



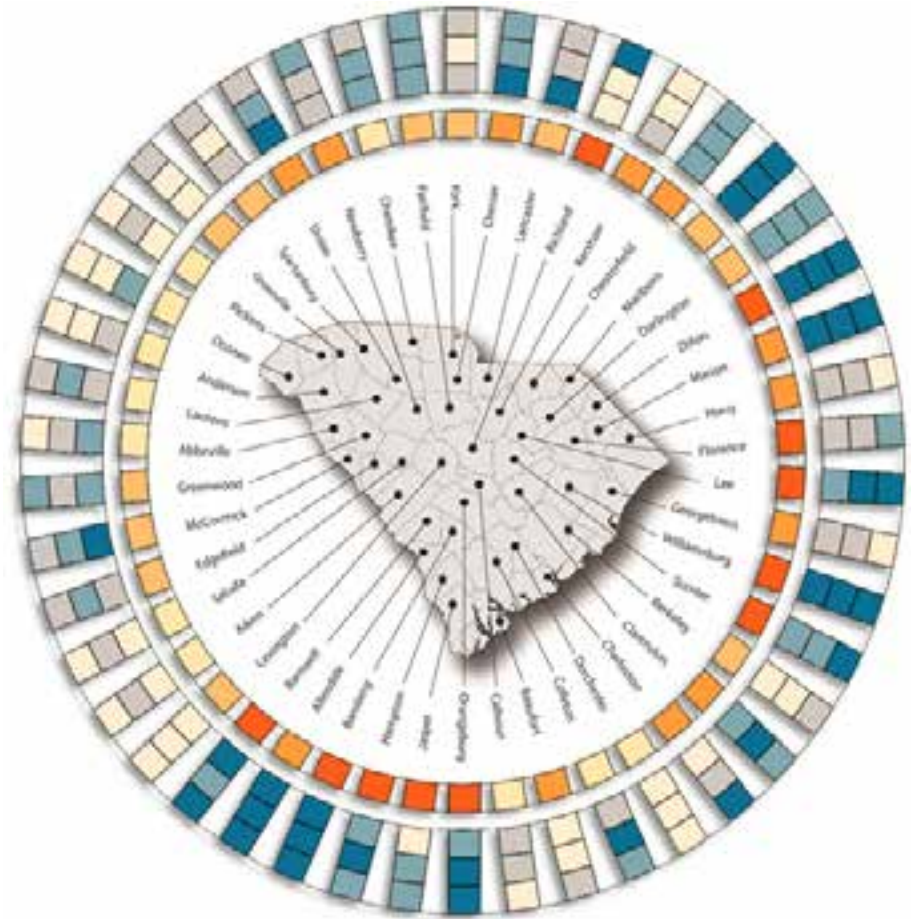
Health Data Visualization With Ring Maps

Ana Lòpez-De Fede, PhD

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Institute for Families in Society
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ESRI User Conference
San Diego, CA

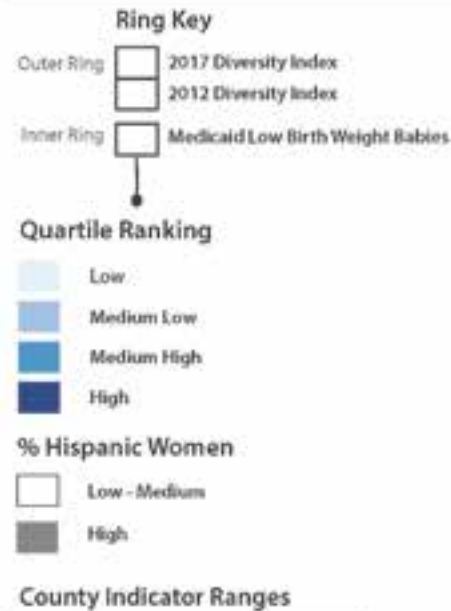
July 22, 2015

“Maps are the workbench on which ideas are fashioned in a manner that permits them to be argued and, often, tested.” ---- Tom Koch



Ring Mapping

South Carolina Population Diversity, Percent Medicaid Low Birth Weight Babies and Percent Women of Childbearing Age with Hispanic Ethnicity



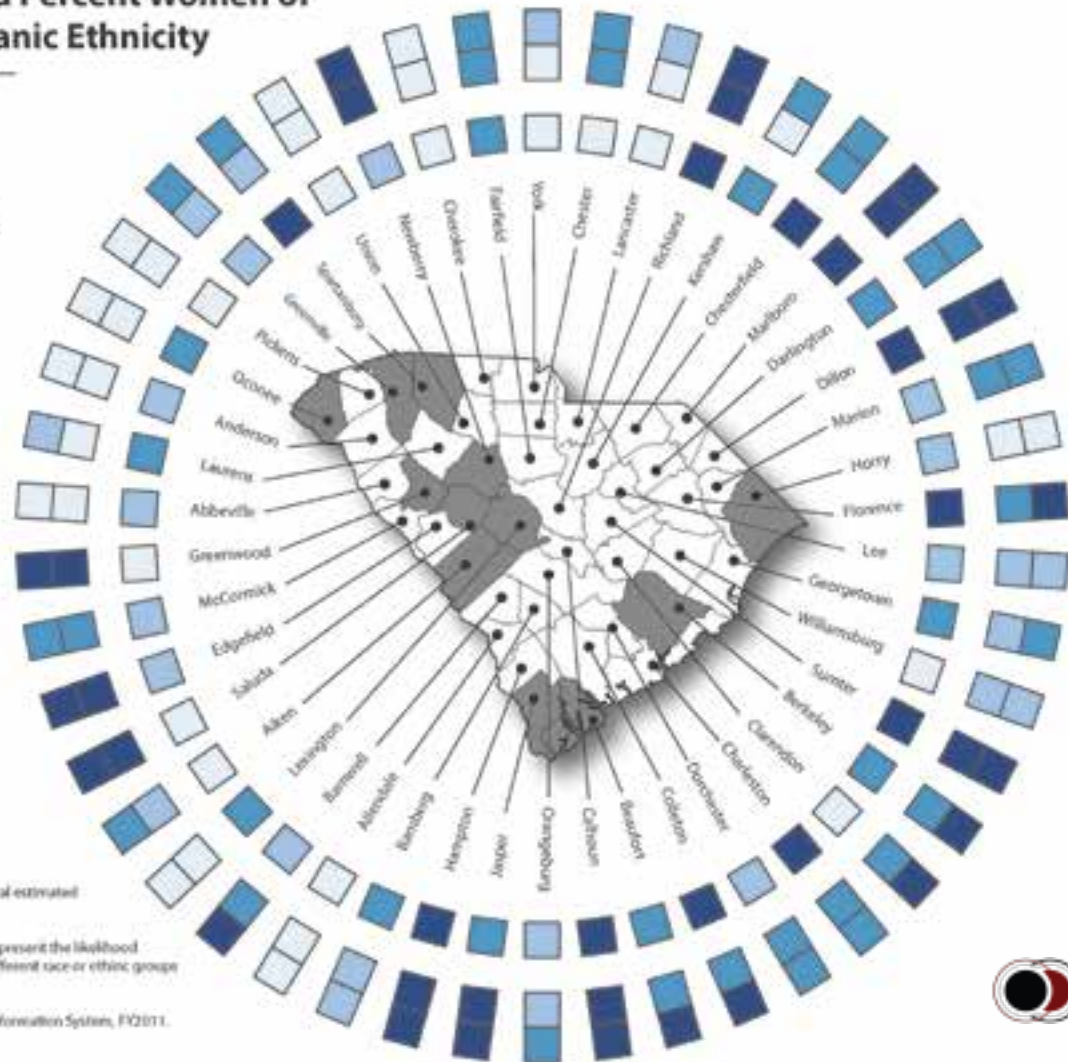
Percent Hispanic Women (Low-Medium (1-6); High (6-19))
 Percent Medicaid Low Birth Weight Babies (12.8 to 40.7)
 2012 Diversity Index (27.6 to 69.8)
 2017 Diversity Index (32.1 to 71.7)

Notes:

Percent Hispanic Women of Childbearing Age is the percent of the total estimated female population ages 15 to 44 with Hispanic ethnicity.

