How Cold Weather Events Influence Policymaking on Climate Change at the State Level

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1. INTRODUCTION

Climate change refers to long-term changes in weather patterns often attributed to human activities [2]. Climate change affects our environment through increasing incidence of extreme weather events (short-lived occurrences of unusually severe weather such as heat waves, tornadoes, blizzards, hurricanes, etc.), rising sea levels, and the disruption of natural ecosystems [1].

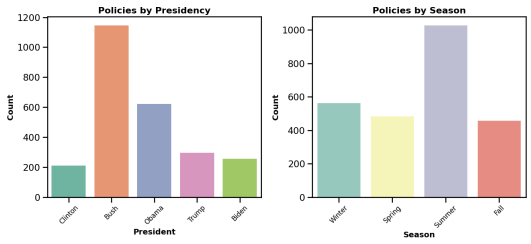
Additionally, climate change affects our society, as unpredictable weather patterns impact the economy, food and water access, and public health, making climate change a public policy issue. There are several official actors, or individuals who are elected or appointed by the public, to address public issues. However, it is unclear what motivates the actions of the official actors. Our research sought to determine if there was a relationship between extreme cold weather events and the implementation of climate change policies at the state level. We hypothesized that extreme low minimum temperatures and increased heating degree days in a state will lead to the addition or reinforcement of climate policies within the following year. This work is significant as climate change is a pressing issue that affects every living being on this planet, and furthering our understanding of what influences statewide policymaking on climate change will allow advocates against climate change to strategize on how best to enact change locally.

2. METHODS

We began our research by collecting data on climate policy from the past 24 years (2000-2024) using data from the Database of State Incentives for Renewables and Efficiency (DSIRE). We then used the National Centers for Environmental Information's (NCEI) database to compile data on minimum temperature and heating degree days for the same time period. Minimum temperatures and heating degree days are indicators of extreme cold weather, and useful in determining deviations from average temperatures for a season. Extreme cold weather was defined as a minimum temperature below 20°F occurring in a non-winter month in our data. We used descriptive statistical analysis to compare how the current president and season related to the number of state climate change policies passed. The median minimum temperatures and heating degree days were calculated. Lastly, panel analysis was conducted in order to determine if there was a relationship between extreme weather events and implementation of climate change policies at the state level.

3. RESULTS

Figure 1. Summary of the count of policies implemented by (A) Presidency, (B) Season



Descriptive statistical analysis of the policy data revealed that the largest number of subnational climate change policies were created during the George W. Bush presidency (**Fig 1A**). Additionally, policies were most often created during the Summer (**Fig 1B**).

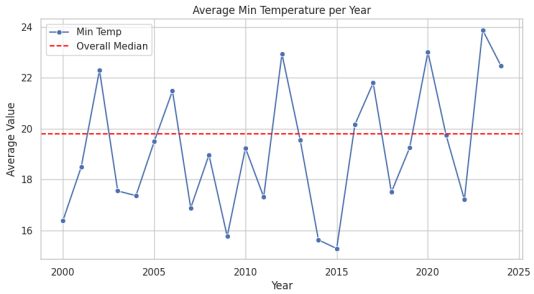


Figure 2. Average minimum temperature per year (2000-2024) in the United States

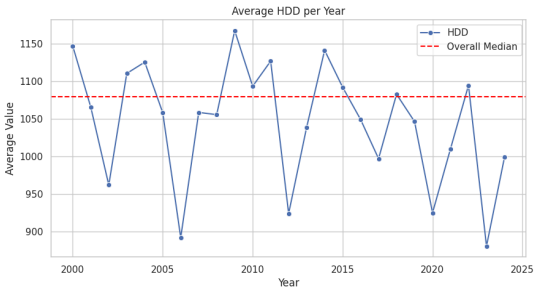


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The results of our data analysis revealed a connection between the number of amendments to state climate-change policies and the current president. The greatest number of amendments to

state climate-change policies occurred during the Bush and Obama presidencies. The current season was also correlated to the number of changes to state climate-change policy, the majority of which occuring in summer. Minimum temperature in the U.S have been on the incline for the past 24 years, with more dramatic increases over the past couple of years. The median minimum temperature for the entire country was 19.8 degrees fahrenheit, but it ranged between -20.2 degrees in Alaska and 51.1 degrees in Florida. Alternatively, heating degree days have decreased over the past 24 years, with a median of 1,079.5 for the entire country. Heating degree days ranged from 136 in Florida to 1,945 in North Dakota. Panel analysis demonstrated that there was no relationship between extreme cold events, increased heating degree days, or decreased temperatures and the implementation of state climate change policy.

4. DISCUSSION

Data analysis revealed that there has been a decline in cold weather events over the past 24 years. Moreover, regulatory policies and financial incentives associated with climate change were mostly created in the summer or during the Bush administration suggesting a relationship between extreme hot weather events and/or political party, and policymaking. These findings indicate that factors beyond extreme cold events, such as political climate, extreme hot weather events, and season may play a more dominant role in driving climate policy decisions at the state level. Future research may analyze how extreme hot weather events and political parties relate to local policy making on climate change. Understanding what influences subnational policymaking on climate change is crucial in order to strategize how best to protect our environment so that our planet will be around for the generations that come after us.

Although we did not find a relationship between extreme cold weather events and state policy making on climate change, our work provided some clarity on what other factors drive local policymaking on climate change.

References

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2- United Nations. (n.d.). *What is climate change?* | *United Nations*. https://www.un.org/en/climatechange/what-is-climate-change

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