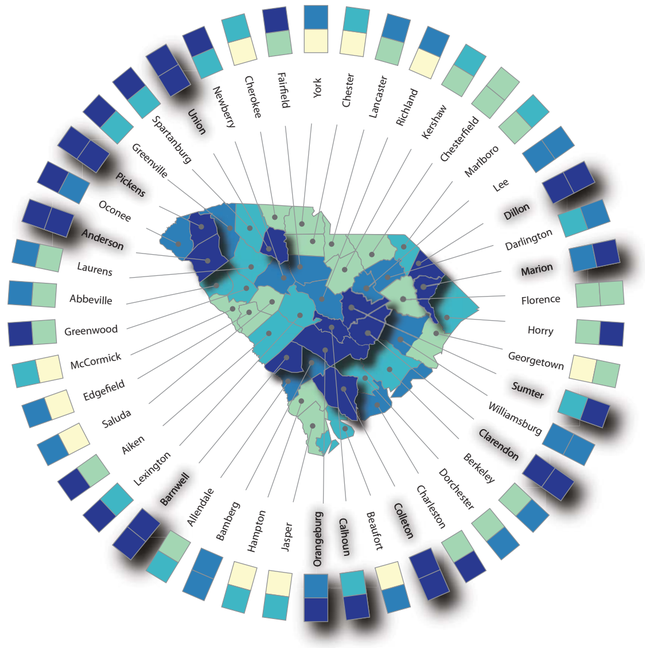
Ring Maps for Spatial Visualization of Multivariate Epidemiological Data

Sarah E. Battersby[1,2]; John. E. Stewart[2]; Ana Lopez-De Fede[2]; Kevin C. Remington[1,2]; Kathy Mayfield-Smith[2]

1 - Department of Geography, University of South Carolina
2 - Institute for Families in Society, University of South Carolina

Abstract: Coherent representation of three or more variables on a single map is challenging, particularly when the individuals using the map are not trained in cartography or geovisualization methods. Increasingly for epidemiological research, scientists have become interested in the creation of novel information visualization methods to aid basic visual exploration of spatial patterns in large multivariate datasets. In this paper we demonstrate the use of use of ring maps for spatial visualization of county-level multivariate epidemiological data for the state of South Carolina. In particular, we focus on the use of the ring map style for exploring relationships between health and characteristics of the physical, socioeconomic, and built environment, uncertainty levels associated with collected data, and to examine patterns of age-, race-, or gender-specific mortality and morbidity within a population.



Ring Key

- African American (outer ring)
- White (inner ring)

