



# HEALTH DISPARITIES STORY MAP

Conception and Technical  
Implementation

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Research Professor

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## Conception and Technical Implementation

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# Goals of the Presentation

3

- Introduce the Health Disparity Interactive Map Journal
- Highlight the approach and link to community planning and policy
- Identify the technical and security challenges and solutions



# Why Map Health Disparities?

4

- **Disparities in health and health care limit continued improvement in overall quality of care and population health and result in unnecessary costs.**
- Recent analysis estimates that 30% of direct medical costs for Blacks, Hispanics, and Asian Americans are excess costs due to health inequities with economic losses estimated at **\$309 billion** per year due to the direct and indirect costs of disparities.
- As the population becomes more diverse, with people of color projected to account for over half of the population by **2050**, it is increasingly important to address health disparities.

# Health disparities are...

5

- differences in the relative health status of population groups defined by such characteristics as race/ethnicity, gender, socioeconomic status, and geographic location.
- driven largely by unequal population access to such life-enhancing resources (or social determinants of health) as food, housing, employment, education, transportation, and health care.

# Medicaid Population Health High Need Areas

6

- Areas of South Carolina with a high prevalence of at least 3 select child health conditions AND at least 3 select adult health conditions among Medicaid enrollees
  - Select child conditions: ADHD, autism, asthma, diabetes, obesity, or sickle cell disease
  - Select adult conditions: cardiovascular disease (CVD), diabetes, end-stage renal disease (ESRD), hypertension, obesity, or stroke

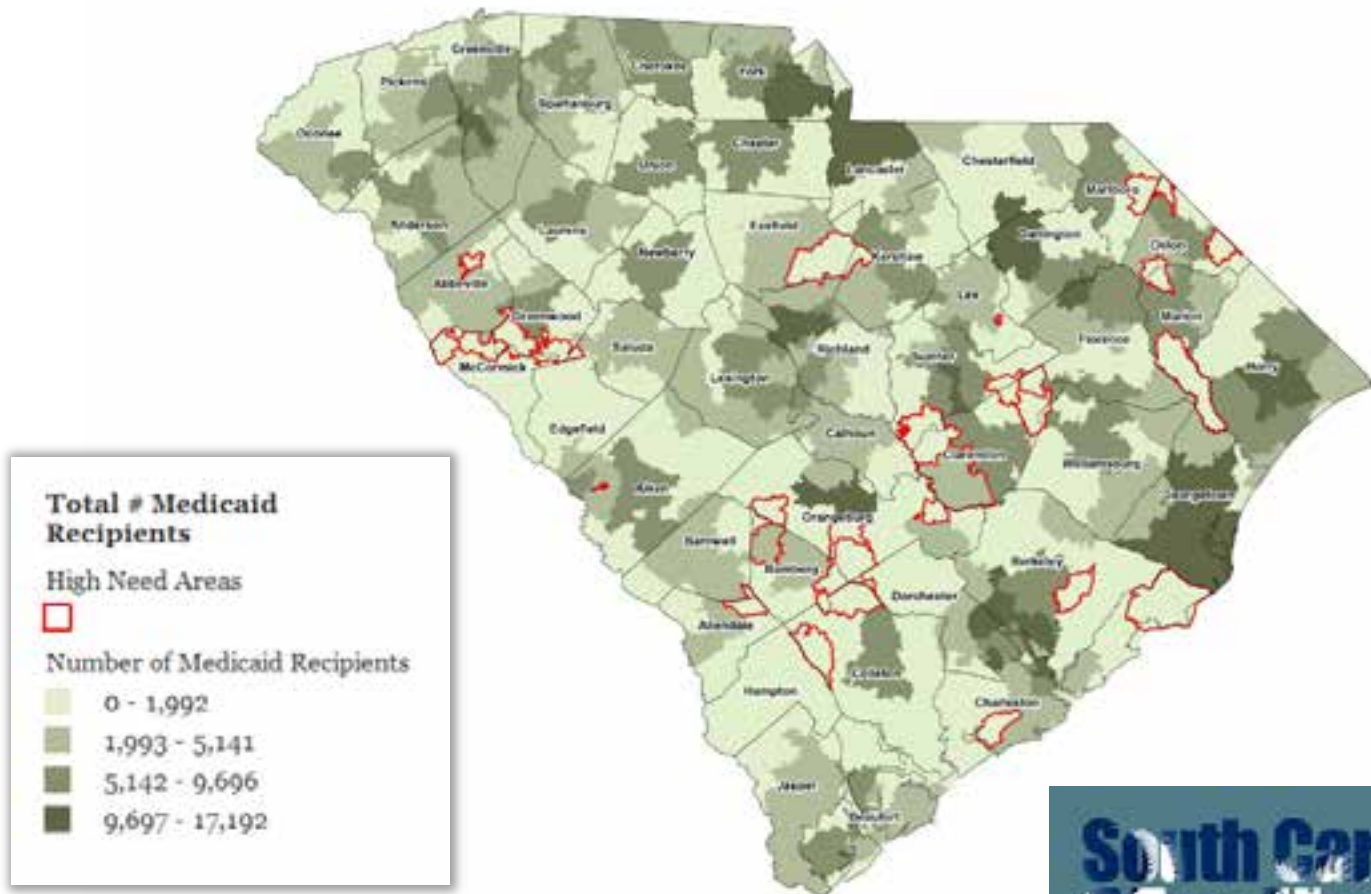


# Medicaid Recipients

7

- Recipients in 2013: 1,162,210
  - Increase of 13.8% from 2012
- Nearly 1 in 4 South Carolinians are enrolled in Medicaid
- Greatest number are in metropolitan areas
  - **BUT** the highest enrollment rates are in predominantly rural areas
    - Especially along the I-95 corridor



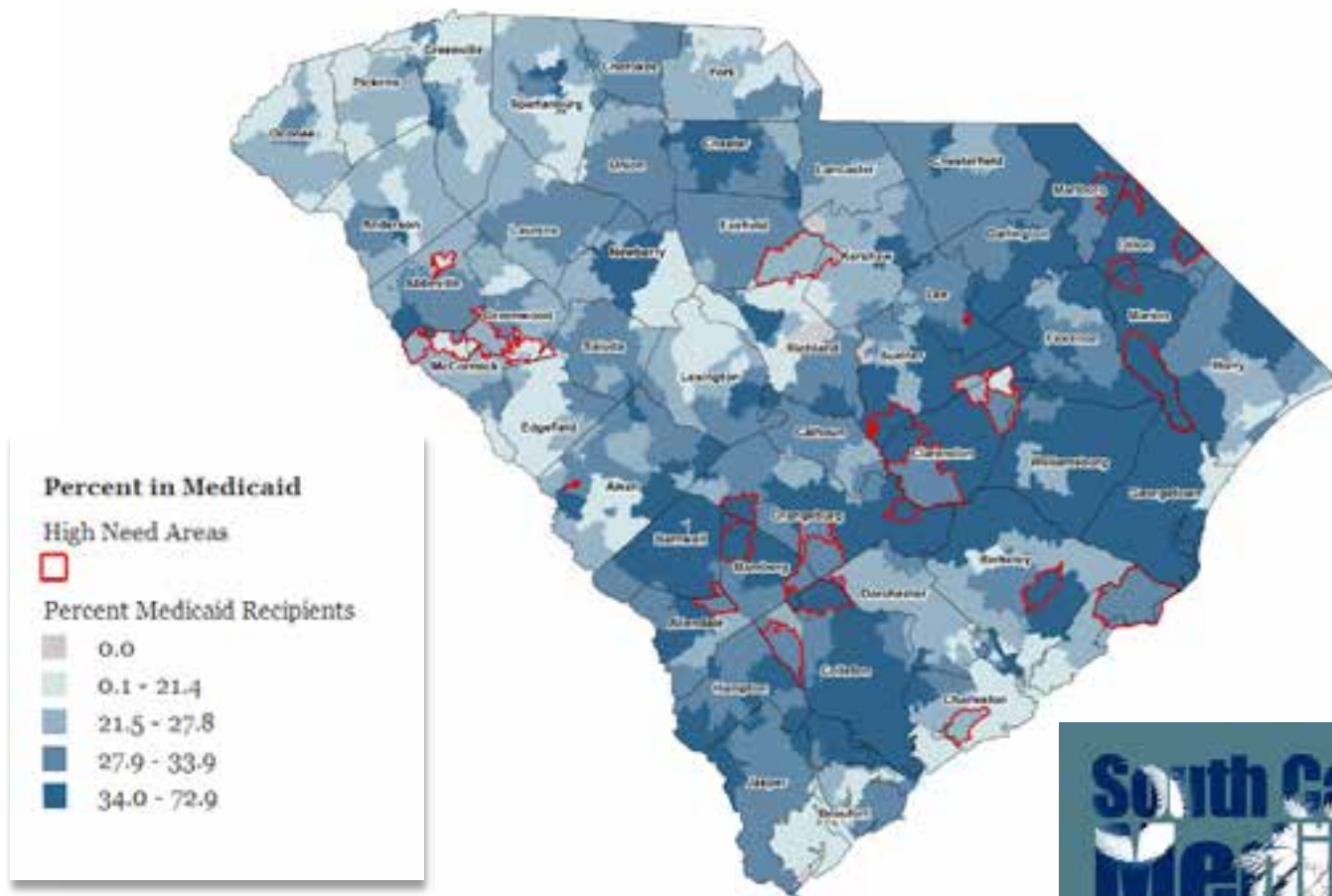


## Number of Medicaid Recipients

§ More than 50% of Medicaid recipients are children ages 0-18 years.







## Percent in Medicaid

Notice that the highest rates (percentages) are found along the I-95 corridor (Extending from Marlboro County in the Northeast to Jasper County in the Southern portion of the state)

### Medicaid Recipients



Between 2011 and 2013, South Carolina Medicaid enrollment grew from 1,021,064 to 1,162,216, an increase of 13.8%. Currently, nearly one in four South Carolinians are enrolled in Medicaid. More than 50% of Medicaid participants are children ages 0 - 18 years. Although the greatest number of Medicaid recipients resides in the state's largest metropolitan areas, the highest rates of Medicaid participation are found in predominantly rural areas, especially along the South Carolina birth corridor (extending from Marlboro County in the

Northeast to Jasper County in the southern portion of the state).

