



# Rural Health 101: An Overview of Rural Health Research

Mark Holmes (@gmarkholmes)

Director, NC Rural Health Research Program (@ncrural), Sheps Center

Professor, Health Policy and Management, UNC Gillings School of Global Public Health

NC TraCS Institute  
ISP Spring Seminar Series  
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*This presentation uses work partially funded by Federal Office of Rural Health Policy, Award #U1GRH03714*

Collaborative work: project team listed at  
end of presentation

# About the NC Rural Health Research Program

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- Based at the Cecil G. Sheps Center for Health Services Research, UNC
- Major funder: Federal Office of Rural Health Policy (HRSA/HHS)
  - Conduct research to advise “the Secretary on health issues within these communities, including the effects of Medicare and Medicaid on rural citizens’ access to care, **the viability of rural hospitals**, and the availability of physicians and other health professionals” (emph. added, §711 SSA)
- Investigators: economists, finance experts, statisticians, policy analysts...

# Agenda

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- Defining rural
  - (I know, I know...)
- Rural health at a glance
  - Focus on mortality
- Some “gotchas”

# General posture

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- Orientation to rural North Carolina
- Rural health, mix of NC as an example and US
- Focus more on secondary, quantitative analyses
- Interrupt as you want!



# Defining Rural

# What is *rural*?



# Defining *rural*

- Rural means different things to different people
  - “There’s a farm near us.”
  - “There is no hospital for 122 miles.”
- This location
  - 17 minutes from a Level I Trauma
  - Metropolitan county of 1m
  - Does not qualify for FORHP grant
- Is it “rural”?



Metropolitan County, RUCA 2.0



# Measuring rural

- “Rurality” is a spectrum, subjectively defined
- For policy, we need formal definitions
- Common definitions:
  - County-based: Metro vs. non-metro (micropolitan and “non-core”)
  - ZIP-based: RUCAs
  - FORHP: Nonmetro OR rural RUCA
- Can be important distinction (e.g. poverty rates)
  - Urbanized areas > non-urbanized areas
  - Metro areas < non-metro areas
  - *Census Bureau has reported it both ways*
- *Some of the places you think are rural might not be as measured by the federal government; the places you think are urban probably are urban*

# Defining rural

- Rural is a latent concept which needs to be operationalized  
(access to healthcare, culture, lifestyle, socioeconomics...)

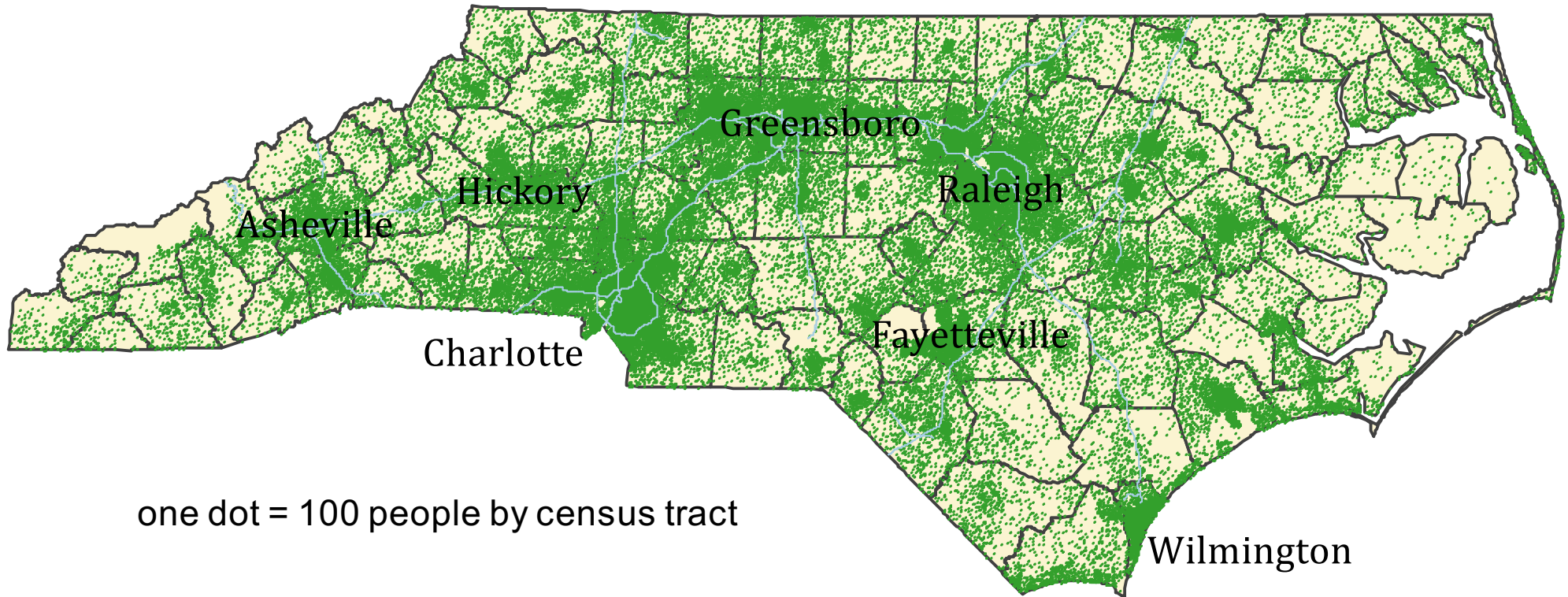
*Take a moment to think about areas near here and whether you think they are rural*

