The Role of Urbanicity and Race in the Relationship Between Poverty and Cancer Death Rates

Introduction

The purpose of this report is to explore the relationship between poverty and cancer death rates across different states, with a specific focus on the potential role of urbanicity as a mediating or confounding variable. The analysis seeks to determine whether urbanicity (urban or rural) influences the strength of the correlation between poverty and cancer death rates. Additionally, the report explores the possible contributions of other variables, such as race and employment, to this relationship.

Data Preparation

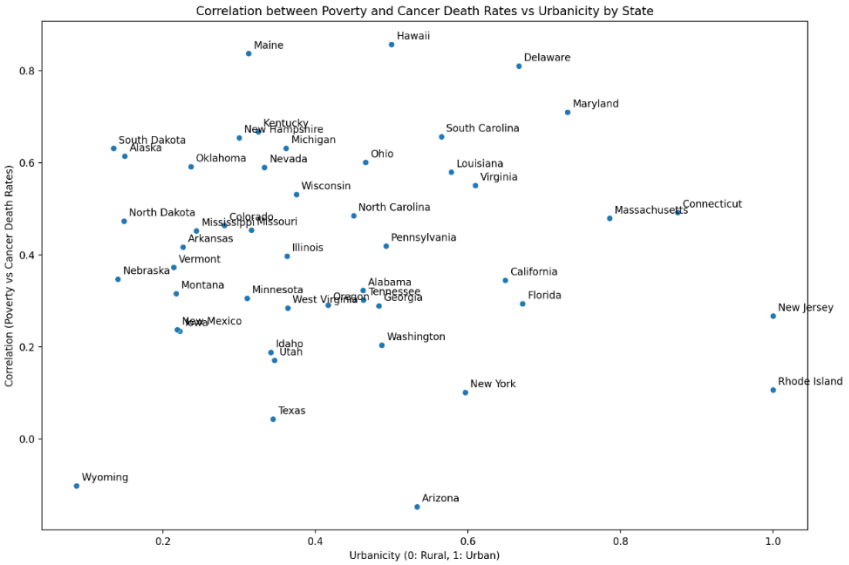
The dataset provided includes a column labeled "Urbanicity," which is a categorical variable indicating whether a state is more urban or rural. For the purposes of this analysis, the Urbanicity column was converted to a numeric scale where values closer to zero indicate a more rural environment, and values closer to one indicate a more urban environment.

Analysis

Correlation Between Poverty and Cancer Death Rates by Urbanicity

I created a scatter plot of the relationship between urbanicity and the correlation between poverty and cancer death rates. This plot compares the strength of the correlation between poverty and cancer death rates with the level of urbanicity for each state.

Figure 1: *Scatter Plot of Correlation Between Poverty and Cancer Death Rates vs. Urbanicity*



Key Observations

1. **Lack of Clear Relationship**: The scatter plot reveals that there is no clear linear relationship between urbanicity and the correlation between poverty and cancer death rates. The data points are widely scattered, indicating that urbanicity alone does not strongly determine the relationship between poverty and cancer death rates across states.

2. **Positive Correlation in Most States**: Most states exhibit a positive correlation between poverty and cancer death rates, suggesting that as poverty increases, so do cancer death rates. However, the strength of this correlation varies significantly between states.

3. **Outliers**: States like Hawaii and Maine have some of the highest correlations between poverty and cancer death rates, despite differing levels of urbanicity. Conversely, Wyoming and Arizona show negative correlations, which are atypical compared to other states.

4. **Cluster of States**: There is a noticeable cluster of states with urbanicity values between 0.2 and 0.4 that display a wide range of correlation strengths, indicating that other factors besides urbanicity may be influencing the relationship between poverty and cancer death rates.