[Go back to SC HealthViz](#)

### Race as a Health Risk Factor



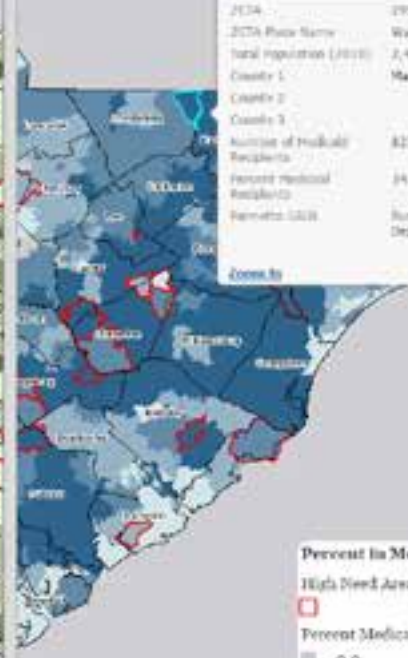
Health disparities exist along racial and ethnic lines in South Carolina. For example, the life expectancy of Medicaid recipients along the birth corridor is lower than in other parts of the state. In addition, the percentage of Medicaid recipients who are African American is higher in the birth corridor than in other parts of the state. These disparities are a result of the complex interactions of social, economic, and environmental factors.



Total # Medicaid Recipients



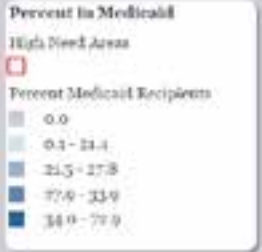
Percent in Medicaid



Percent Medicaid Recipients

ZCTA Name: Wallace	
ZCTA	29506
ZCTA Place Name	Wallace
Total Population (2010)	2,424
County	Marlboro
County 2	
County 3	
Number of Medicaid Recipients	822
Percent Medicaid Recipients	34.0
Source: USCB	Rural
	Designation

[Zoom In](#)

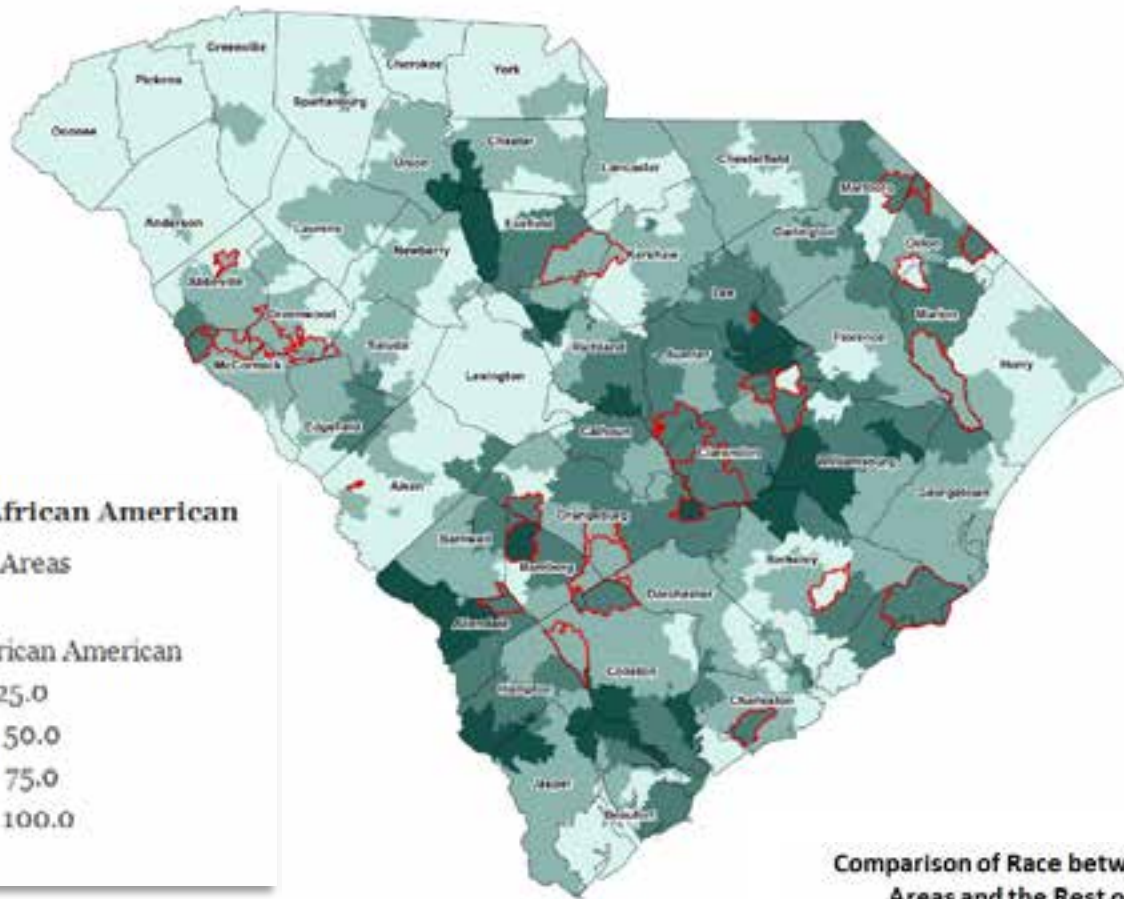


Division of Medicaid Policy and Research at SC's Institute for Future in Society (IFS)

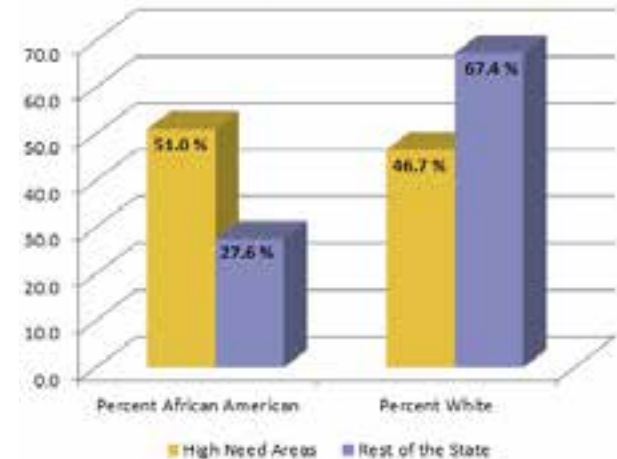
## Swipe Example in Journal

- Text information on left
- Two related maps on the same page with swipe bar
- Ability to interact and retrieve data about spatial locations





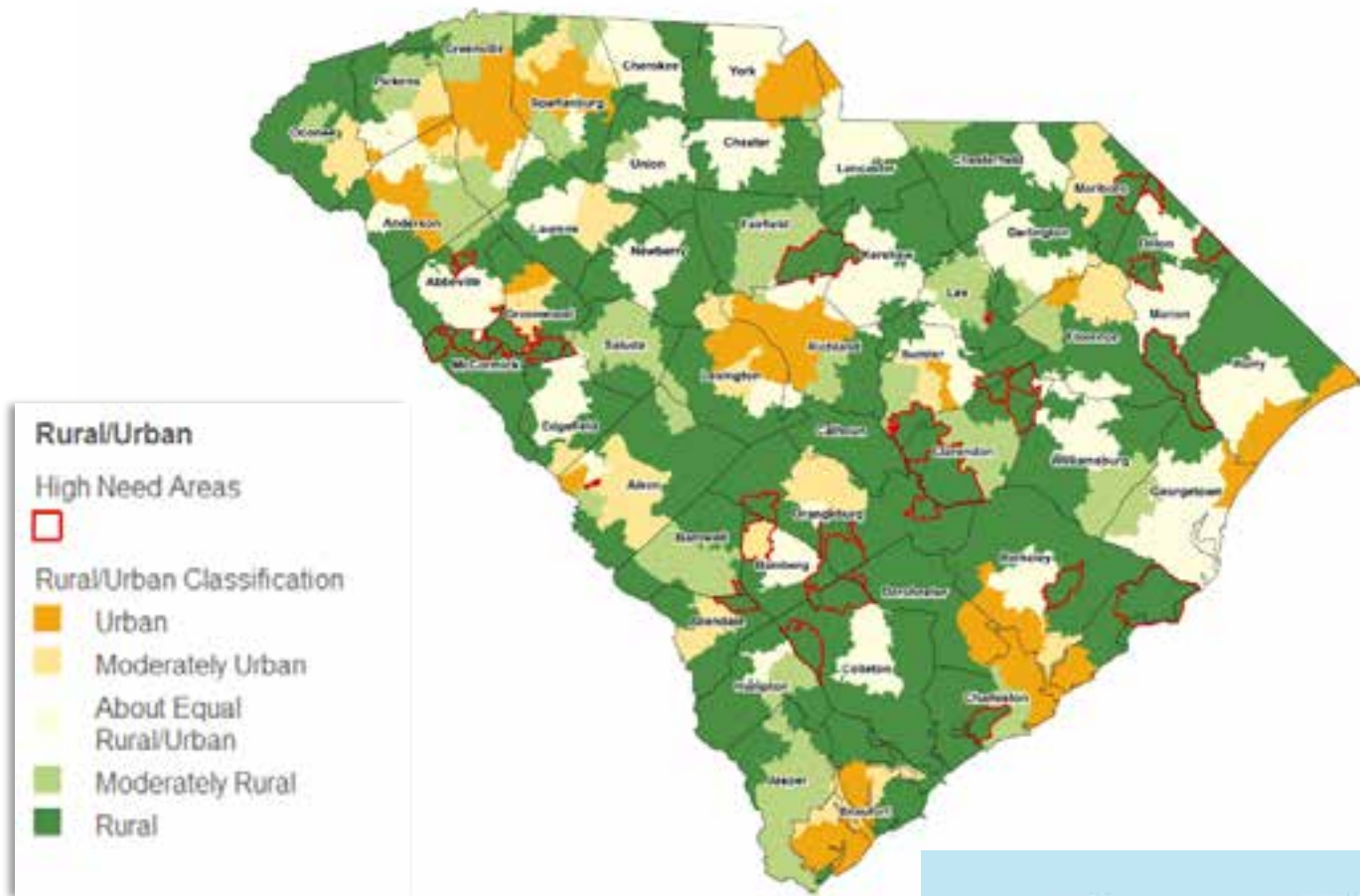
Comparison of Race between High Need Areas and the Rest of the State