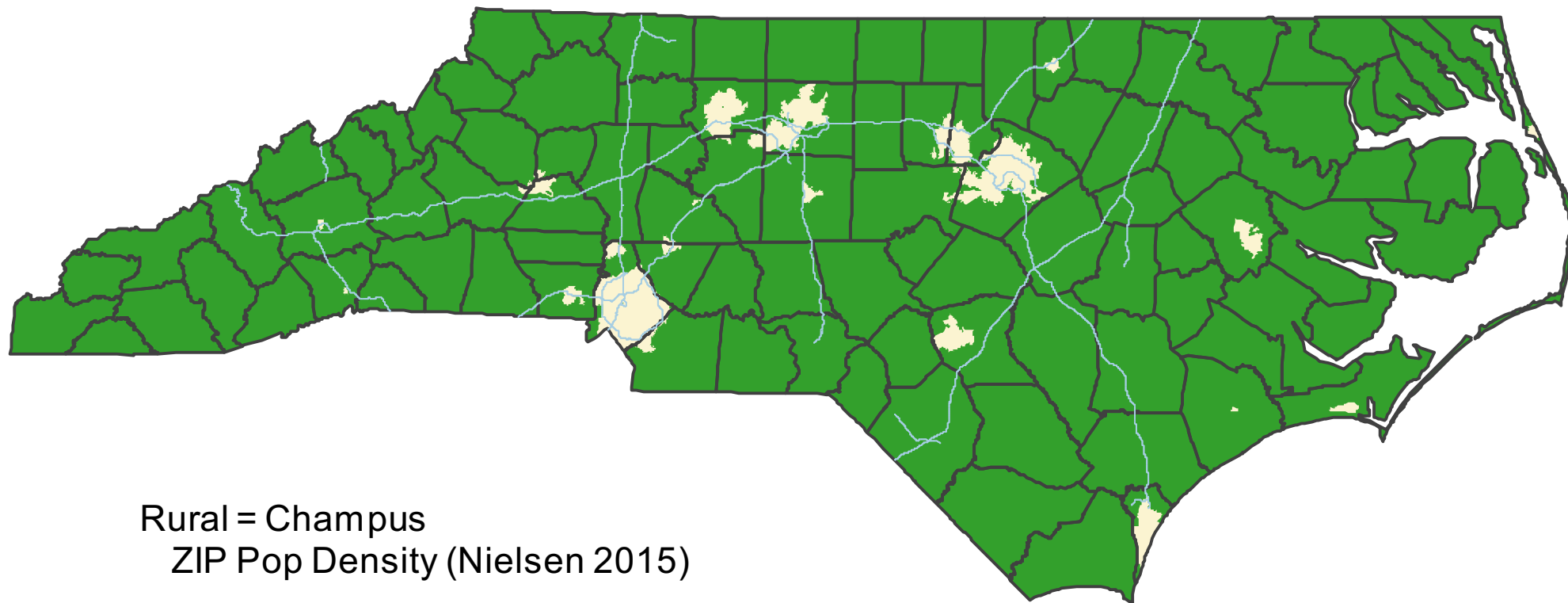
- Federal government has at least 15 definitions (11 by USDA alone). Most use some combination of three variables:
  1. Size of population
  2. Population density
  3. Commuting patterns