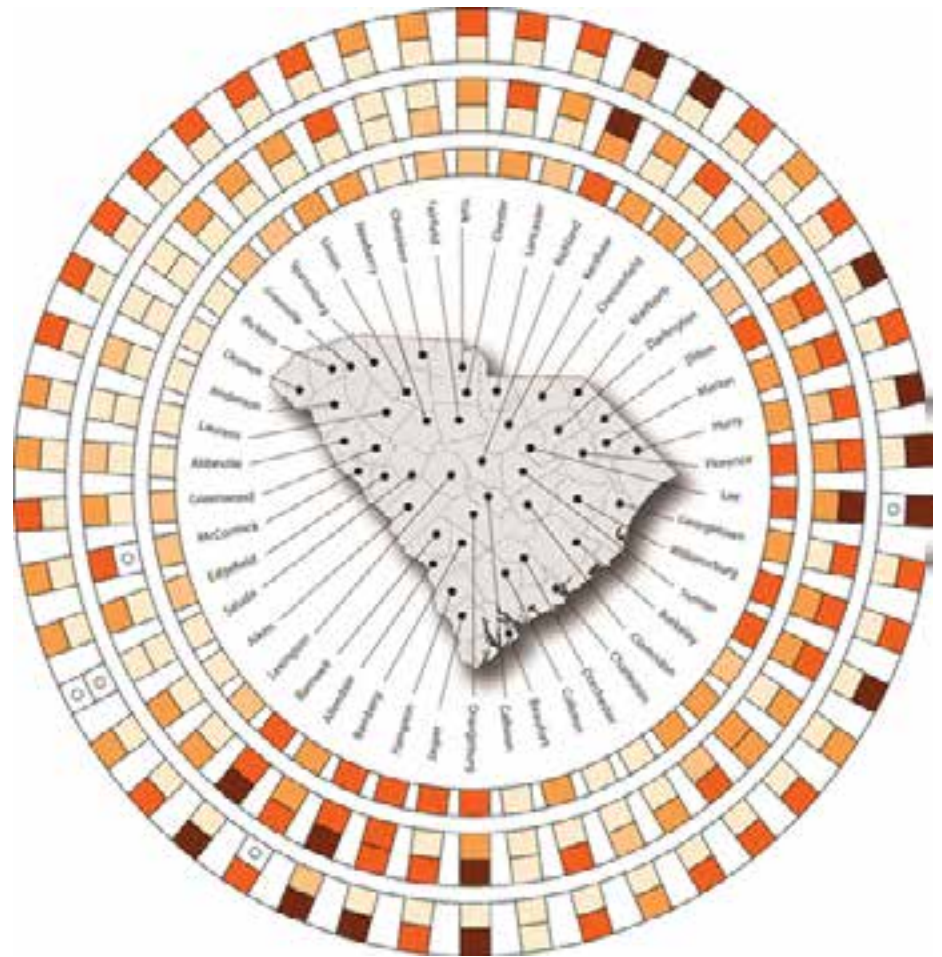
The Diversity Index is based on ESI analysis and projections which represent the likelihood that two persons, chosen at random from the same area, belong to different race or ethnic groups (0 represents no diversity and 100 represents complete diversity).

Date: 2012/2017 ESI Demographic Data: South Carolina Medicaid Information System, FY2011.
 Created by the University of South Carolina,
 Institute for Families in Society, Division of Policy
 and Research on Medicaid and Medicare, May 2011.



A Ring Map...

shows geospatially referenced data in multiple rings around a base map of interest.



Ring Map Applications in Population Health Research

- Socioeconomic context of HIV/AIDS (López-De Fede, et al., 2011)
- Diabetes and the socioeconomic and built environment (Stewart, et al., 2011)
- Risk of developing diabetes (Noble, et al., 2012)
- Dengue vector analysis (Sarfraz, et al., 2012)
- Geovisualization of multidimensional cardiovascular disease data (Zhao, et al., 2013)

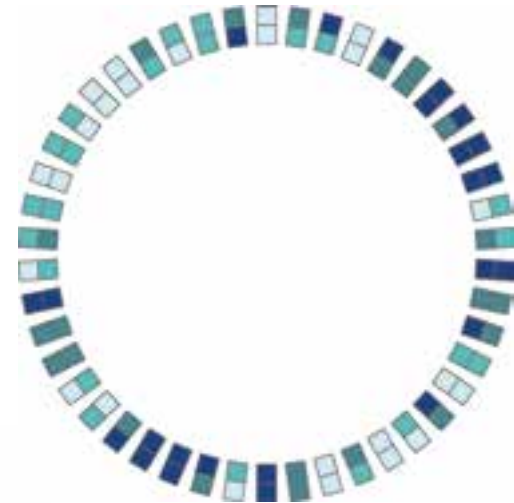
Ring Mapping at the USC Institute for Families in Society Division of Medicaid Policy Research (MPR)

- Custom JavaScript generates rings
- Base map created using ArcGIS
- Ring map graphic components integrated using Adobe Illustrator



MPR Custom Script Options

- # of Geospatial Units (e.g., counties, states) represented in Rings
- # of Rings
- Ring spacing
- Color



MPR Ring Map Applications to...