## Percent African American

- Increased risk for poor health outcomes
- Largest % of residents in areas along the I-95 corridor





## Rural/Urban Landscape



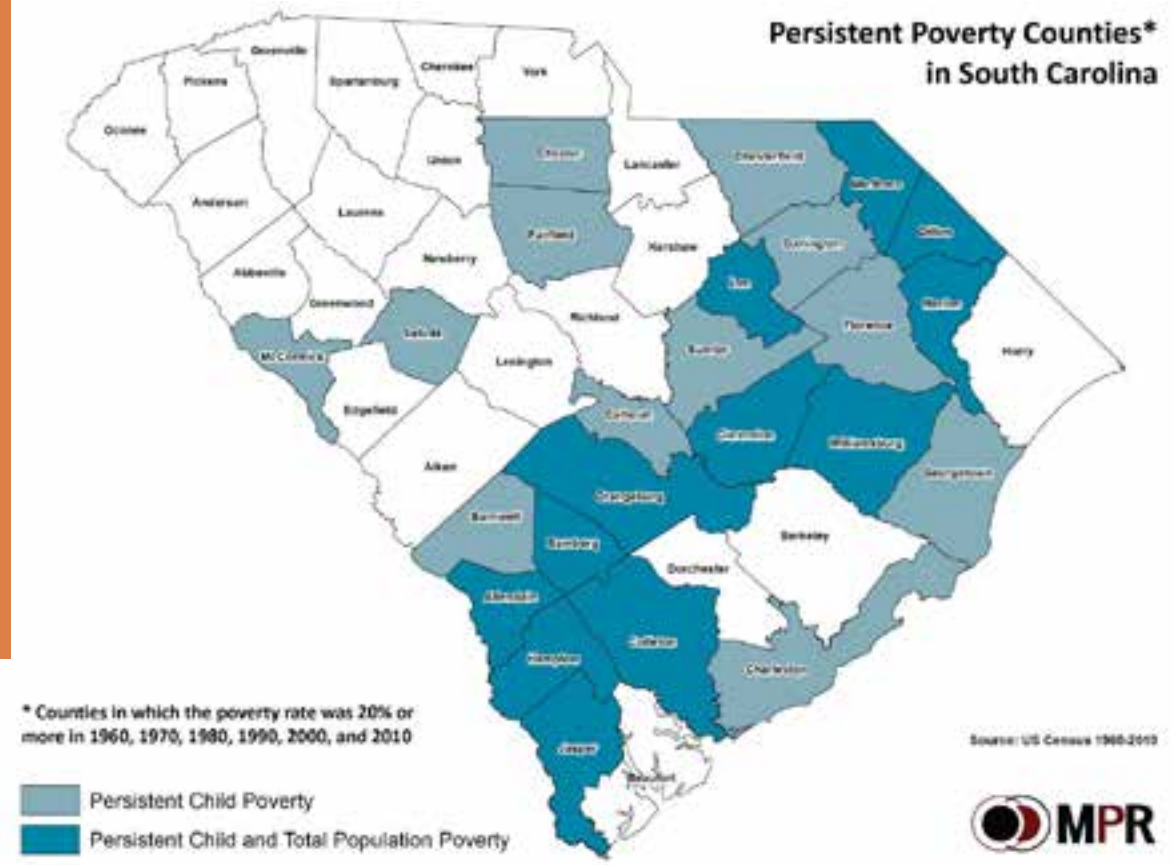
- § 1/3 of South Carolinians live in rural areas
- § Geographic isolation and socioeconomic disadvantage can increase risk for poor health

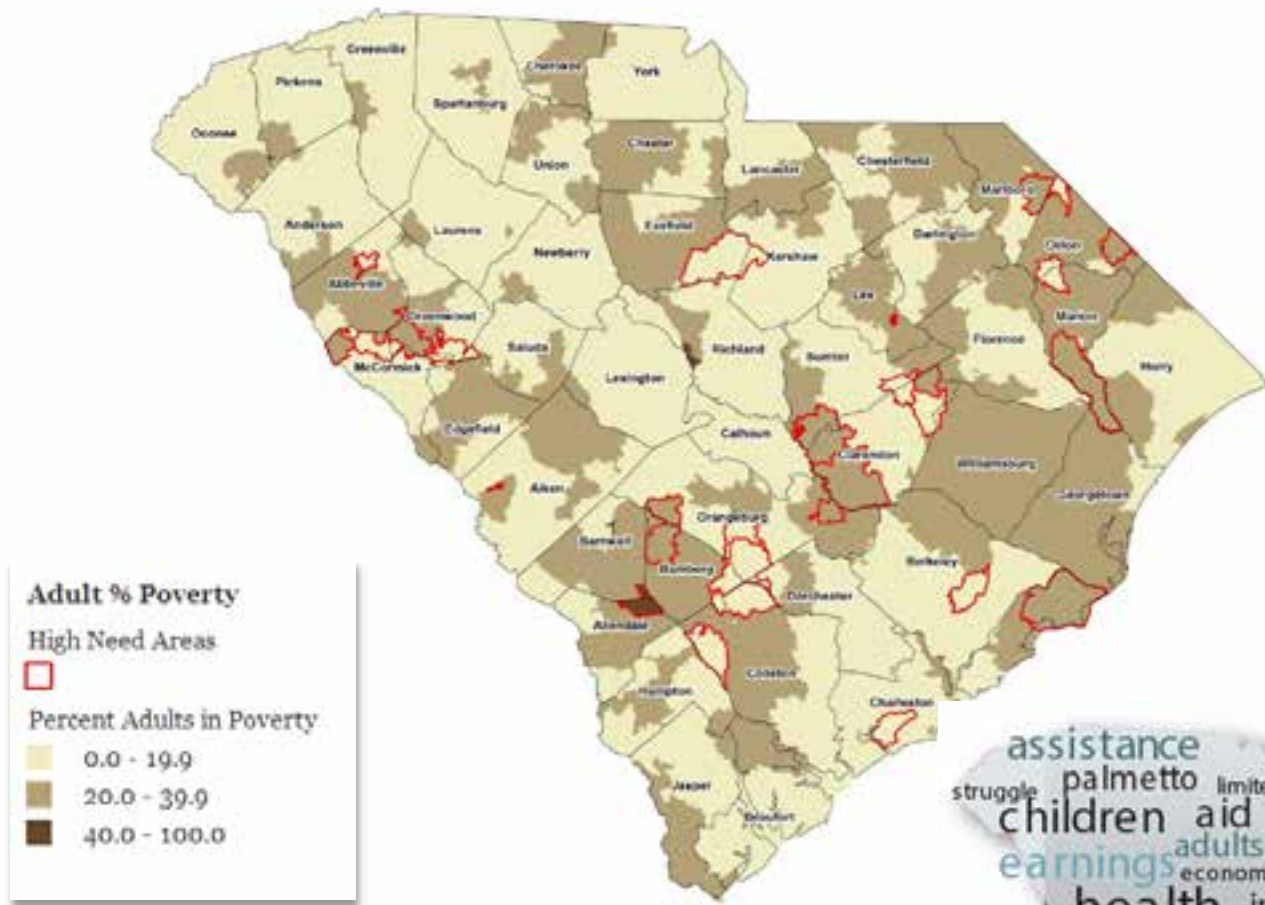
# Poverty

- Associated with higher rates of mortality and morbidity
- Defined by US Census Bureau

Geographic areas in which 20% or more of population live below the federal poverty level are “poverty areas”

Geographic areas in which 40% or more of population live below the federal poverty level are “extreme poverty areas”



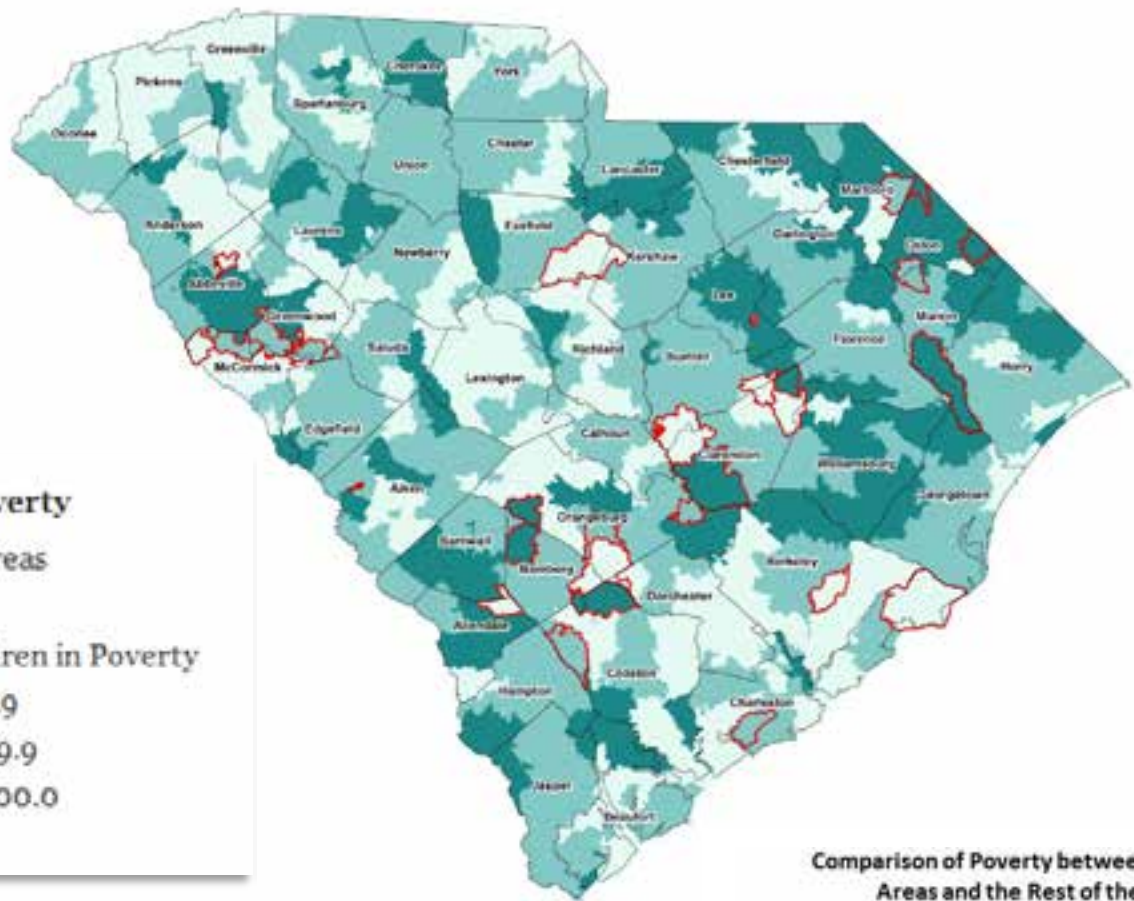


# Adult Percent Poverty

§ Notice more of the poverty areas are found along the I-95 corridor (Extending from Marlboro County in the Northeast to Jasper County in the Southern portion of the state)