Measured at different levels: county, Census tract, ZIP code are common

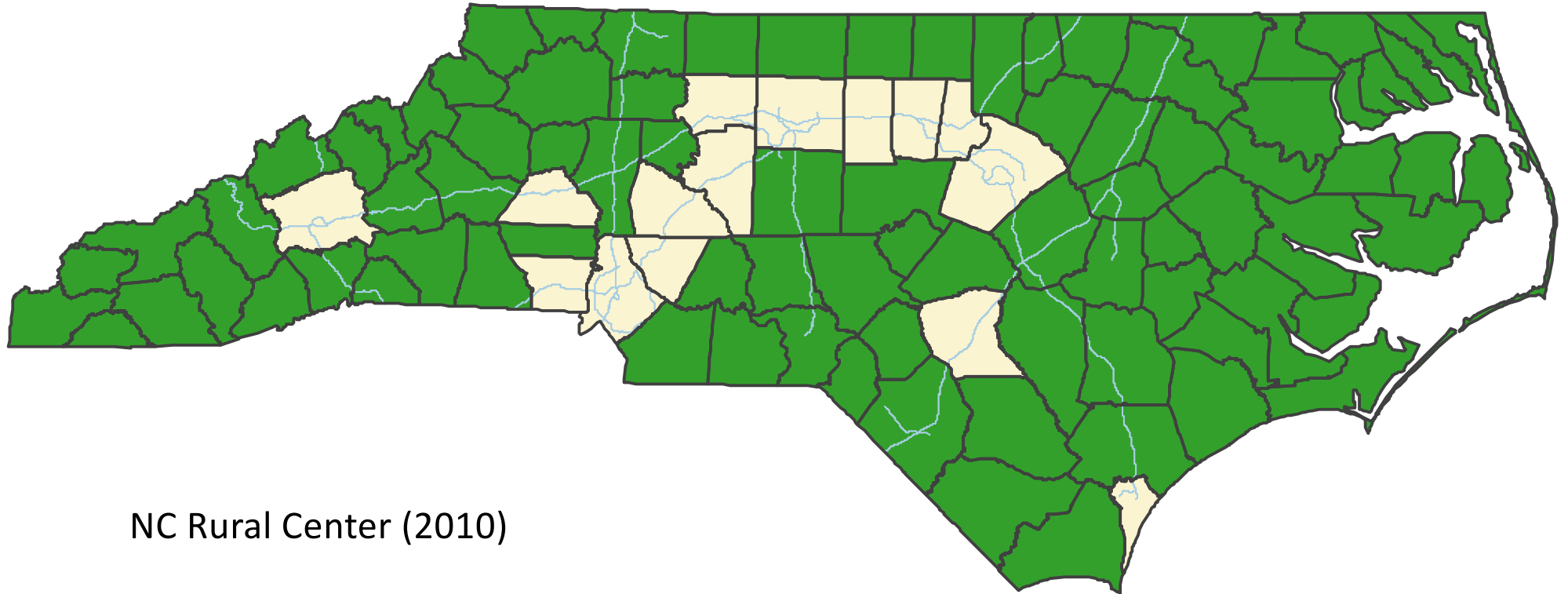
*How do these different definitions exist in NC?*