- Identify High Risk/High Need Areas and Populations



- Evaluate Health Care Provider Accessibility



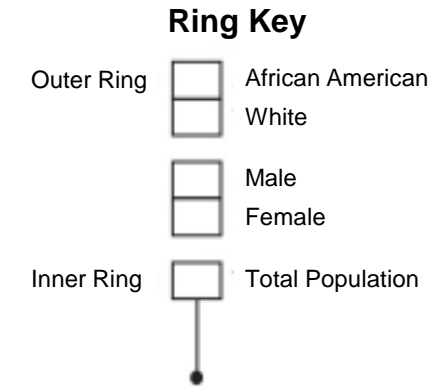
- Evaluate Health Care Quality



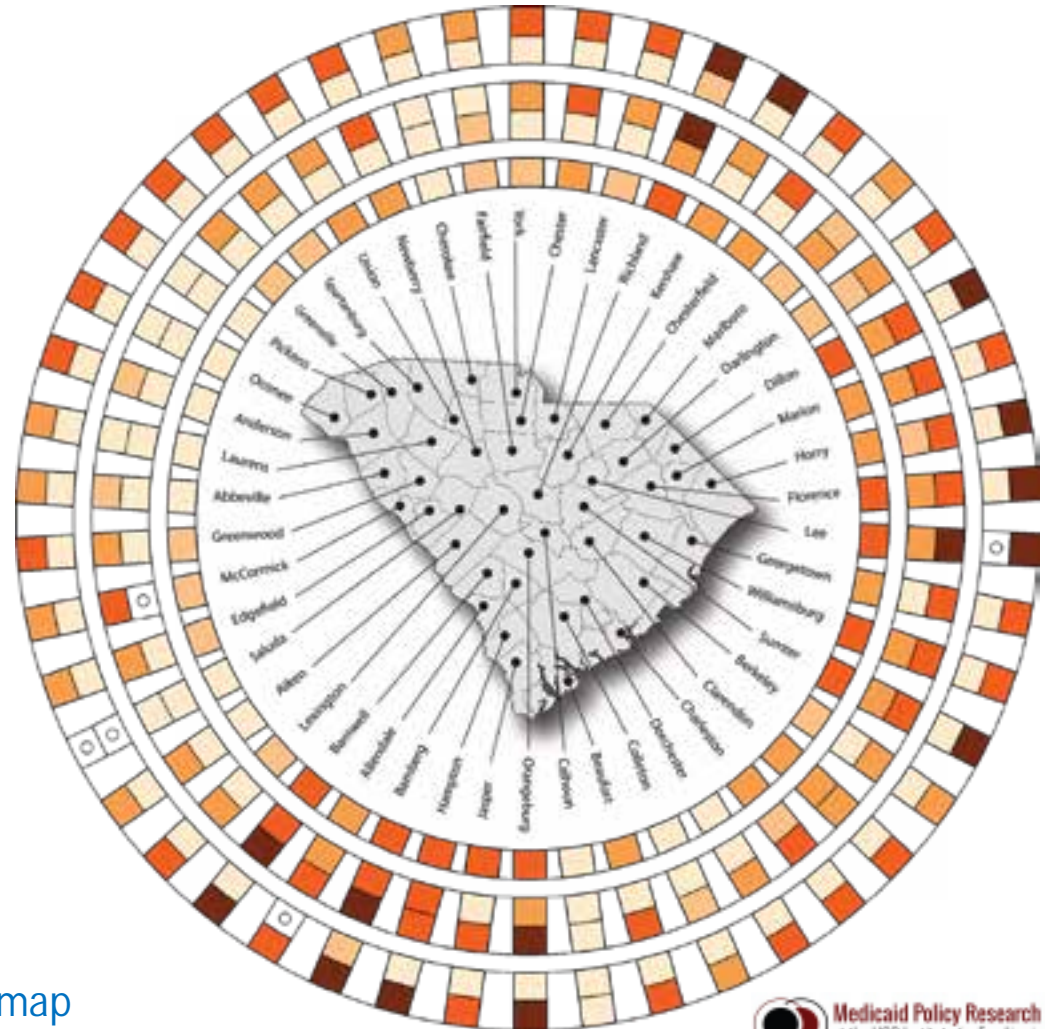
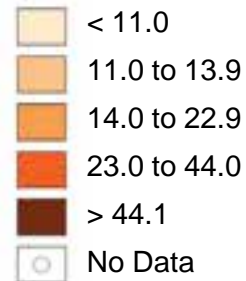
- Inform State and Local Health Services Planning and Policy

Highlighting Health Disparities

Diagnosis Rate of HIV/AIDS in South Carolina Counties by Race and Gender



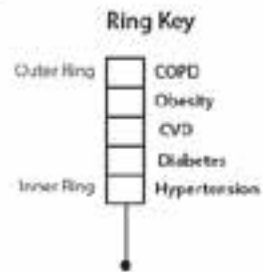
**Diagnosis Rate
(Cases per 100,000)**



Base map serves solely as a locator map

Identifying County-Level Chronic Disease Burden

Prevalence of Top 5 Statewide Chronic Conditions Among Adult Medicaid Recipients by County, FY 2014.



Quartile Ranking

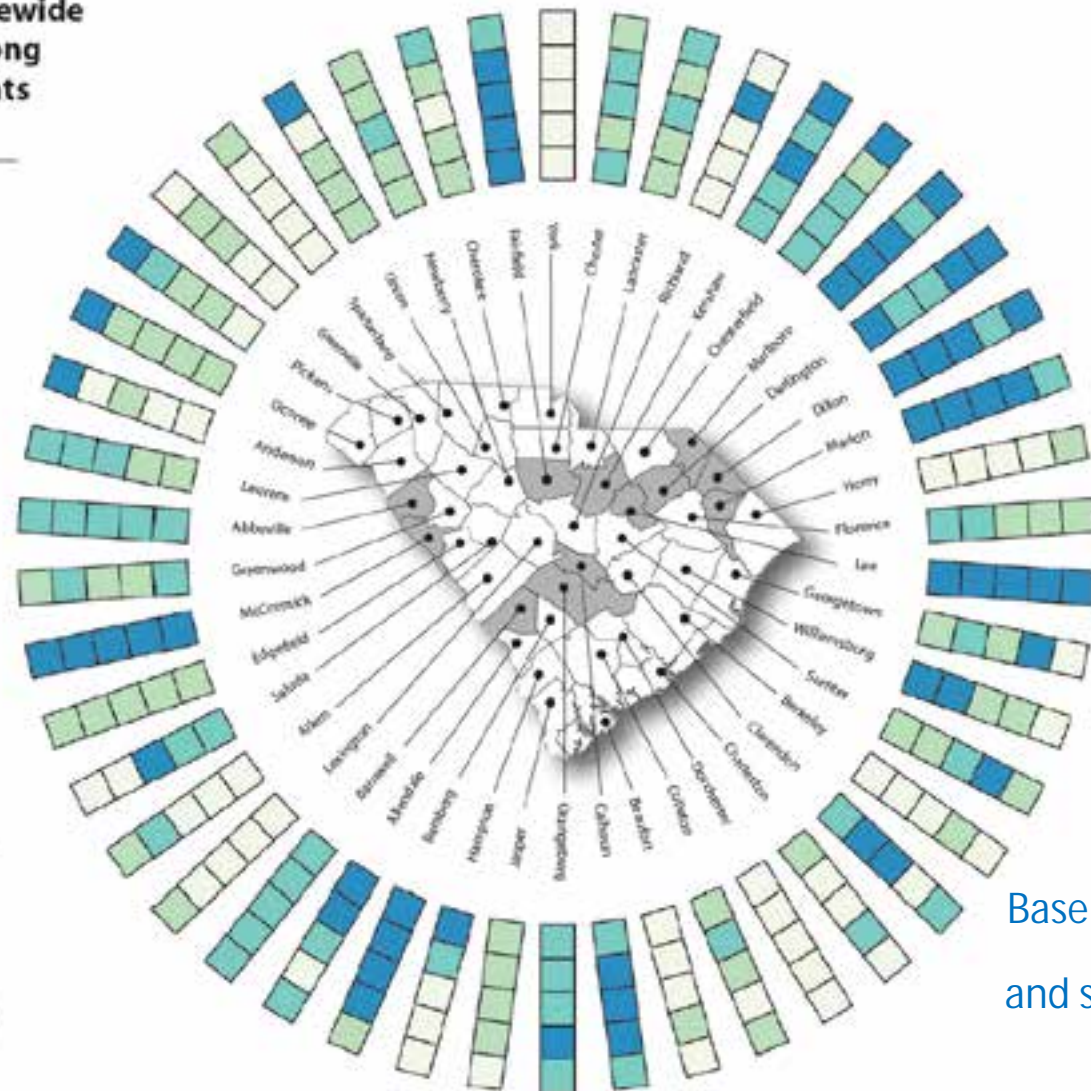


Statewide Prevalence (per 1,000)