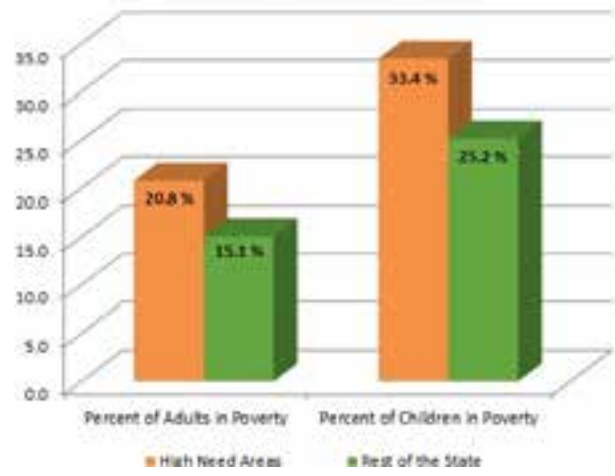


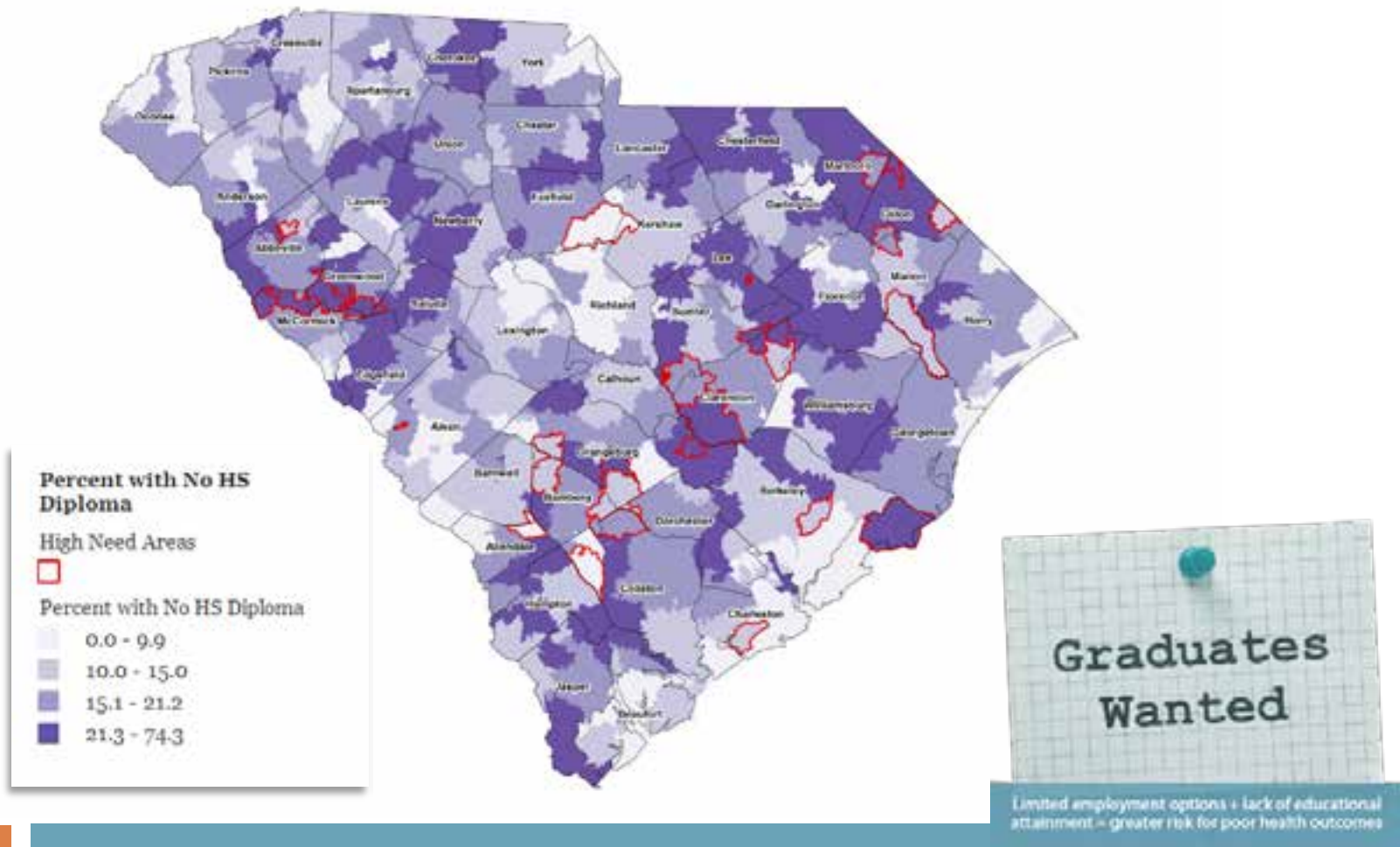


# Child Percent Poverty

§ Poverty and extreme poverty are more prevalent among children than adults.

**Comparison of Poverty between High Need Areas and the Rest of the State**

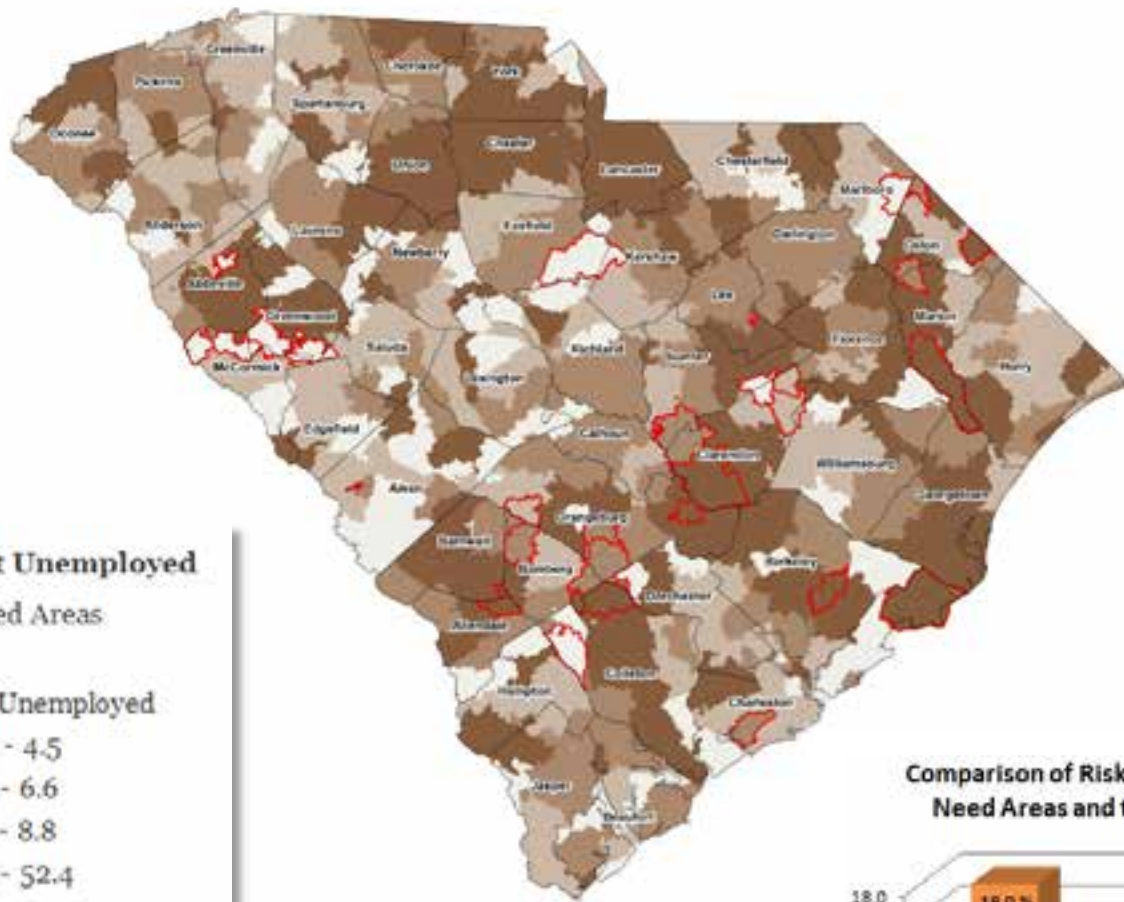




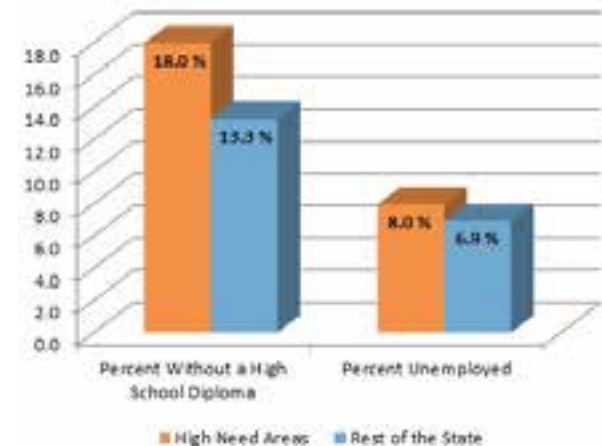
## Percent With No High School Diploma

- More likely to suffer functional limitations, acute conditions, and chronic diseases
- Can restrict access to health information and health care services, limit job opportunities, and diminish lifetime earnings potential



