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

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.

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
- 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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