Hypertension: 200.1 (County Range = 132.7 to 354.8)
 Diabetes: 104.8 (County Range = 75.5 to 211.2)
 CVD: 75.6 (County Range = 48.3 to 120.8)
 Obesity: 64.5 (County Range = 51.4 to 89.9)
 COPD: 59.1 (County Range = 31.4 to 100.2)

Notes:

Data: SC MDES, FY 2014 (June 2014 as of September 2014).
 Adult Medicaid recipients include those aged 19 or older.
 Created by the University of South Carolina, Institute for Families in Society, Division of Medicaid Policy Research, October 2014.

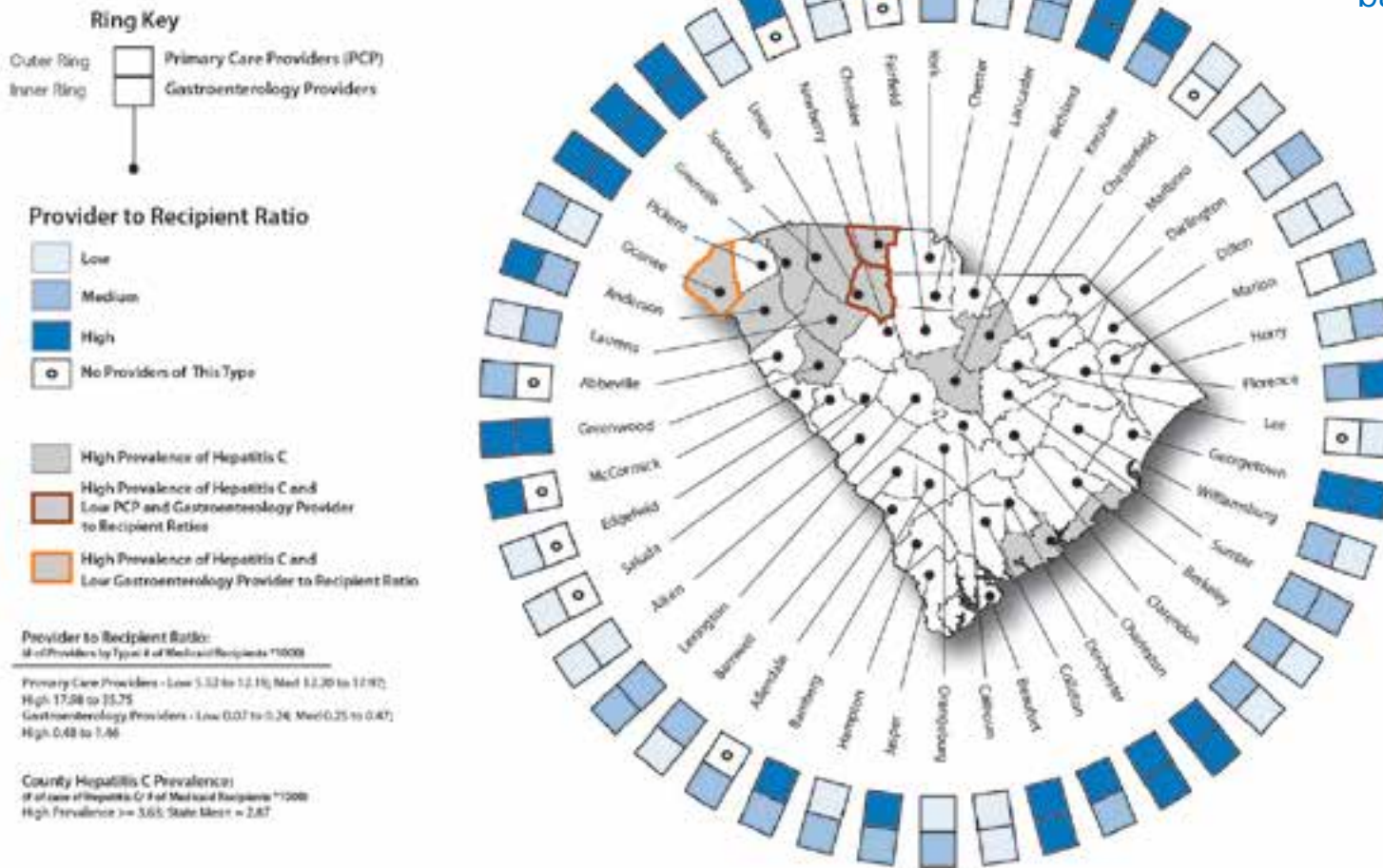


Base map serves as a locator map and summarizes data shown in rings

Assessing Health Care Provider Accessibility

Hepatitis C Prevalence and Number of Selected Provider Types per 1,000 Medicaid Recipients by County, CY 2014

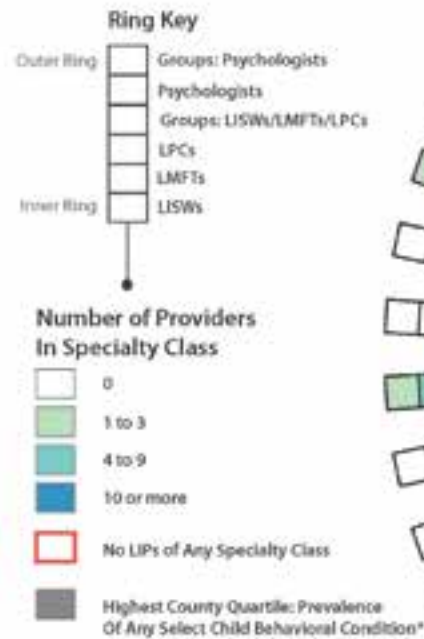
Base map serves as a locator map, presents data not shown in rings, and summarizes data from both base map and rings



Notes:
 All classifications are based on ordered quartiles.
 Source:
 South Carolina Medicaid Information System, CY 2014,
 AMIS March 2015, Enrollment Broker March 2015.

