Application of an Assessment of County-Level Cardiovascular Health Profile and its Association with County-Level Disease Rates

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Introduction

The American Heart Association defines cardiovascular health based on seven metrics known as Life's Simple 7 that include: smoking, diet, obesity, physical inactivity, high blood cholesterol, high blood pressure, and fasting plasma glucose levels.

We created a modification of Life's Simple 7, using publicly available data, to estimate county-level cardiovascular health and to determine its association with cardiovascular health outcomes in all 100 counties of North Carolina.

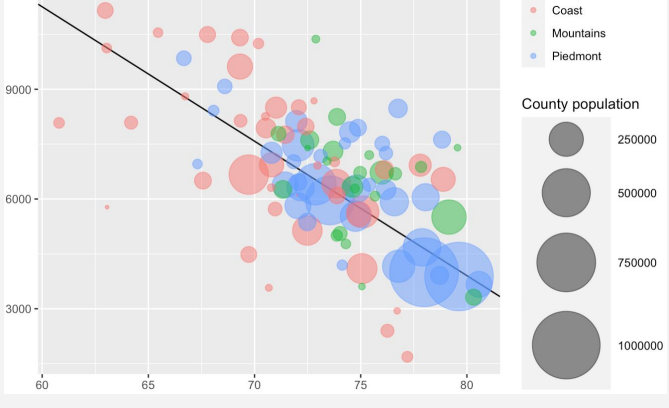
Objective

Determine the association between county-level cardiovascular health metrics and rates of diseases of the circulatory system, ischemic heart diseases, and cerebrovascular diseases in each county and identify regional patterns and differences.

Methods

- **Study population.** 100 counties in North Carolina
- **Data Sources.** BRFSS, USDA Food Environment Atlas, CDC Diabetes Surveillance System, Community Health Assessments
- **Explanatory variable.** Modified Life's Simple 7 risk score by county
  - AHA's Life's Simple 7 definition of ideal or intermediate cardiovascular health were used for our modified measure
  - County-level surveillance data connected to each risk factor (smoking, diet, obesity, physical inactivity, high blood cholesterol, high blood pressure, diabetes)
- **Response variables.** Hospitalization rates for diseases of the circulatory system (ICD 10 I00-I100), ischemic heart disease (ICD 10 I20-I25), and cerebrovascular diseases (ICD 10 I60-I69).
- **Statistical Analysis.** Linear regression weighted by county population were used to determine correlation between variables and leverage diagnostic tests were performed to determine county outliers

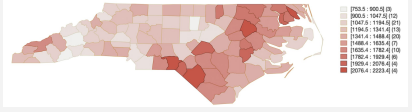
Findings



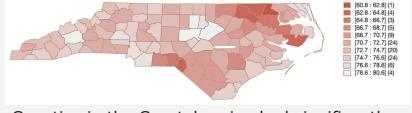
- We found a negative correlation between Modified Life's Simple 7 scores and county-level hospital discharge rates for diseases of the circulatory system (R-squared = 0.621), ischemic heart disease (0.647), and cerebrovascular disease (0.608).
- 5 counties were identified to have worse cardiovascular outcomes than predicted based on Modified Life's Simple 7 scores (Chowan, Harnett, Hoke, Pasquotank, and Robeson) and 2 counties were identified to have better outcomes than predicted (Hyde, Hertford)

Regional Differences

CVD Hospital Discharge Rates



Modified Life's Simple 7 Scores by County



Counties in the Coastal region had significantly higher discharge rates for all 3 cardiovascular outcomes and significantly lower Modified Life's Simple 7 scores compared to counties in the Mountain and Piedmont regions.

Conclusion

The Modified Life's Simple 7 model provides a novel approach to examine county-level variation and regional differences in cardiovascular health that had previously been only reported at the national, state, or individual level.

There was a moderate correlation between the Modified Life's Simple 7 score and the county-level hospital discharge rates for diseases of the circulatory system, ischemic heart disease, and cerebrovascular disease.

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