# Where North Carolinians live





Rural = Champus  
ZIP Pop Density (Nielsen 2015)



NC Rural Center (2010)



# Common county-based: metro, micro, “noncore”

+ “any adjacent counties that have a high degree of social and economic integration, as measured by commuting to work” (US OMB)

## Metropolitan

- ▶ Core urban area of 50,000+
- ▶ Raleigh, Rocky Mount



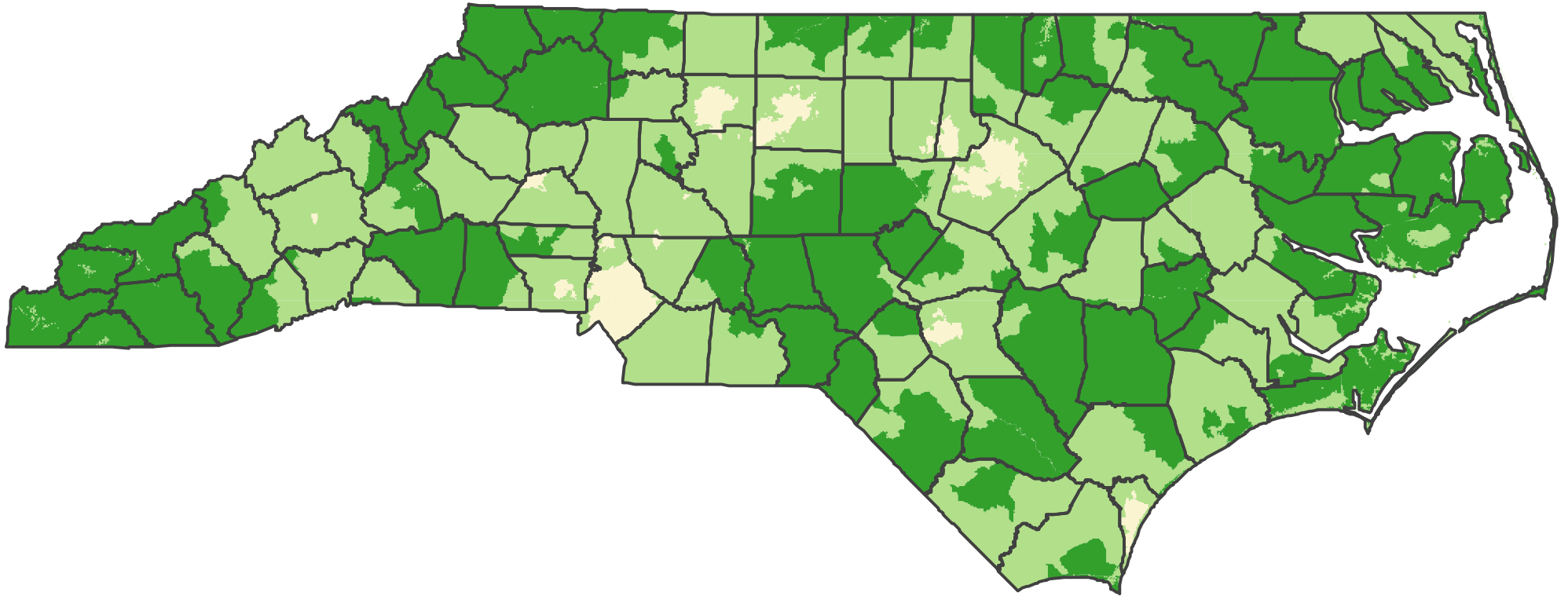
## Micropolitan

- ▶ Core urban area of 10,000 - 49,999
- ▶ Kinston, Wilson





If we view as a continuum: sand = urban, forest = rural, light green = "\\_(ツ)\_/"



## Avoid the temptation of using local measures or building your own

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There are lots of rurality measures, including some at the state level. Choose a standard measure to increase generalizability. Rural researchers gripe when you don't use a standard definition.