Assessing Health Care Provider Accessibility

Number of Medicaid Licensed Independent Practitioners (LIPs) in South Carolina by Specialty by County
Also Showing Highest Quartile: Prevalence Of Any Select Child Behavioral Condition*

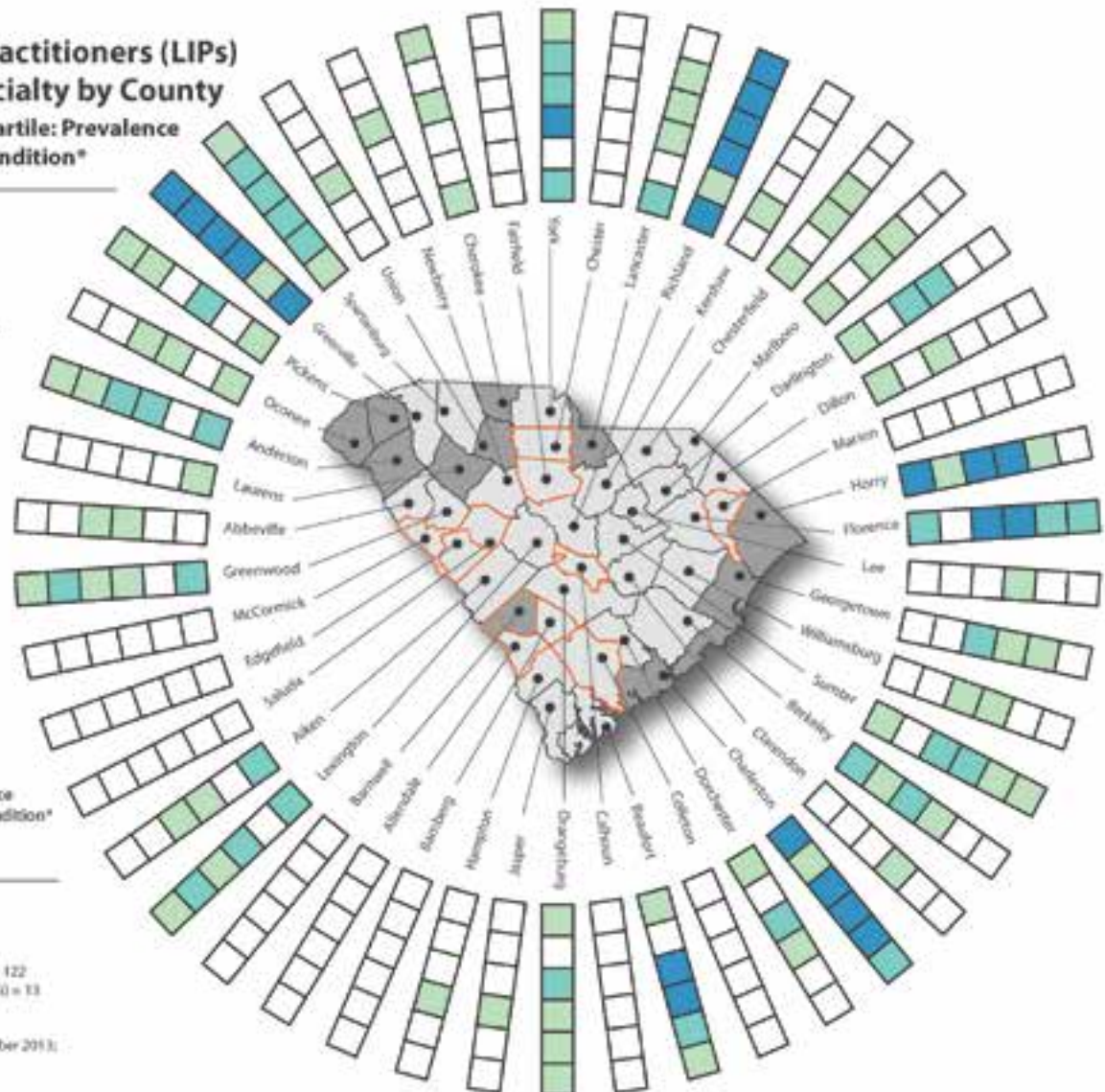


Notes:

Statewide LIPs Specialty Class Summary
 Groups: Psychologists = 52
 Psychologists = 149
 Groups: LISWs/LMFTs/LPCs = 144
 Licensed Independent Social Workers (LISWs) = 122
 Licensed Marriage and Family Therapists (LMFT) = 13
 Licensed Professional Counselors (LPC) = 253

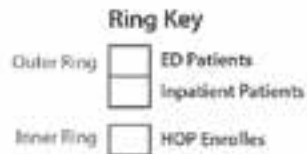
Date: SC MMS Directory of Enrolled LIPs, September 2013;
 SC MMS June 2012.

* Select conditions include ADHD, Autism, and Depression.

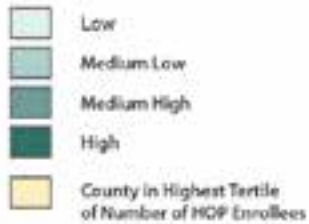


Evaluating Health Service Utilization

Healthy Outcomes Plan (HOP) Enrollees with Inpatient and Emergency Department (ED) Patients Enrolled in HOP



Quartile Ranking



County Indicator Ranges

HOP Enrollees (99 - 876)