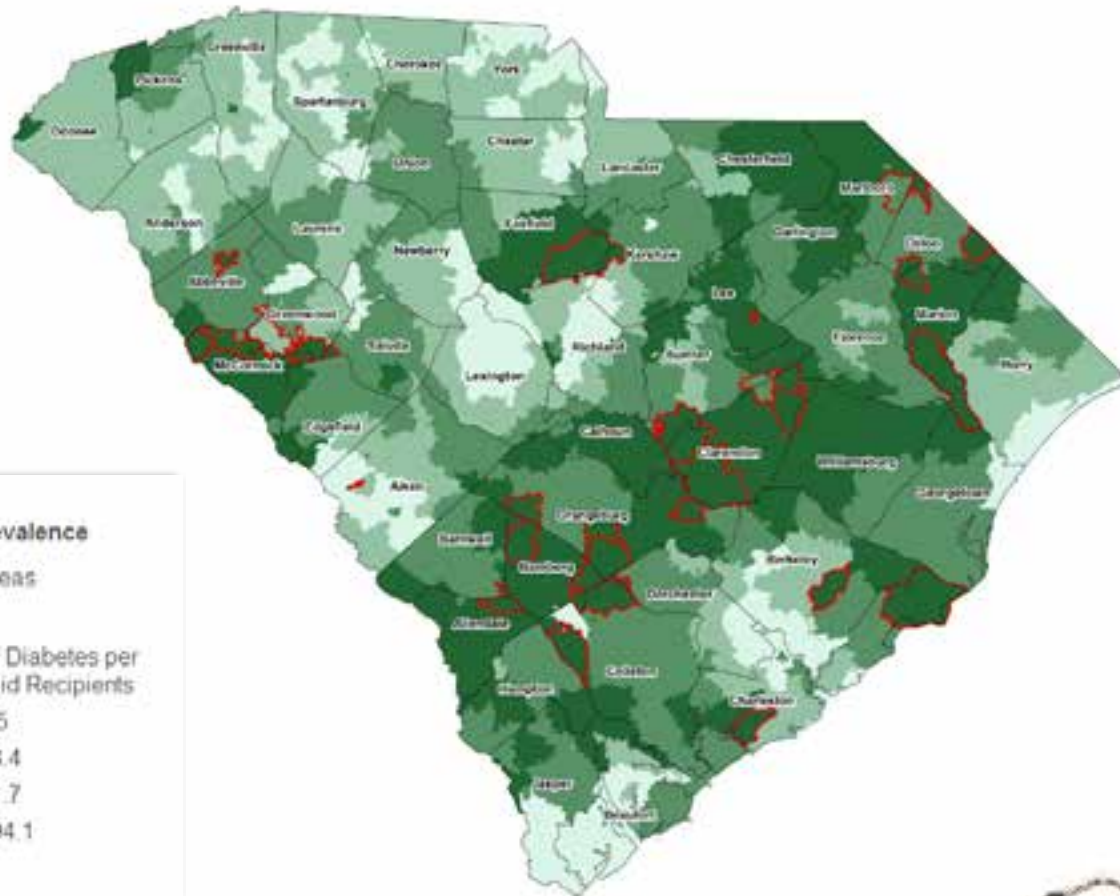


**Comparison of Risk Factors between High Need Areas and the Rest of the State**



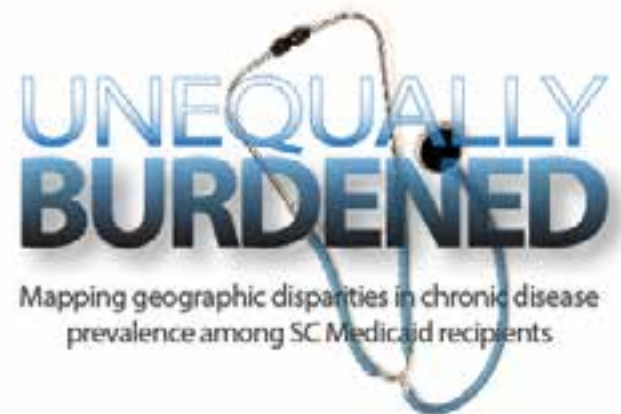
## Percent Unemployed

- Limits the financial means needed to acquire or access such resources as healthy food, safe housing, adequate clothing, reliable transportation, and continuous, coordinated health care

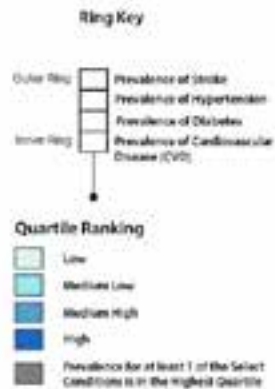


## Prevalence of Diabetes

§ Diabetes prevalence is high along the I-95 corridor.



## Prevalence of Select Conditions in South Carolina Medicaid Recipients, FY 2013 by County

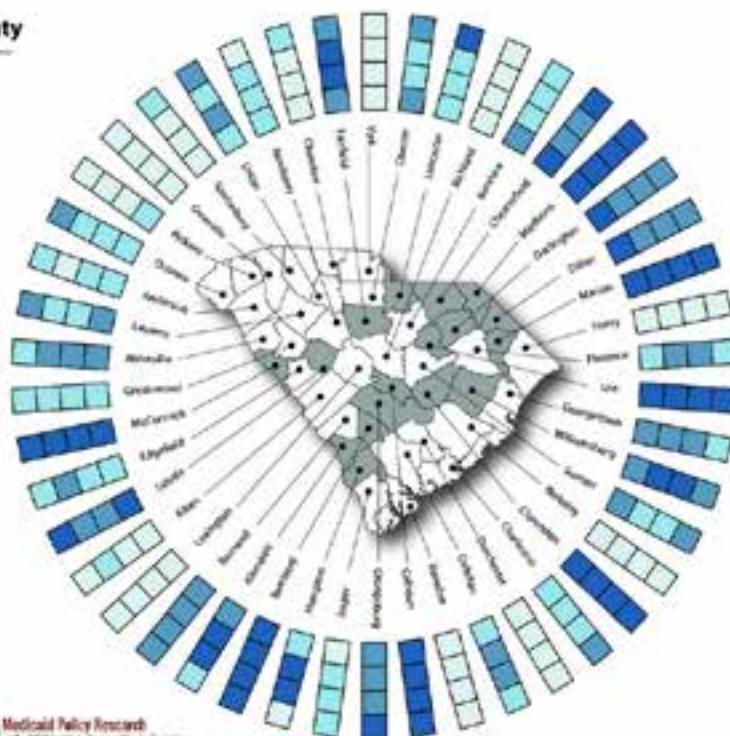


**High Quartile Ranges  
(Prevalence per 1,000)**

CVD (14.2 to 28.8)  
Diabetes (11.0 to 14.1)  
Hypertension (33.1 to 59.3)  
Stroke (24.7 to 27.6)

**Notes:**

Data: IC 1995-2013; Low 2013 as of October 2013.  
Credited to the University of South Carolina  
Institute for Healthcare Policy Research, Division of Medicaid  
Policy Research, July 2014.

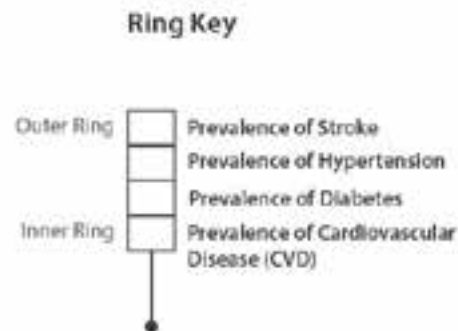


## Enlarge Images to View

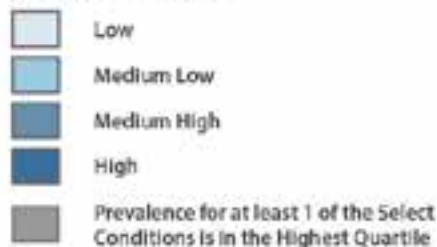
- Images on the left-hand side will enlarge when clicked