### What Is Rural? Challenges And Implications Of Definitions That Inadequately Encompass Rural People And Places

Kevin J. Bennett, Tyrone F. Borders, George M. Holmes, Katy Backes Kozhimannil, and Erika Ziller

AFFILIATIONS ▼

PUBLISHED: DECEMBER 2019 No Access

<https://doi.org/10.1377/hlthaff.2019.00910>

<https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2019.00910>

# TIP: The practicality of your data's resolution

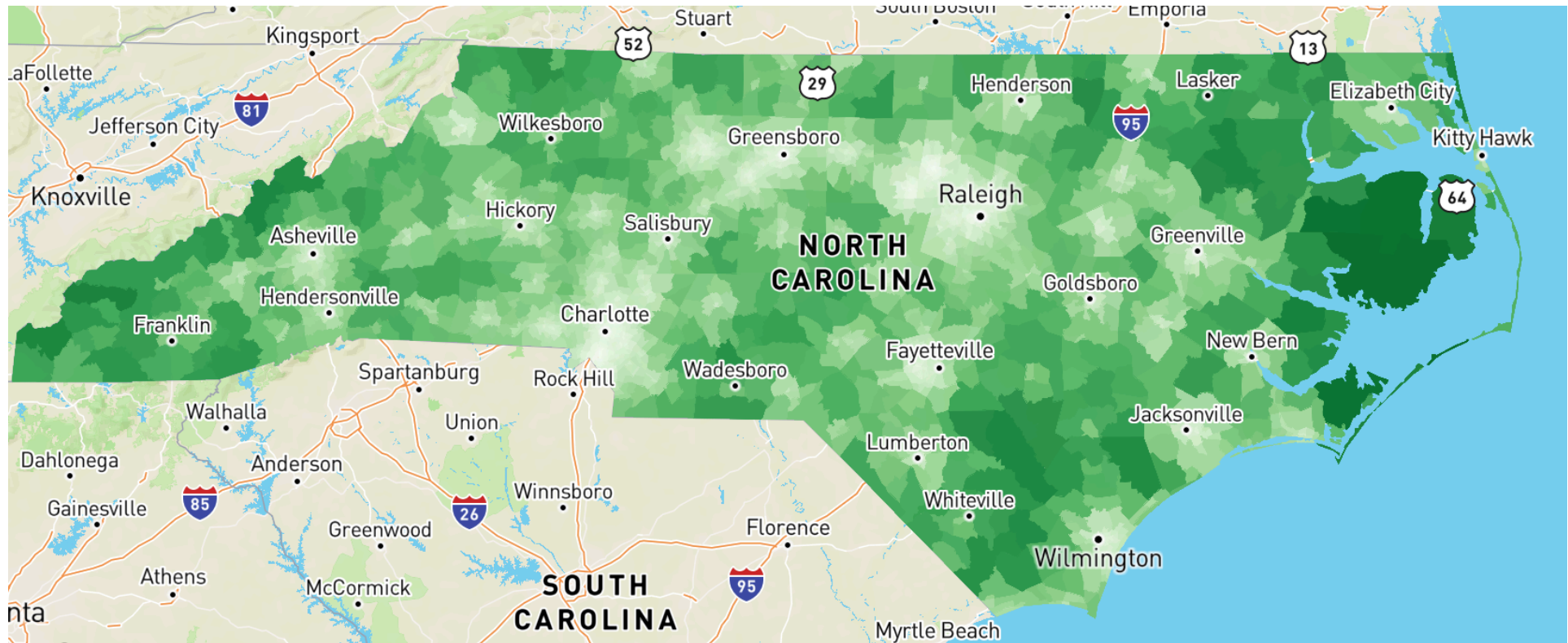
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- What level data do you have?
  - County-based:
    - Metro vs. Non-metro
    - RUCCs?
  - Zip-based:
    - RUCAs
  - Something else?
    - e.g. PUMAs
    - Need to get creative



