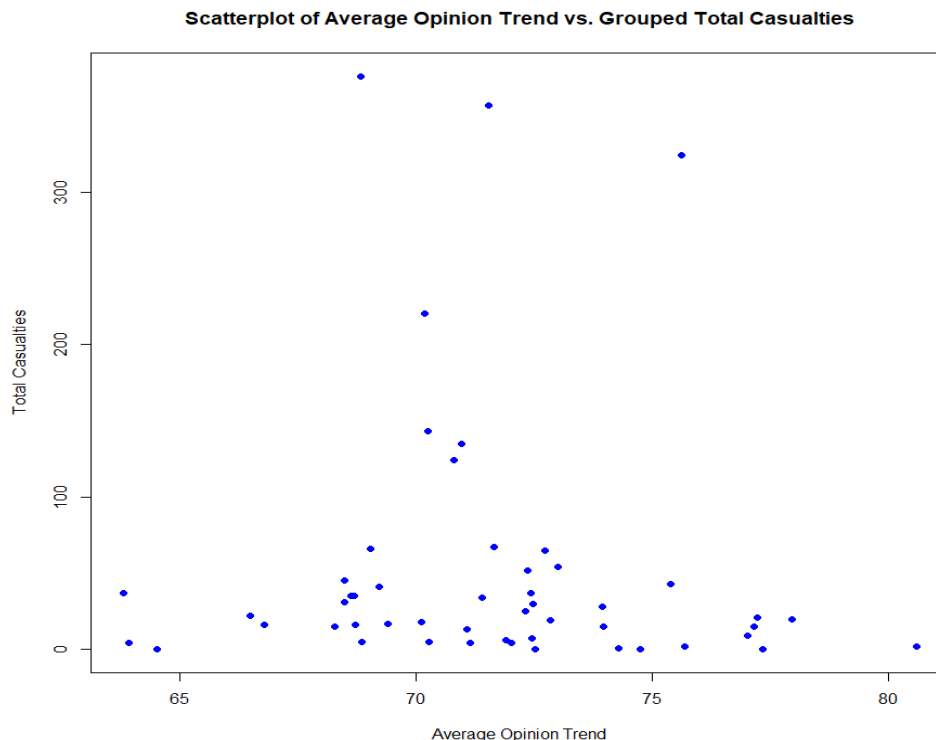
The statistic programming language R was used as a tool to analyze. Data from the two SQLite databases were utilized: one containing political opinion trends and another summarizing weather event damages. The analysis involved the following steps:

1. Total casualties were aggregated by state from the weather data due to them being present only per county.
2. The aggregated data were joined with the political opinion data using state names as the common key. A inner join was used to only analyze states being present in both datasets (this step remove a few states).
3. The Pearson correlation coefficient was calculated to quantify the linear relationship between AverageOpinionTrend and grouped_total_casualties.
4. A scatterplot was generated to visualize the relationship and deepen the understanding of the potential relationship.

Note: The exact R code is in the repository.

Results

Finally, there are 51 inner-joined data rows. The Pearson correlation coefficient was calculated to be $-0,051$, indicating a weak, negative linear relationship between political opinion trends and weather-related casualties. The following scatterplot illustrates the distribution of data points and the overall trend.



The scatterplot shows the data points mainly between 0-100 casualties and reaching from 60% to 90% of the population agreeing towards climate change countermeasures. This shows a majority of the public being in favor of action against climate change. The graph highlights a rather non-existing correlation between the relevant variables.

Interpretation

The results indicate that there is no significant correlation between political sentiment and weather-related casualties. While there can't be found a significant correlation, this does not falsify the hypotheses. For one, a negative correlation would indicate that with more casualties in a U.S. state there are less people supporting action against climate change. Viewing current research in this field, this seems rather unlikely. Furthermore, some existing research rather shows that there is, in fact, a positive relationship between such similar variables due to people tending to prioritize political topics that affects them personally. Nonetheless, one theoretical explanation for a weak negative relationship could also be people being driven to conspiracies and simple answers. Some research shows that some people tend to be driven towards conspiracies and simple answers when they are in dire life situations and their daily lives are affected. A prominent sentiment on the republican political spectrum is claiming climate change to be a "hoax". Therefore, this effect could also come into play.

The most likely explanation for this result is methodological and technical faults. For one, the data points amount of 51 is rather small which might lead to distorted results. Additionally, with a rather small amount of data points, multiple states having attributed 0 casualties and some states with more than 200, it is hard to remove outliers with such few datasets. This indicates that the data and the approach might not be fitting. Even with results that would have better theoretical backup, it is questionable if one could simply conclude from a state-level analysis to individuals. A better approach combining all those faults would be an analysis on a county level with more fine-granular datasets, not aggregated to a state-level.

Conclusion

This analysis explored whether individuals in states experiencing higher casualties from climate-related weather events are more likely to support action against climate change. The results showed no significant correlation between the two variables. Therefore, the main question can't be directly answered, but rather that these findings suggest that the hypothesized connection could not be confirmed at the state level, and alternative explanations and influencing factors may need to be considered.

Nonetheless, the observed lack of correlation does not necessarily disprove the hypothesis. It is possible that methodological constraints, such as the limited dataset size, aggregation at the state level, and the presence of outliers, influenced the results. A state-level analysis may not fully capture individual-level dynamics, and other factors like political events, media narratives, and economic conditions could play a role in shaping public opinion.

Future research could benefit from more granular datasets, such as county-level data, and by incorporating additional variables like financial damage, temporal trends across multiple years, and the impact of political campaigns or elections. These refinements may provide a clearer picture of the complex relationship between climate-related casualties and public support for climate action.

Overall, this study underscores the need for further investigation to account for the complexities of public opinion and its drivers in the context of climate change.