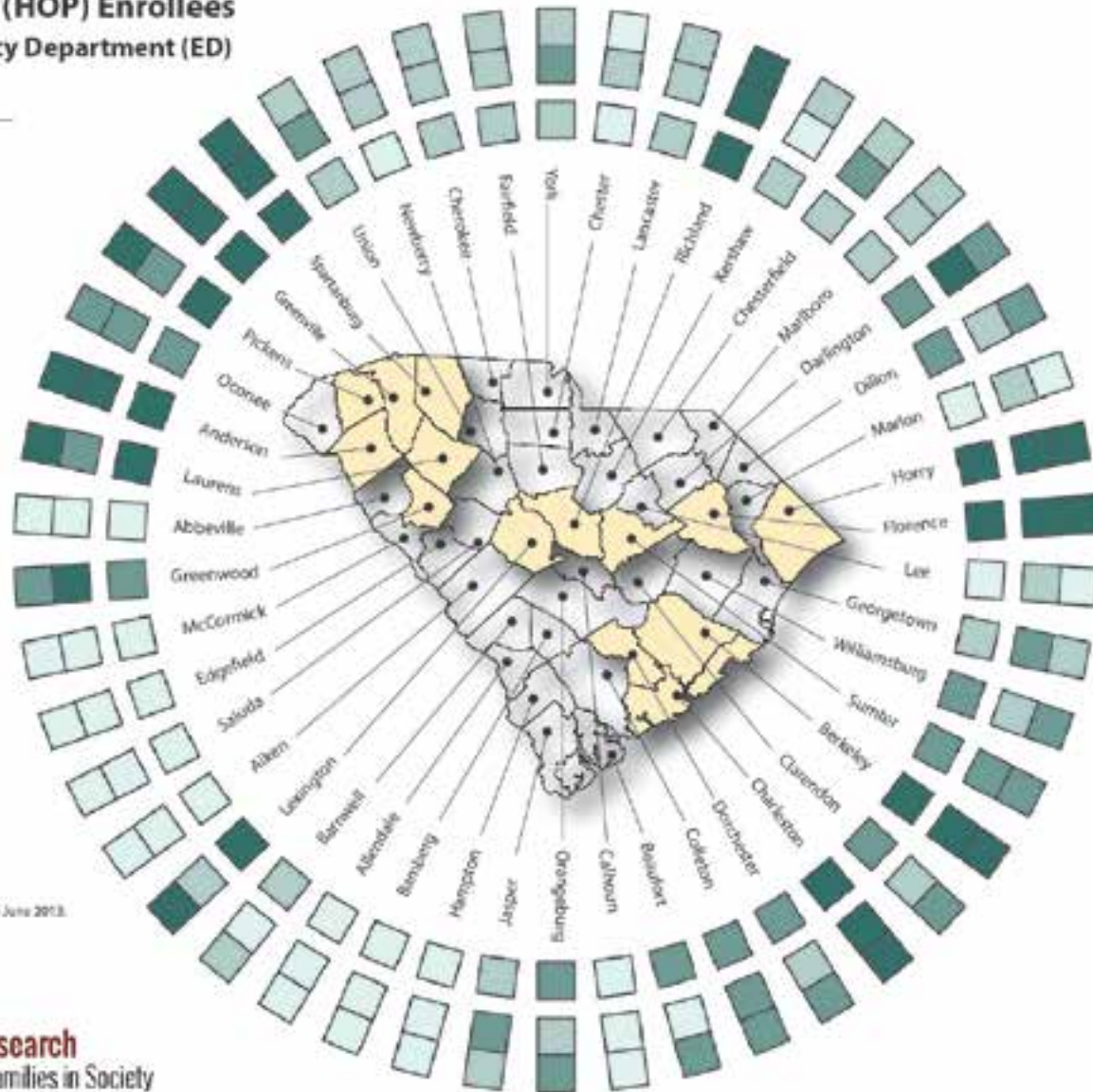
State Totals

HOP Enrollees N = 4,998
 Inpatient HOP Enrollees N = 1,341
 ED HOP Enrollees N = 4,827

Notes:

Data: South Carolina Inpatient and ED Patients, July 2012 to June 2013.
 DHS Healthy Outcomes Plan (HOP) Initiative.

Created by the University of South Carolina,
 Institute for Families in Society, Division of Policy
 and Research on Medicaid and Medicare, August 2014.



Evaluating Health Care Quality

Selected South Carolina Medicaid HEDIS Measures:

Well-Child Visits in the First 15 Months of Life,
Well-Child Visits in 3 - 6 Years of Life, and
Well-Care Visits for Adolescents



Tertile Ranking



County Indicator Ranges (%)

	W15	W34	AWC
Low	92.5 to 96.9	41.7 to 49.6	17.9 to 27.1
Medium	97.0 to 97.7	49.7 to 54.4	27.2 to 31.0
High	97.8 to 100	54.5 to 63.3	31.1 to 40.5

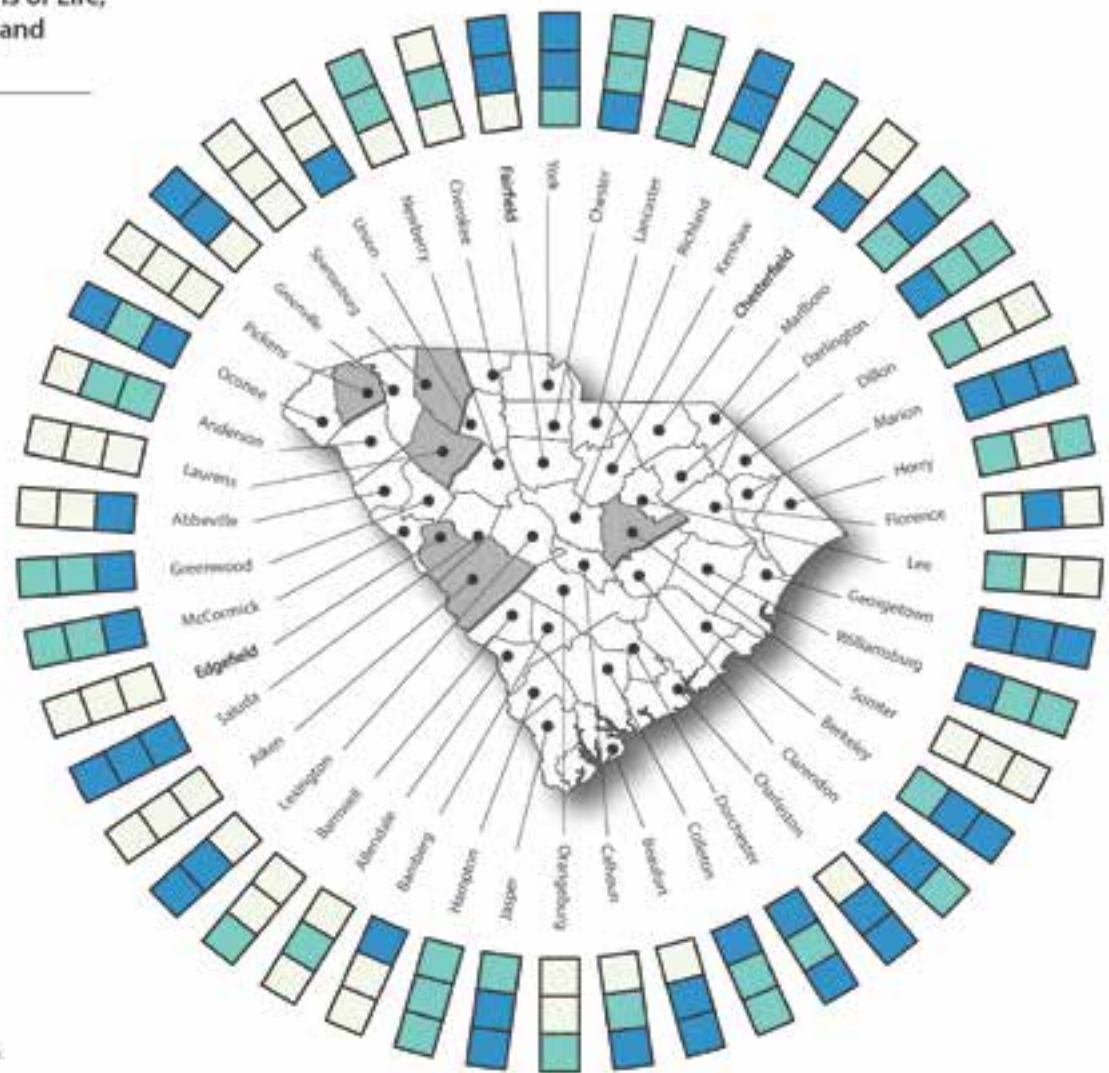
Notes:

Well-Child Visits in the First Fifteen Month of Life:
The percentage of Medicaid Recipients who turned 15 months old during the measurement year and who had at least one Well-Child visit with a Primary Care Provider.

Well-Child Visits in the Third, Fourth, Fifth and Sixth Years of Life:
The percentage of Medicaid Recipients 3 - 6 years of age who had one or more Well-Child visits with a Primary Care Provider.

Adolescent Well-Care Visits:
The percentage of Medicaid Recipients 12 - 21 years of age who had at least one comprehensive Well-Care visit with a Primary Care Provider or an OB/GYN practitioner during the measurement year.