# Prevalence of Select Conditions in South Carolina Medicaid Recipients, FY 2013 by County



## Quartile Ranking



## High Quartile Ranges (Prevalence per 1,000)

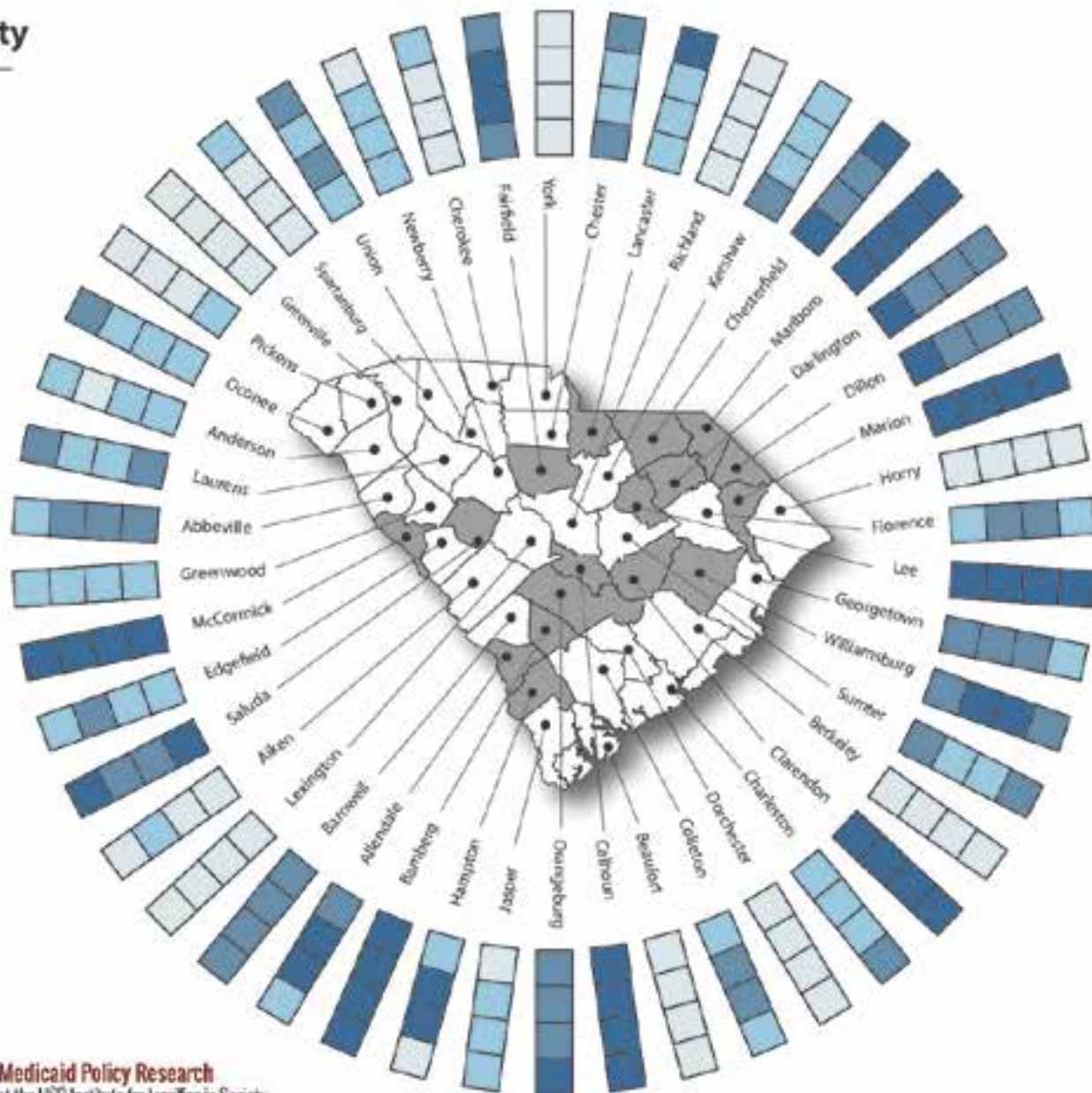
CVD (46.0 to 58.4)  
 Diabetes (75.0 to 116.1)  
 Hypertension (133.6 to 191.6)  
 Stroke (19.7 to 27.6)

### Notes:

Data: SC MMIS FY 2013 (June 2013 as of October 2013).  
 Created by the University of South Carolina,  
 Institute for Families in Society, Division of Medicaid  
 Policy Research, July 2014.



**Medicaid Policy Research**  
 at the USC Institute for Families in Society

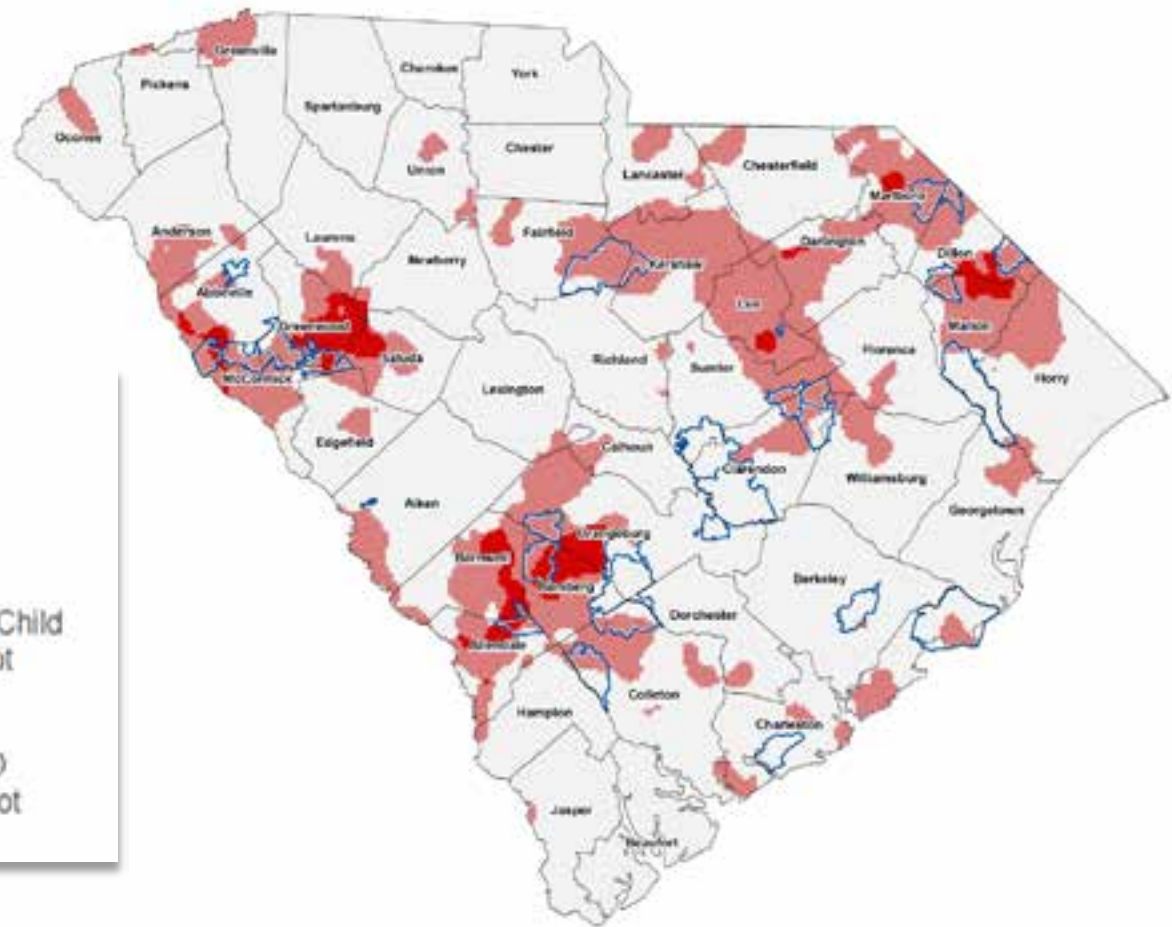


# Hot Spot Maps

21

- Reflect the degree to which high disease prevalence areas in the state are geographically clustered
  - Adult hot spots represent clustered areas characterized by a high prevalence of any one of 22 conditions
    - Including asthma, breast cancer, cervical cancer, chronic obstructive pulmonary disease, depression, diabetes, end stage renal disease, hypertension, and obesity
  - Child hot spots represent clustered areas characterized by a high prevalence of any one of 6 conditions
    - ADHD, autism, diabetes, obesity, and sickle cell disease





