**Topic Proposal and Research Motivation**

We will compare mean rates of adult obesity against mean state climate [atmospheric behavior over relatively long periods of time] in contiguous U.S. states. We chose this subject to investigate whether mean state temperature could generate an unhealthy environment that contributes to higher mean obesity rates.

* 1. **Proposed Question**

Is there a statistically significant difference in the obesity means by state?

**1.2 Null Hypothesis**

There is no statistically significant relationship between states and average state obesity rate.

**1.3 Alternative Hypothesis**

There is statistically significant relationship between states and average state obesity rate at 95% confidence level.

**2.1 Proposed Question**

Do contiguous U.S. states with intemperate climates [too warm, too cold] display higher mean rates of adult obesity?

**2.2 Null Hypothesis**

There is no statistically significant relationship between average state temperature and average state obesity rate.

**2.3 Alternative Hypothesis**

Average state temperature correlates to average state obesity rate at a 95% confidence level.

**Data Sources and Types**

Centers for Disease Control and Prevention’s “*Nutrition, Physical Activity, and Obesity: Data, Trends and Maps*” CSV

* This dataset provides rates of adult obesity in U.S. states and U.S. territories Guam, Puerto Rico, and U.S. Virgin Islands. This data is used as the base for our statistical analysis.

National Centers for Environmental Information’s [*National Oceanic and Atmospheric Administration Map*](https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-regions.php)

* This map illustrates the nine climatically consistent regions within the contiguous U.S.

**Data Exploration and Analysis: Weather and Obesity**

Cleanup of weather data included isolating months from 2010 and averaging all monthly temperature values into one annual temperature per state. We created a line series graph for nine states, each taken from one of the nine contiguous U.S. climatic regions, to view annual trends. We then created a bar graph and a choropleth map to display the annual temperature per state.

Cleanup of obesity data included rejecting previous datasets for incomplete records or severe limitations. We identified only one dataset with sufficient records, with the limitation of using only single-year data from 2010. We built a boxplot to compare the statistics of each state within the year to create a general view of the data and outliers. The boxplot p-value was <0.05, which means we reject the null hypothesis1 which says

The significant difference between obesity rates in states.

We began analyzing the weather and obesity data for a statistically significant relationship via a scatterplot and line graph.

Based on the scatterplot of temperature versus obesity, we can view the residuals from the regression line. Based on the linear regression between the predictor variable of temperature and the response variable of obesity, we found no significant linear relationship. We fail to reject the null hypothesis2 which says high correlation between state temperature and state obesity.

**Final Thoughts**

We fail to reject the null hypothesis, and the result of our analysis is statistically insignificant. We see no correlation between state temperature and state obesity. However, our analysis indicates a high correlation between state and rate of obesity. This correlation can be further researched to identify the common health factors in each state that result in higher rates of obesity.