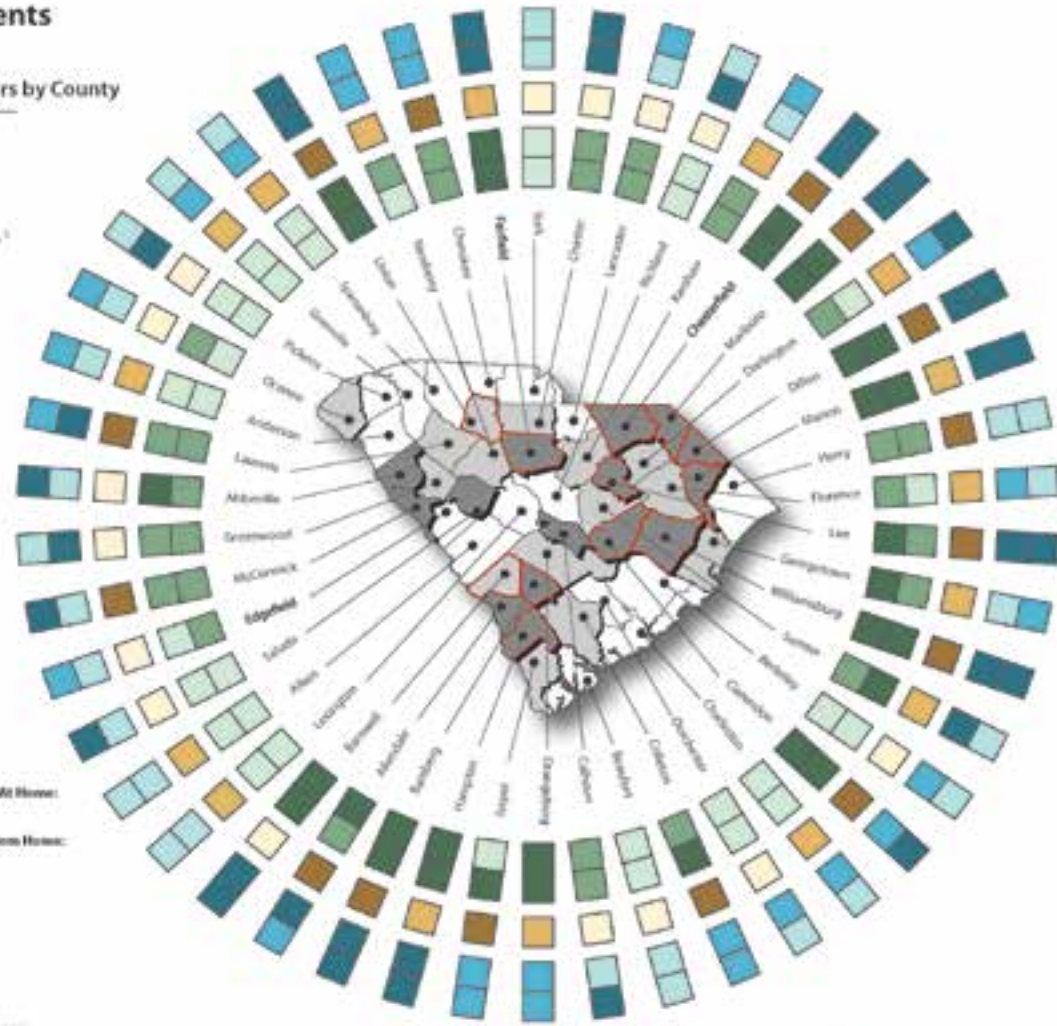
Data: SC MMS, CY2014; US Census Bureau 2010.
Created by the University of South Carolina,
Institute for Families in Society, Division of
Medicaid Policy Research, April 2015.



Exploring Social Determinants of Health

Prevalence of Diabetes Among Adult Medicaid Recipients In South Carolina

And Related Socioeconomic Contextual Factors by County



County Indicator Ranges

- Spending on Sweet Snacks as a Percent of Total Spending on Food At Home:**
Low: 3.70% to 3.90%; Medium: 3.91% to 3.96%; High: 3.99% to 4.11%.
- Fast Food Spending as a Percent of Total Spending on Food Away From Home:**
Low: 39.5% to 40.1%; Medium: 40.5% to 40.7%; High: 40.8% to 41.5%.
- Convenience Stores Per 10,000 Residents:**
Low: 1.1 to 3.1; Medium: 3.4 to 4.3; High: 4.4 to 9.2.
- Percent of Households with Income < \$15,000:**
Low: 9.8% to 13.8%; Medium: 13.9% to 16.7%; High: 16.8% to 24.3%.
- Percent Unemployed:**
Low: 5.7% to 6.0%; Medium: 6.1% to 7.7%; High: 7.8% to 12.5%.
- Prevalence of Diabetes Per 1,000 Medicaid Recipients Ages 19 and Older:**
Low: 77.0 to 99.4; Medium: 109.5 to 147.1; High: 147.2 to 222.0.

Data: SC HHS, CY2014; US Census Bureau, 2010; ESR Business Analyst; 2012; US Bureau of Labor Statistics, March 2015.
Created by the University of South Carolina, Institute for Families in Society, Division of Medicaid Policy Research, June 2015.