**Combined Hotspot**

High Need Areas

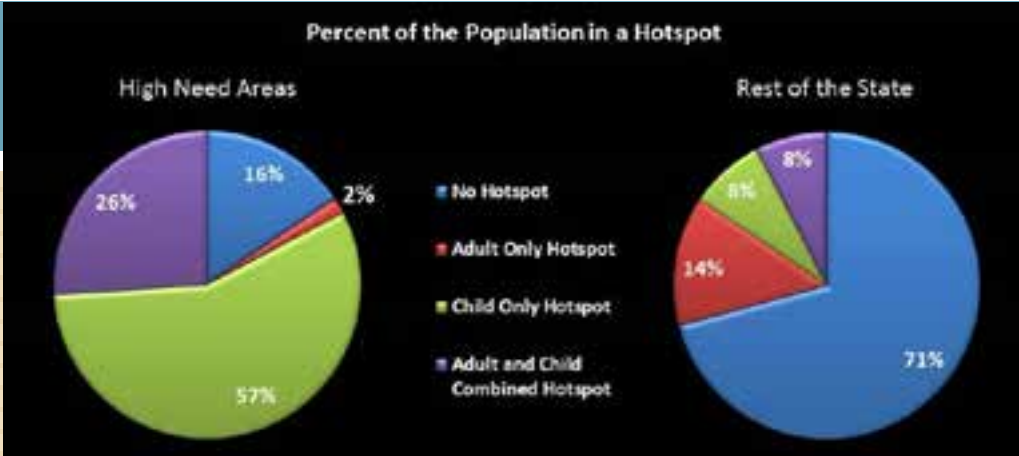
Adult or Child Hotspot

Significant Adult OR Child High Disease Hotspot

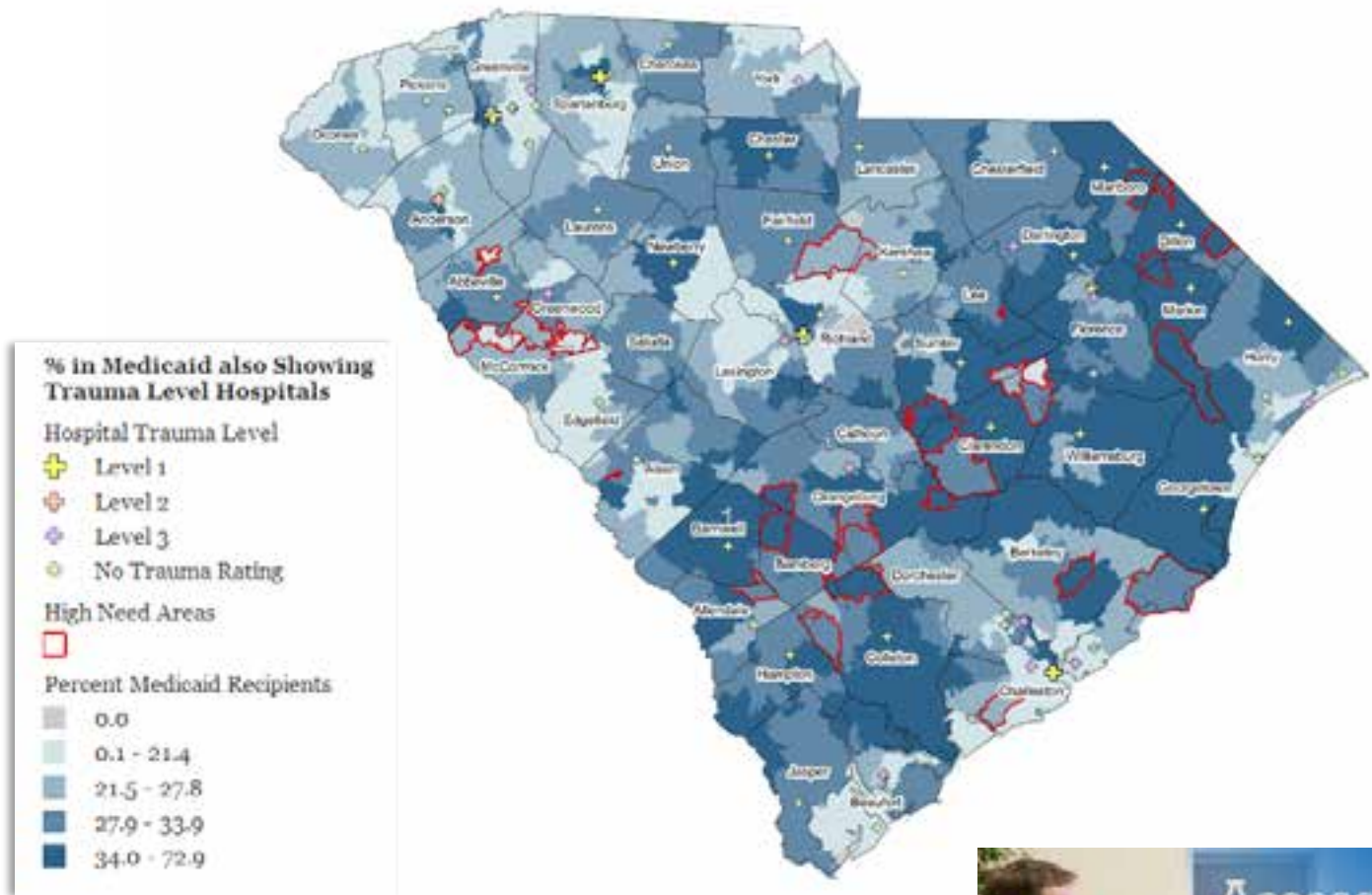
Adult AND Child Hotspot

Significant Adult AND Child Disease Hotspot

# Hotspot

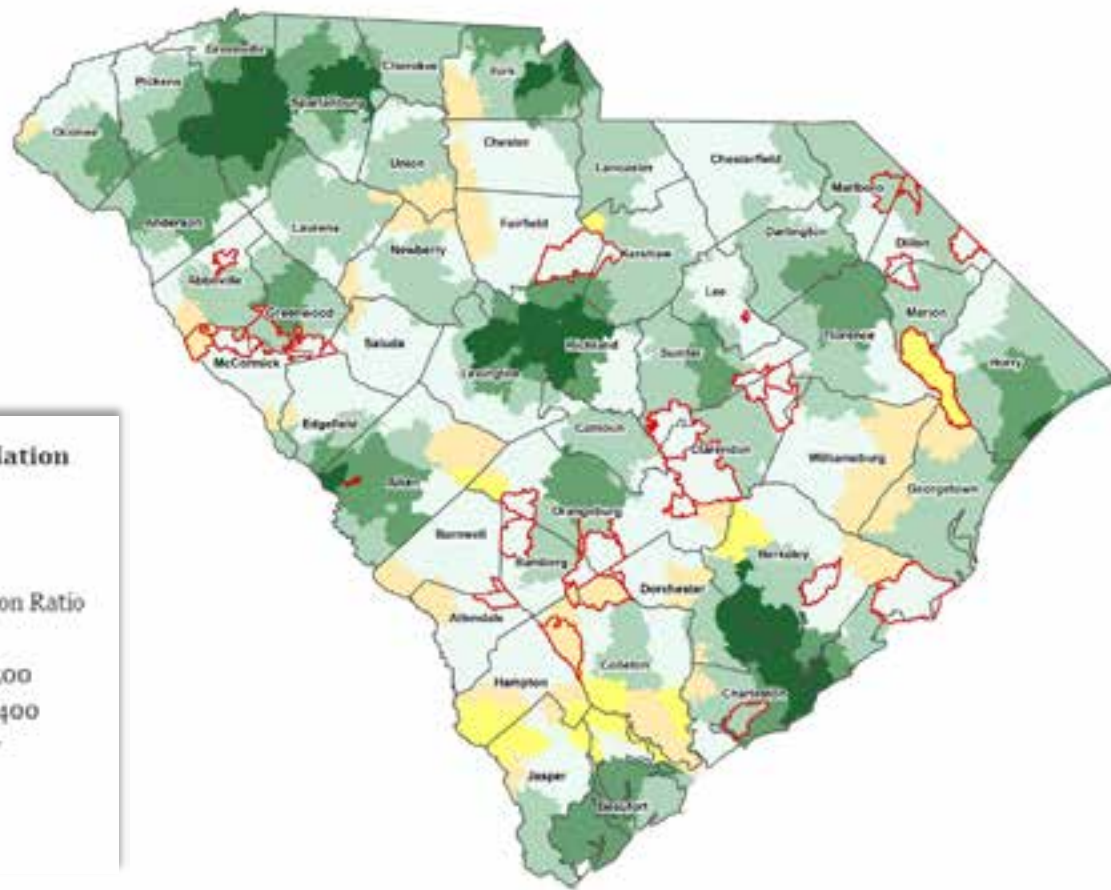






## Percent in Medicaid Also Showing Trauma Level Hospitals

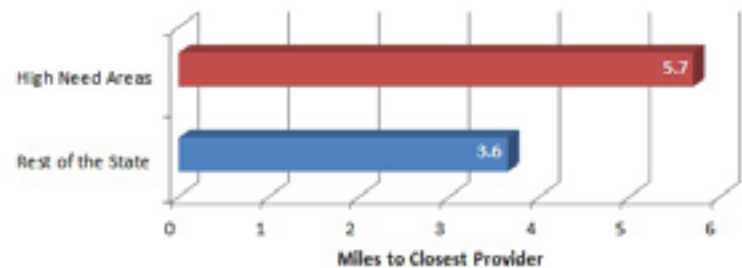
- Health care resources are not evenly distributed across the state
- Rural residents typically must travel farther to advanced hospital-based services



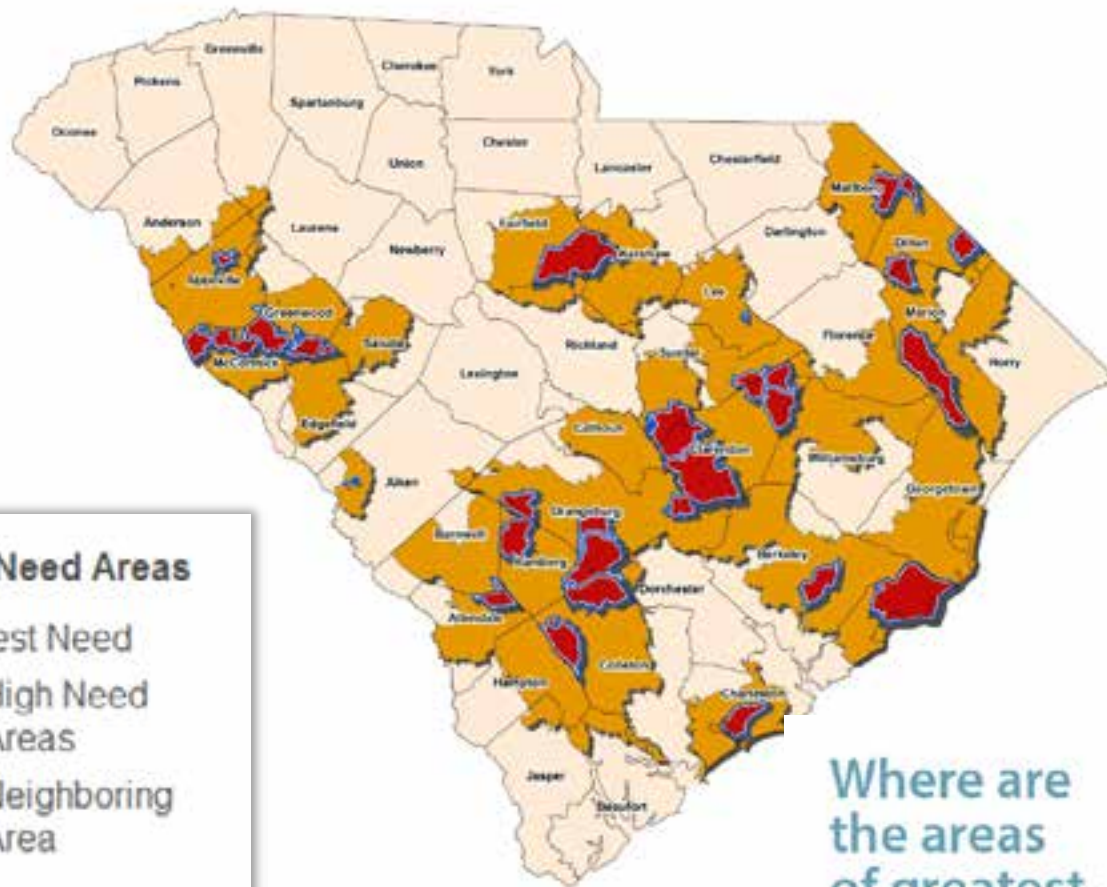
## Provider to Population Ratio

- Low geographic access can prevent or limit appropriate utilization of health care, including preventive and acute care, and chronic disease management.

**Average Distance to Primary Care Provider**







**High Need Areas**

Greatest Need

 High Need Areas

 Neighboring Area

Where are the areas of greatest health disparity?



## Targeting High Need Areas

- High Need Areas (symbolized in red on the map) have lower educational attainment, higher poverty rates, higher unemployment, and less access to health care

Mapping the Story of Health Disparities



Targeting High-Need Areas

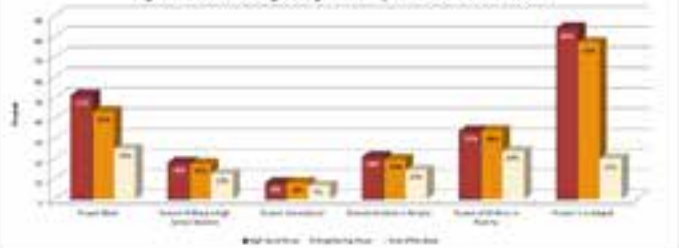
Where are the areas of greatest health disparity?



