**Cardiovascular Risks in America: A Data- Driven Analysis of Risk Clusters of the Disease Prevalence.**

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**Summary**

This preliminary analysis explores the prevalence of three major cardiovascular risk factors; high blood pressure, diagnosed diabetes and coronary heart disease using the 2024 CDC PLACES dataset and the U.S Department of Agriculture’s Economic Research Service Median Household Income dataset to measure household income correlation. Cardiovascular disease remains the leading cause of death in the United States, and these three conditions contribute significantly to long-term morbidity and mortality. Understanding their geographic distribution can help the US National Cardiovascular Society identify priority areas for prevention and intervention. Analyzing available data, we have identified national hotspots and conducted a cross-statistical analysis with States where the burden is highest and lowest. The key findings indicate a strong overlap of risk in the rural areas of the Southeast States counties with low household income that suggest inaccessibility to preventative care. Our finding lays the foundation for deeper state to even county specific investigation and confident that this analysis supports the Society’s ongoing effort to help address cardiovascular disease and health disparities.

**Background and Policy Relevance**

According to the Center for Disease Control (CDC) cardiovascular disease remains the leading cause of death in the United States with one in every five deaths imposing an annual economic burden of more than $400 billion (Centers for Disease Control and Prevention). Despite decades of clinical advancement, high blood pressure and diabetes are underdiagnosed and poorly controlled in many regions, particularly in under-served, rural, low-income counties and racial and ethnic minorities. This analysis aligns with several national objectives of the Center for Disease Control and Prevention (CDC) including [Healthy People 2030](https://odphp.health.gov/healthypeople), [CDC’s Million Hearts Initiative](https://millionhearts.hhs.gov/about-million-hearts/index.html) and the [Affordable Care Act](https://www.hhs.gov/healthcare/about-the-aca/index.html) which is designed to reduce high-cost, high-need cases.

**Data and Methods**

**Data Source**

The data set used for this analysis came from the Center for Disease Control and Prevention 2024 CDC [PLACES dataset](https://data.cdc.gov/500-Cities-Places/PLACES-Local-Data-for-Better-Health-County-Data-20/swc5-untb/about_data) and the [U.S Department of Agriculture’s Economic Research Service Median Household Income dataset.](https://www.ers.usda.gov/data-products/county-level-data-sets/county-level-data-sets-download-data) This publicly available dataset provides a wide range of model-based estimates.  This analysis focuses on three key selected variables from the dataset as see bub the table below, that includes the prevalence of high blood pressure, diagnosed diabetics and coronary heart disease among adults at the county level.

|  |  |
| --- | --- |
| **Category** | **Measure** |
| Health Outcomes | Coronary heart disease among adults |
| Health Outcomes | Diagnosed diabetes among adults |
| Health Outcomes | High blood pressure among adults |

These selected variables can be identified within the dataset which has Health Category and Measures variable at county level across 50 states and the District of Columbia. The U.S Department of Agriculture’s Economic Research Service Median Household Income dataset provides median household income for which the year 2022 was used in this analysis.

**Methods**

For this report, a comprehensive analytical approach was used to uncover spatial and statistical patterns in cardiovascular health outcomes across U.S. counties. Data cleaning in R and ensuring data quality served as the foundational step, ensuring the dataset was standardized and structured for accurate analysis. This was followed by prevalence mapping and clustering, which visualized geographic hotspots and grouped counties based on similar disease burden profiles. Finally, a correlation matrix and co-prevalence detection were conducted to identify statistically significant associations among chronic conditions in a State with the highest prevalence to the lowest. Highlighting regions with overlapping health vulnerabilities was key to share public health approaches recommendations.

**Findings**

**1.1 Cardiovascular Disease Distribution**

Figure 1 illustrates a substantial interstate disparity in high blood pressure, diabetes, and coronary heart disease across the U.S. States. The Southeast states exhibit consistently higher mean prevalence rates for all three conditions, suggesting regional clustering that can be influenced by underlying socio-demographic and environmental factors. This offers critical insight into the geographic distribution of cardiovascular diseases which often share common risk outliners that including poor diet, sedentary lifestyle, limited access to primary care and even environmental conditions.



**Figure 1: Choropleth mapped analysis of cardiovascular disease prevalence in the U.S.**

**1.2 Rural vs. Urban Disparities of Cardiovascular Disease in State with the Highest Prevalence**

**A graph of different colored squares

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**Figure 2:Urban vs Rural Prevalence of Cardiovascular disease in Mississippi**

The data reveals that the state with the highest prevalence of cardiovascular disease in the USA is Mississippi. The boxplot analysis shows a clear disparity in the chronic disease prevalence between urban and rural populations. This analysis underscores a systematic rural disadvantage in health outcome within the state evidenced by significant difference prevalence of p< 0.05 in all three conditions. This outcome suggests that systematized barriers such as access of preventative care and socioeconomic status are key contributors to the disease prevalence.

**1.3 Cardiovascular Disease Vs Median Household Income (2022)**

**A graph showing the effects of diabetes

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**Figure 3: County Level Analysis between Cardiovascular Disease and Median Household Income (2022)**

This analysis as seen in Figure 3 reveals a coherent relationship between median household income and the prevalence of cardiovascular disease across U.S. counties. Figure 3 shows that low-income counties have higher burden which shows that heart disease prevalence is above 10% for counties with income below $60,000. This result suggests socioeconomic factors significantly influence public health outcomes and this reinforces the need for upstream health interventions and community-level monitoring to mitigate long-term disease progression in vulnerable populations.

**1.4 Heart Disease Prevalence Vs Median Household Income (2022)**

A graph of diabetes and coronary heart disease burden and health care

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**Figure 4: Median household income comparison between State that has the highest and lowest chronic disease prevalence**

The comparative dataset of state with the highest and lowest indices of chronic disease and income gap using data from the U.S Department of Agriculture’s Economic Research Service Median Household Income reveals that Counties in Mississippi consistently report high chronic disease prevalence and lower household income compared to low-burden District of Columbia. Figure 4 illustrates that counties with lower median household incomes tend to have higher prevalence of coronary heart disease. This trend highlights potential care access challenges and lifestyle risk factors tied to poverty.

**Conclusions**

This report reveals clear patterns in the geographic distribution and co-prevalence of cardiovascular risks across U.S. counties. This project discovered strong correlations between income levels and the prevalence of cardiovascular diseases underscoring clusters of elevated risk in economically disadvantaged counties, particularly in the South and Midwest. Our analysis highlights stark disparities that point to urgent needs for targeted public health interventions. These would include.

1. Investing in primary care
2. Deployment of mobile health clinics
3. Establishing and funding local partnerships and non-profits for lifestyle coaching and health monitoring and education programs

Our data-driven approach has uncovered actionable insights into cardiovascular health disparities, demonstrating our ability to deliver impactful, policy-relevant findings. As a committed consulting firm, we bring high-quality analytical support and impactful insights.

**Appendices**

**Citation**

1. Centers for Disease Control and Prevention. Heart Disease Facts. U.S. Department of Health & Human Services, 15 Feb. 2024, [https://stacks.cdc.gov/view/cdc/6321. Accessed 30 May 2025](https://stacks.cdc.gov/view/cdc/6321.%20Accessed%2030%20May%202025).
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