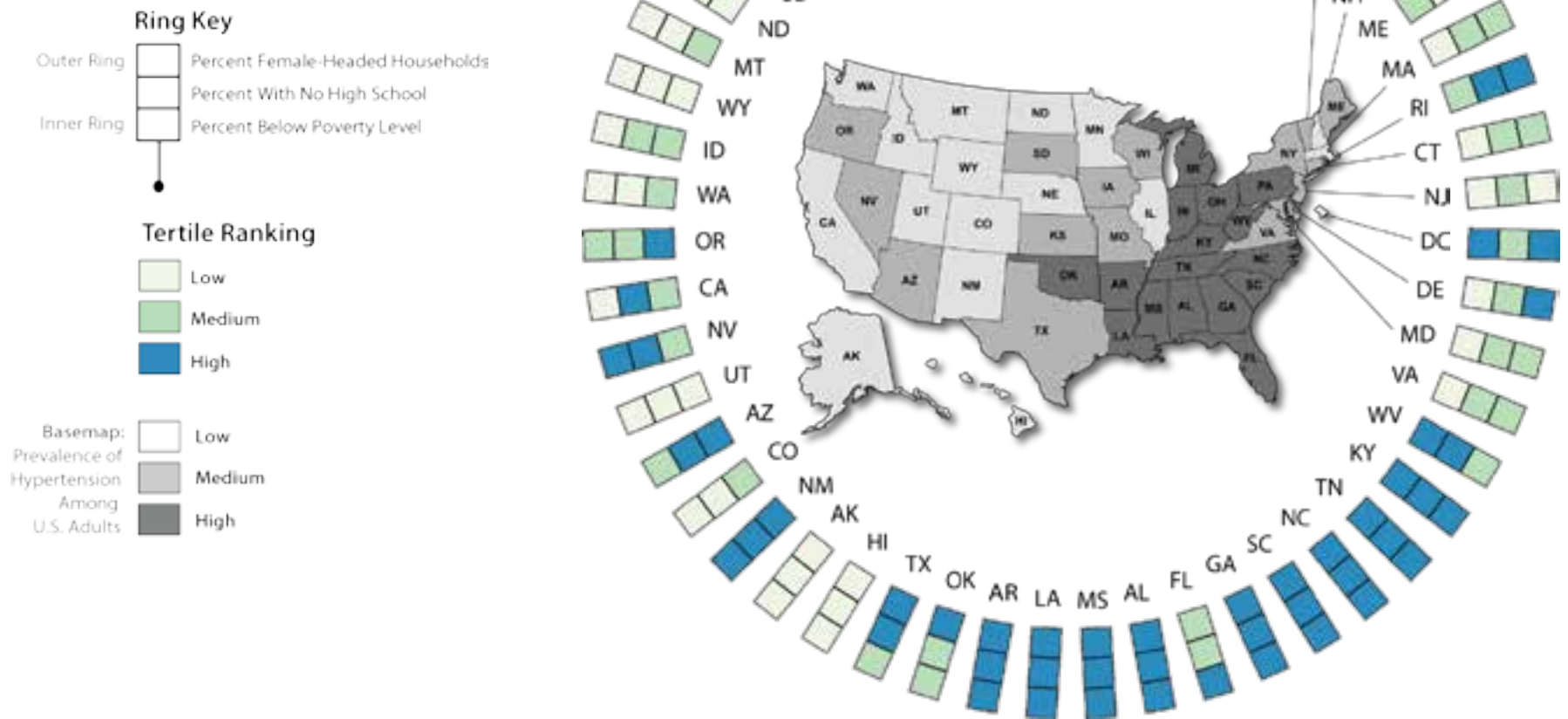


Visualizing the Health of the Nation:

U.S. Ring Map Examples

Self-Reported Hypertension Among U.S. Adults

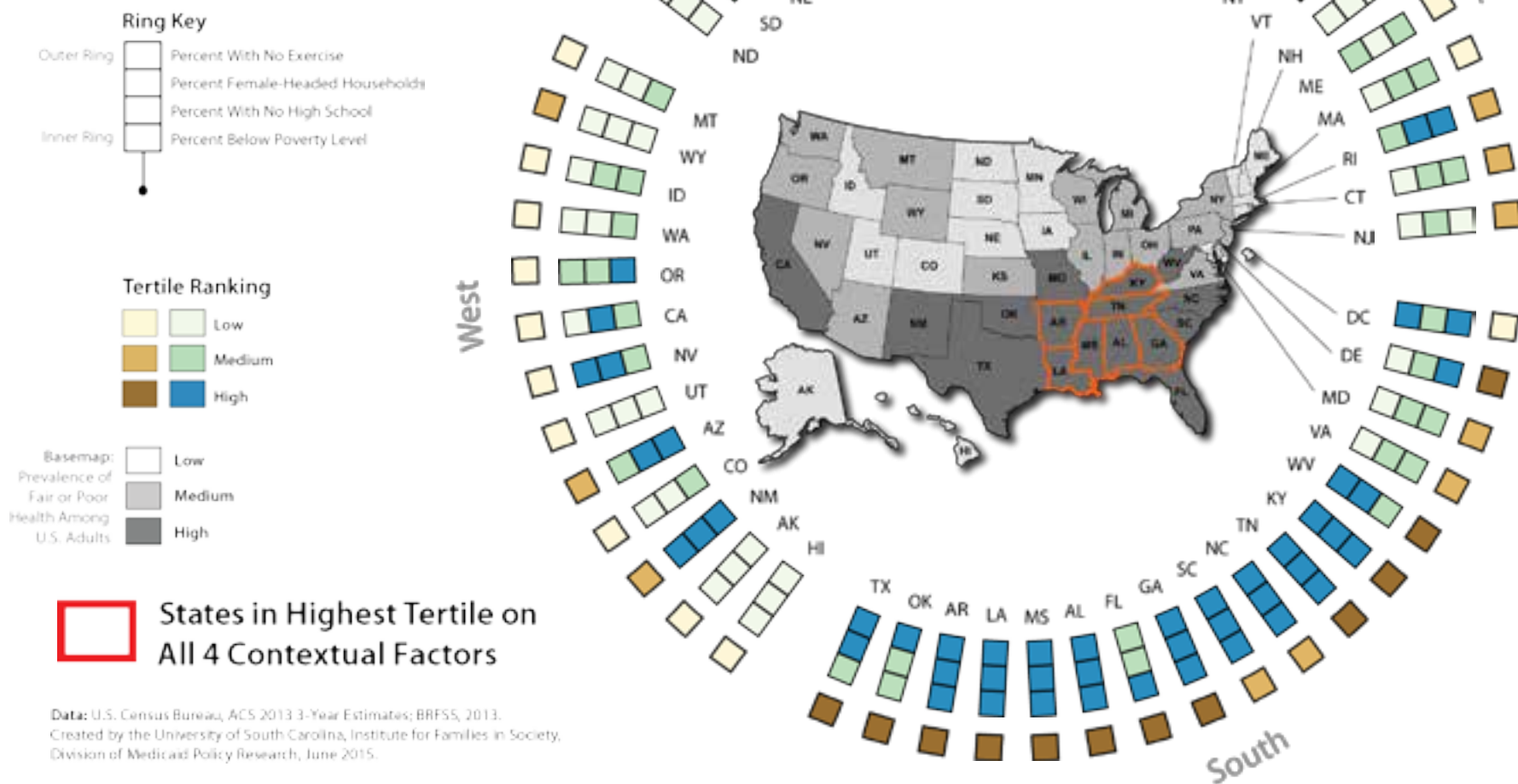
And Related Socioeconomic Contextual Factors by State



Data: U.S. Census Bureau, ACS 2013 3-Year Estimates; BRFSS, 2013.
 Created by the University of South Carolina, Institute for Families in Society, Division of Medicaid Policy Research, June 2015.

Self-Reported Fair or Poor Health Among U.S. Adults

And Related Behavioral/
Socioeconomic Contextual
Factors by State



Ring Mapping Caveats

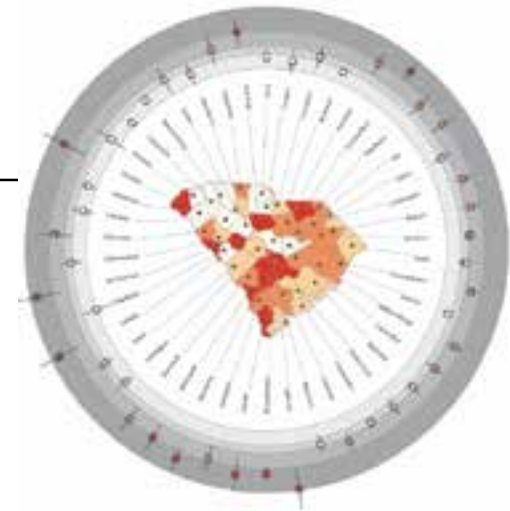
- Legibility limits
 - Number of geospatial units represented in rings
 - Number of rings
- Geospatial topology diminished or lost in rings
- Irregularly shaped base geography may require elliptical or other ring configuration

Questions?

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803-777-5789



For more information:



Lopez-De Fede A, Stewart JE, Hardin JW, Mayfield-Smith K, Sudduth D. 2011. Spatial visualization of multivariate datasets: an analysis of STD and HIV/AIDS diagnosis rates and socioeconomic context using ring maps.

*Public Health Reports / 2011 Supplement 3
Volume 126*

Stewart, JE, Battersby SE, Lopez-De Fede A, Remington KC, Hardin JW, Mayfield-Smith K. 2011. Diabetes and the socioeconomic and built environment: geovisualization of disease prevalence and potential contextual associations using ring maps.



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*International Journal of Health Geographics
2011, 10:18 (1 March 2011)*