# NextGen Definitions: continuous methods (versus dichotomous Urban/Rural)

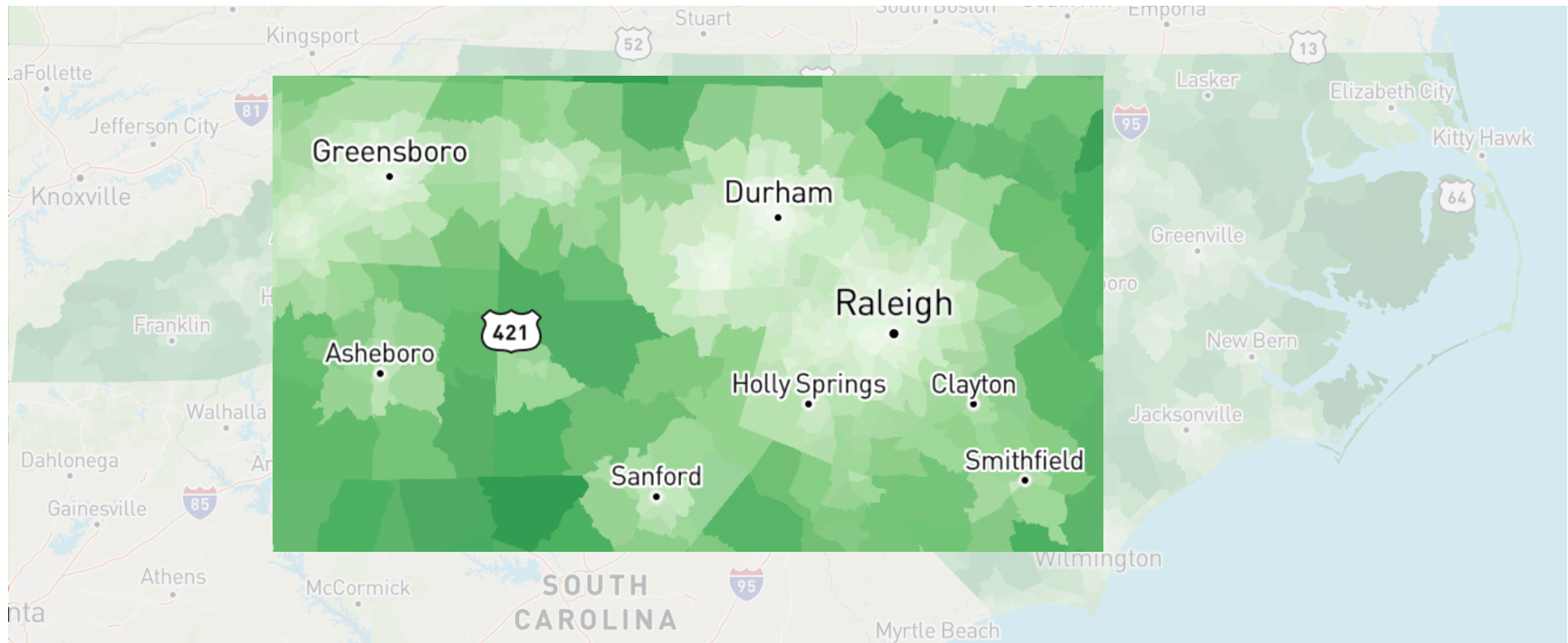
- ▶ Index of Relative Rurality (Waldorf and Kim 2018)
  - ▶ 4-dimension rescaling function: population size, density, remoteness, and urban land use
- ▶ Isolation (Doogan et al 2018)
  - ▶ Cluster-based (think chaining) approach – “close to places that are close to urban”



<https://observablehq.com/@gallowayevan/geographic-isolation-north-carolina>

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<https://observablehq.com/@gallowayevan/geographic-isolation-north-carolina>