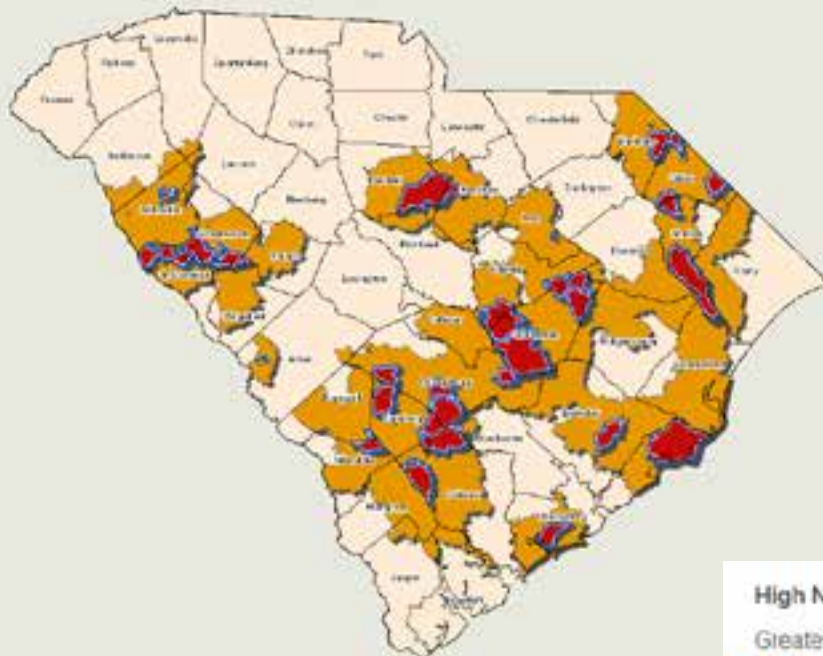
Compared to the rest of the state, High Need Areas (symbolized in red on the map) have lower educational attainment, higher poverty rates, higher unemployment, and less access to health care. There is a strong spatial association between life-enhancing resource disadvantage and poor health outcomes among state Medicaid participants. Areas that border high need areas (symbolized in orange on the map) also experience critical community resource

disadvantage (as evidenced in the bar chart below). More than 210,000 Medicaid enrollees live in High Need Areas and neighboring areas. Health interventions targeting these high-need communities can improve health and reduce health disparities among child and adult Medicaid recipients in South Carolina.

High Need Areas and Neighboring Areas Compared to the Rest of the State



Go back to SC HealthViz



**High Need Areas**

Greatest Need

 High Need Areas

 Neighboring Area

Division of Health Policy and Research or USC's Institute for Families in Society | ©

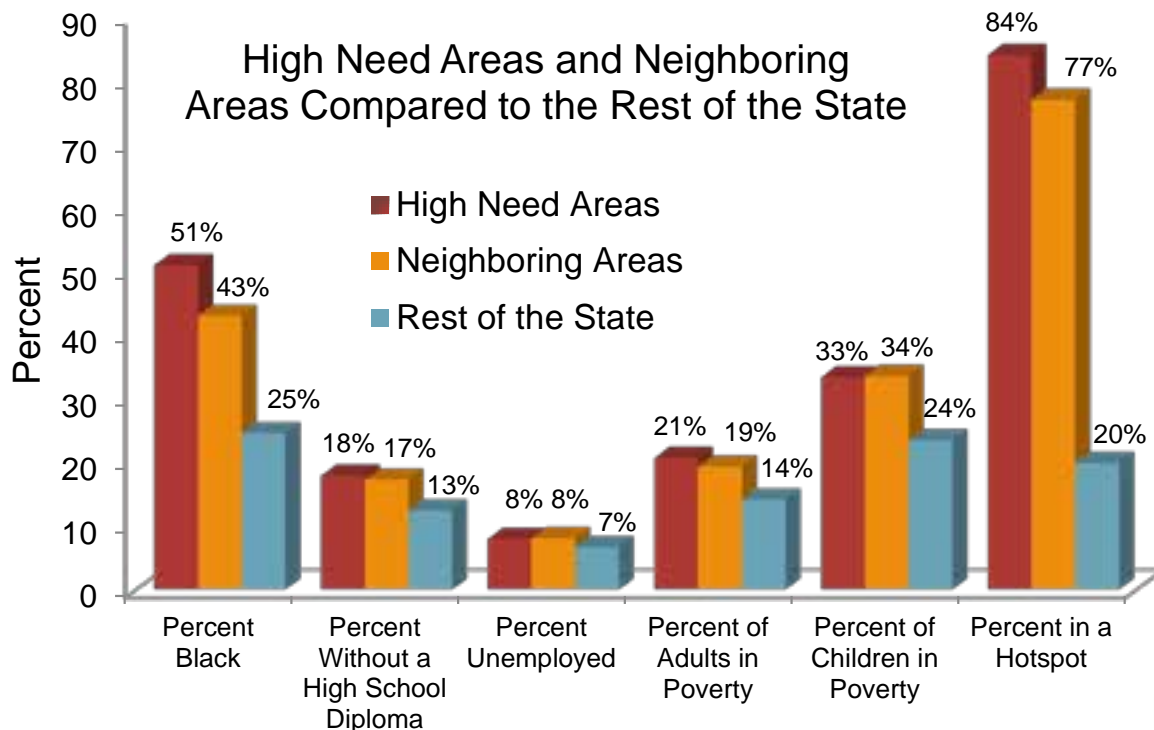
# Applying Shading Effects

- Ability to apply shading effects from desktop to final interactive map

# High Need and Neighboring Areas

27

- Areas that border High Need Areas also experience critical community resource disadvantage
- > 250,000 Medicaid enrollees live in High Need Areas and neighboring areas

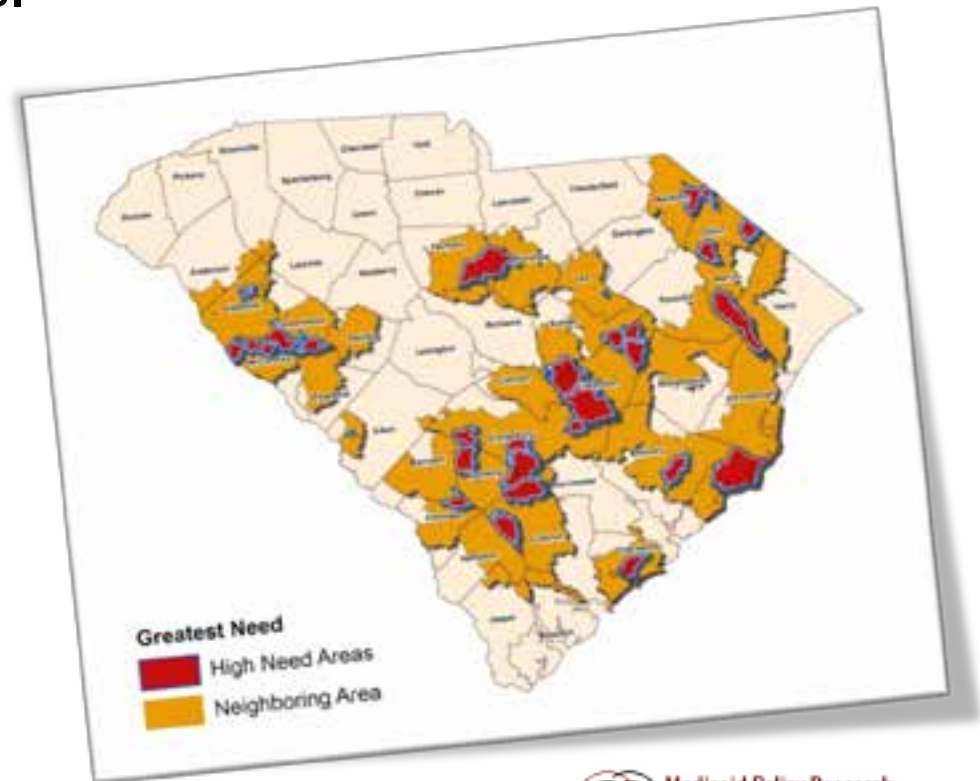




# Targeting Interventions

28

- Strong spatial association exists between limited access to life-enhancing resources and poor health outcomes among state Medicaid participants.
- Health interventions targeting these high-need communities can improve health and reduce health disparities among child and adult Medicaid recipients in South Carolina.



# Technical Notes

29

- Use of ArcGIS Online Templates
  - Esri Story Map Journal
  - Esri Swipe
- Map development in Desktop
- Application hosted on local ArcGIS Server
- Application linked to existing website

# Technical Notes *(continued)*

30

- Minimal text
  - Summary of key points
  - Use instruction
- Graphic Design
  - Adobe Photoshop
  - Adobe Illustrator
  - Stock photos, vector graphics, and original graphics



# Technical Challenges and Solutions

31

## •• Challenges

- Presenting side-by-side interactive maps
- Mapping/Loading speed
- Title and legend tweaks

## •• Solutions

- Template download and integrative custom coding
  - § Swipe template inside Map Journal
- Swipes use one map instead of two for loading speed
- Template pulls titles and legends from layer and service names



# Security Issues

32

- Concern with mapping protected health information
  - What's online?
  - Restrict access?
  - Aggregate?
- Verified ArcGIS Online and other Esri products met required security needs
  - ArcSDE and ArcGIS Server are behind the firewall
  - Webadaptor prevents direct access to ArcGIS Server based REST services
  - Ability to restrict access to no one or specific users via user names and passwords with ArcGIS Online
  - Aggregation of data is useful for public maps



# QUESTIONS?

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**Mapping the Story of Health Disparities**

[http://mapping.mpr.sc.edu/  
healthdisparitiesmapjournal](http://mapping.mpr.sc.edu/healthdisparitiesmapjournal)

**SC HealthViz**

<http://www.schealthviz.sc.edu>

## ACKNOWLEDGEMENTS

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SOUTH CAROLINA  
Healthy Connections  
MEDICAID 