Asthma Prevalence Rate
Per 100 Medicaid Recipients

- 3.2 - 4.9
- 5 - 5.7
- 5.8 - 6.3
- 6.4 - 7
- 7.1 - 10.3

Data Source:
South Carolina Medicaid Information System, fy2009

Asthma Prevalence Rate
Per 100 African American Medicaid Recipients

- 4.9 - 5.7
- 5.8 - 6.1
- 6.2 - 6.8
- 6.9 - 8.9

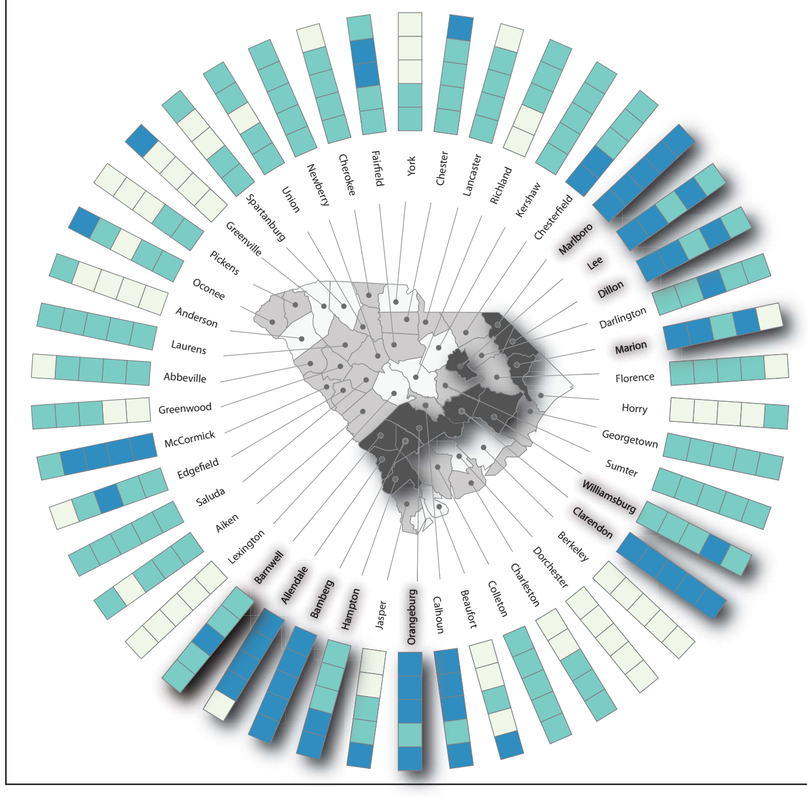
Contextual Attribute Level

- Low
- Medium
- High

Ring Key

- Poverty (inner ring)
- Percent Unemployed
- Percent Urban (outer ring)

Data Sources:
Asthma: South Carolina Medicaid Information System, fy2009
Poverty: U.S. Census Bureau, Census 2000
Unemployment: U.S. Bureau of Labor Statistics, 2008
Urban: U.S. Census Bureau, Census 2000



Poverty Rate

- Low
- Medium
- High

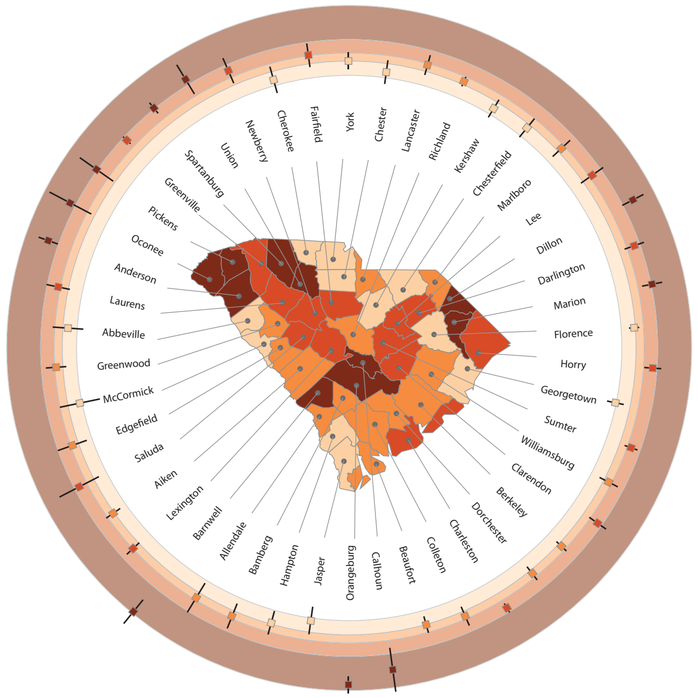
Disease Rate

- Low
- Medium
- High

Ring Key

- CVD (inner ring)
- Diabetes
- ESRD
- Hypertension
- Obesity (outer ring)

Data Sources:
Health: South Carolina Medicaid Information System, fy2009
Poverty: U.S. Census Bureau, Census 2000



Ring Key

95% Confidence Interval
Prevalence Rate

Asthma Prevalence Rate
Per 100 African American Medicaid Recipients

- 4.9 - 5.7
- 5.8 - 6.1
- 6.2 - 6.8
- 6.9 - 8.9

Data Source:
South Carolina Medicaid Information System, fy2009