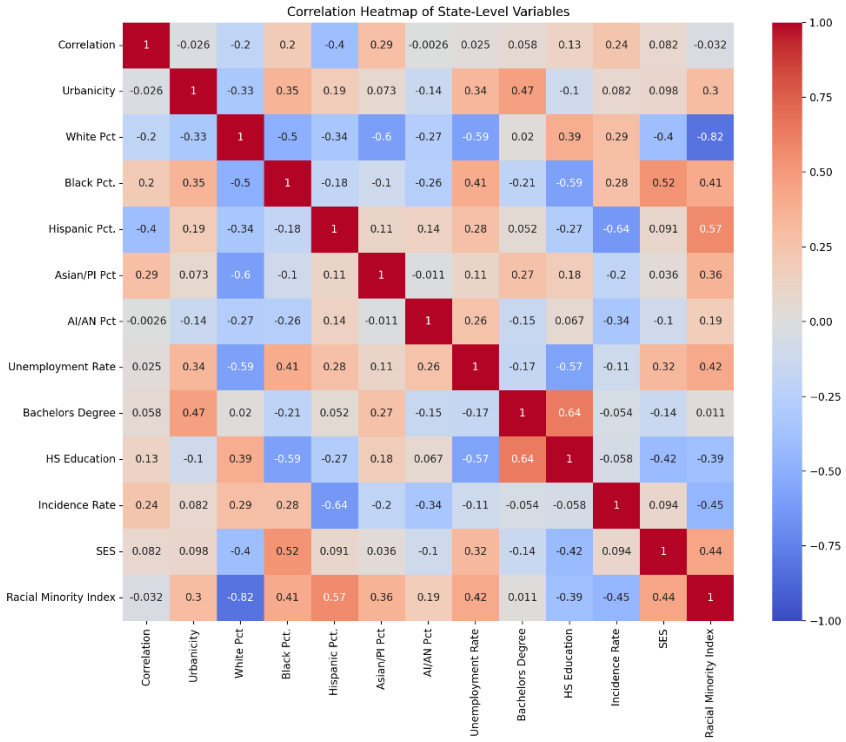
Mediating or Confounding Variables

To better understand why some states, exhibit stronger correlations between poverty and cancer death rates, we examined other variables, such as racial demographics and employment, to see if they might be mediating or confounding this relationship.

Partial Correlation Analysis

I conducted a partial correlation analysis to determine the influence of various racial demographics on the relationship between poverty and cancer death rates, while controlling for the percentage of the Hispanic population.

Figure 2: *Partial Correlation Heatmap*



Key Findings

Race and Ethnicity:

Asian/Pacific Islander (PI) Population: The analysis revealed that states with higher percentages of Asian/PI populations tend to have stronger correlations between poverty and cancer death rates, even after controlling for Hispanic populations.

Hispanic Population: States with higher percentages of Hispanic populations tend to have weaker correlations between poverty and cancer death rates. This suggests that in these states, high cancer death rates might be less strongly associated with poverty compared to states with higher Asian/PI populations.

Other Demographics:

White Population: After controlling for Hispanic population percentages, states with higher White populations showed a negative correlation with poverty-death rate correlations, suggesting that poverty is less likely to be a primary driver of cancer death rates in these states.

Racial Minority Index: When Hispanic population was controlled for, States with greater racial diversity (as measured by the Racial Minority Index) exhibited stronger correlations between poverty and cancer death rates.

Urbanicity

Urbanicity itself showed only a weak negative correlation with the poverty-death rate correlation, indicating that it may not be a strong mediator or confounder in this relationship.

Conclusions

The analysis suggests that while urbanicity does not strongly influence the relationship between poverty and cancer death rates, racial and ethnic demographics play a more significant role. States with higher Hispanic populations tend to show weaker correlations between poverty and cancer death rates, whereas states with higher Asian/PI populations tend to show stronger correlations. These findings point to the complexity of the factors influencing cancer outcomes and highlight the importance of considering multiple variables when analyzing health disparities.

Recommendations for Further Research

1. **State-Specific Analysis**: Future research could benefit from examining state-specific healthcare policies and access to better understand the variations in poverty-cancer death rate correlations.
2. **Non-Linear Relationships**: Further exploration of non-linear relationships between these variables might uncover more nuanced insights.
3. **Incorporating Environmental Factors**: Adding environmental variables to the analysis could provide additional context for understanding the disparities in cancer death rates.
4. **Policy Implications**: These findings suggest the need for tailored public health interventions that consider the specific demographic and socioeconomic context of each state.

This report provides a foundational understanding of the complex relationships between poverty, race, urbanicity, and cancer death rates, highlighting areas for further investigation and potential policy action.