# North Carolina rural is different from US rural

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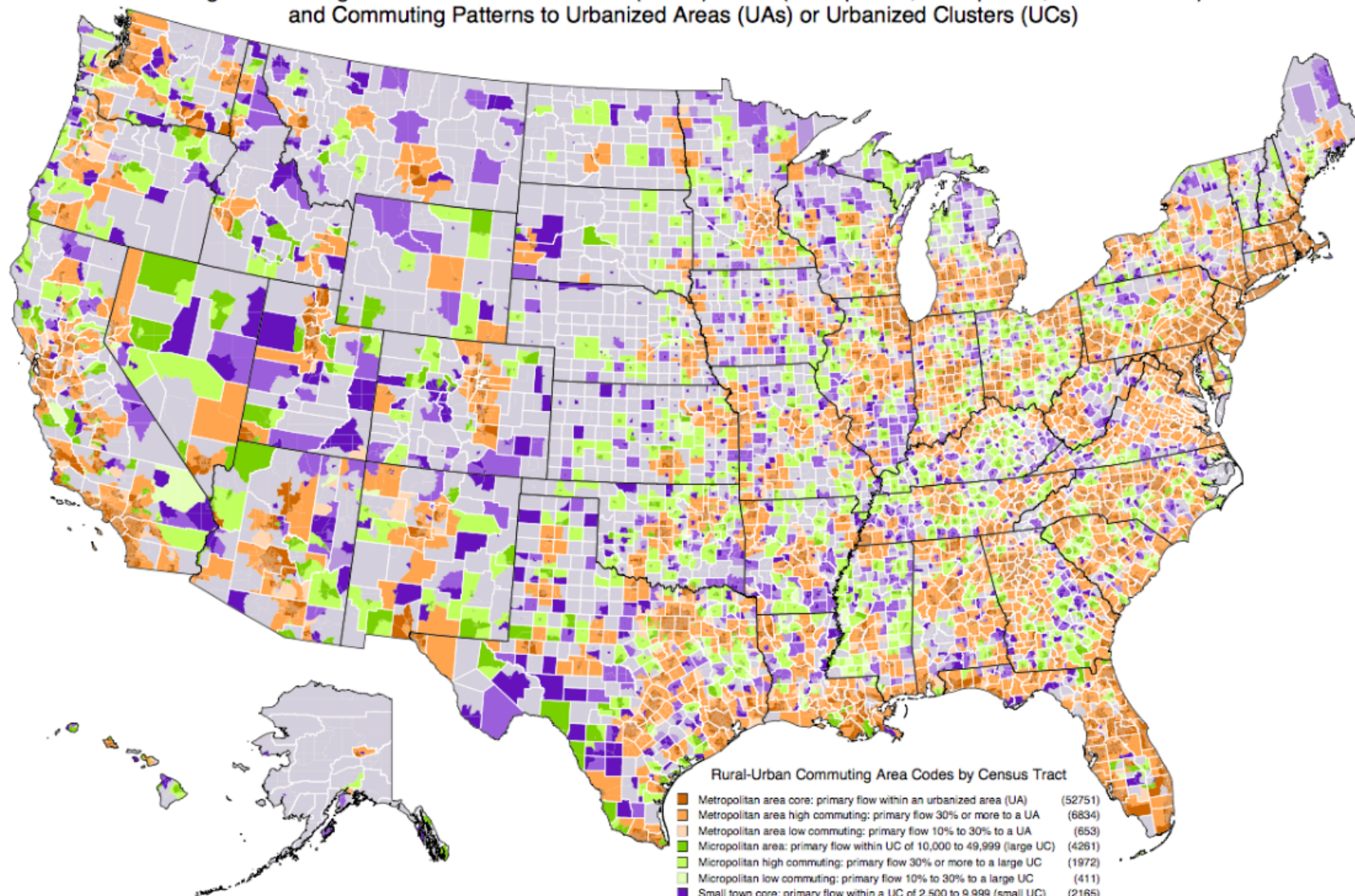
- Regardless of how you define it, North Carolinians are “less” rural than many other parts of country
  - Most parts of North Carolina are not too far from a medium size city
- Don’t bring your sense of rurality to the research setting
  - “Rural North Carolina” <> “Rural Wyoming”



# RUCAs: grey/purple “most rural”

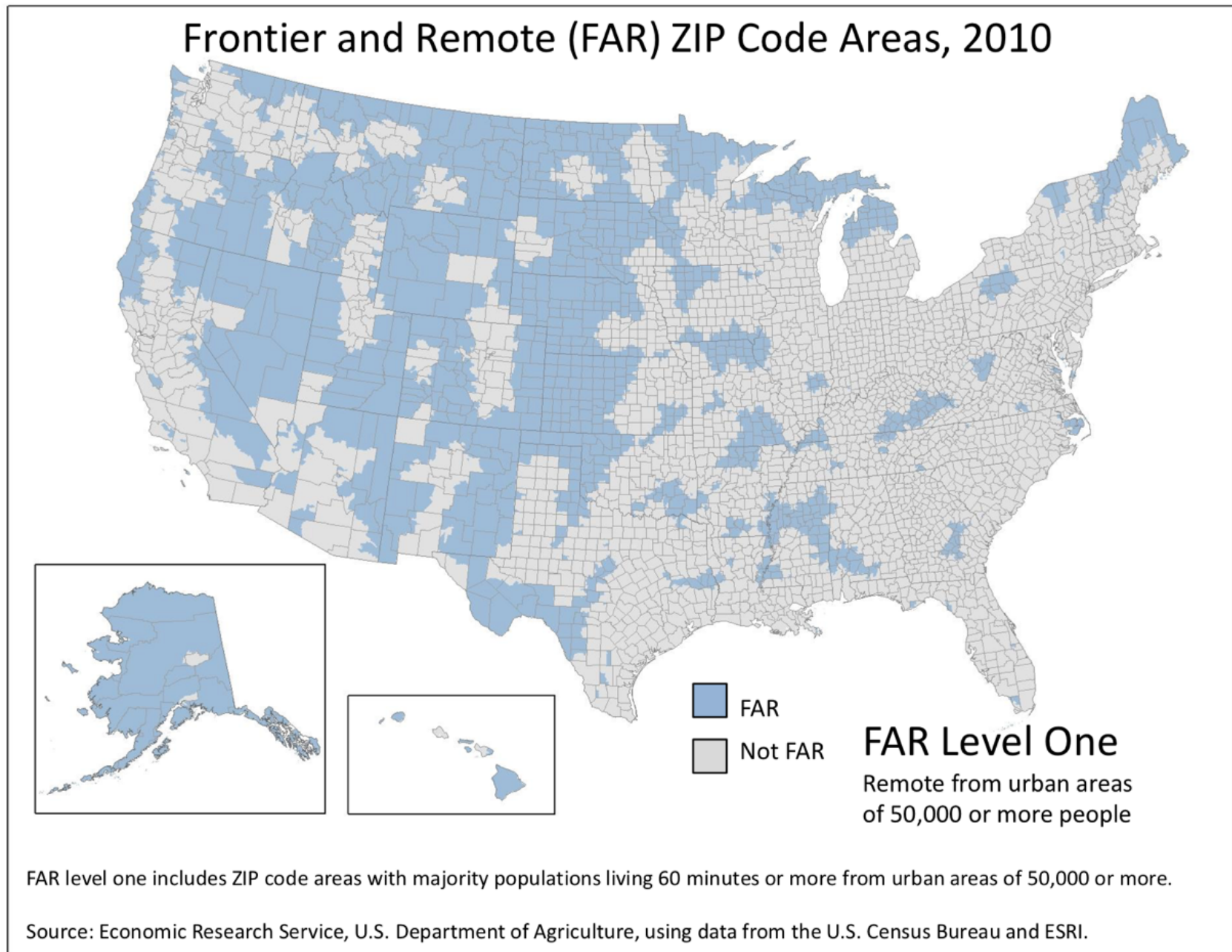
## 2010 Rural-Urban Commuting Area Codes by Census Tract

Designations using Core Based Statistical Area (CBSA) status (Metropolitan, Micropolitan, or Small Town) and Commuting Patterns to Urbanized Areas (UAs) or Urbanized Clusters (UCs)



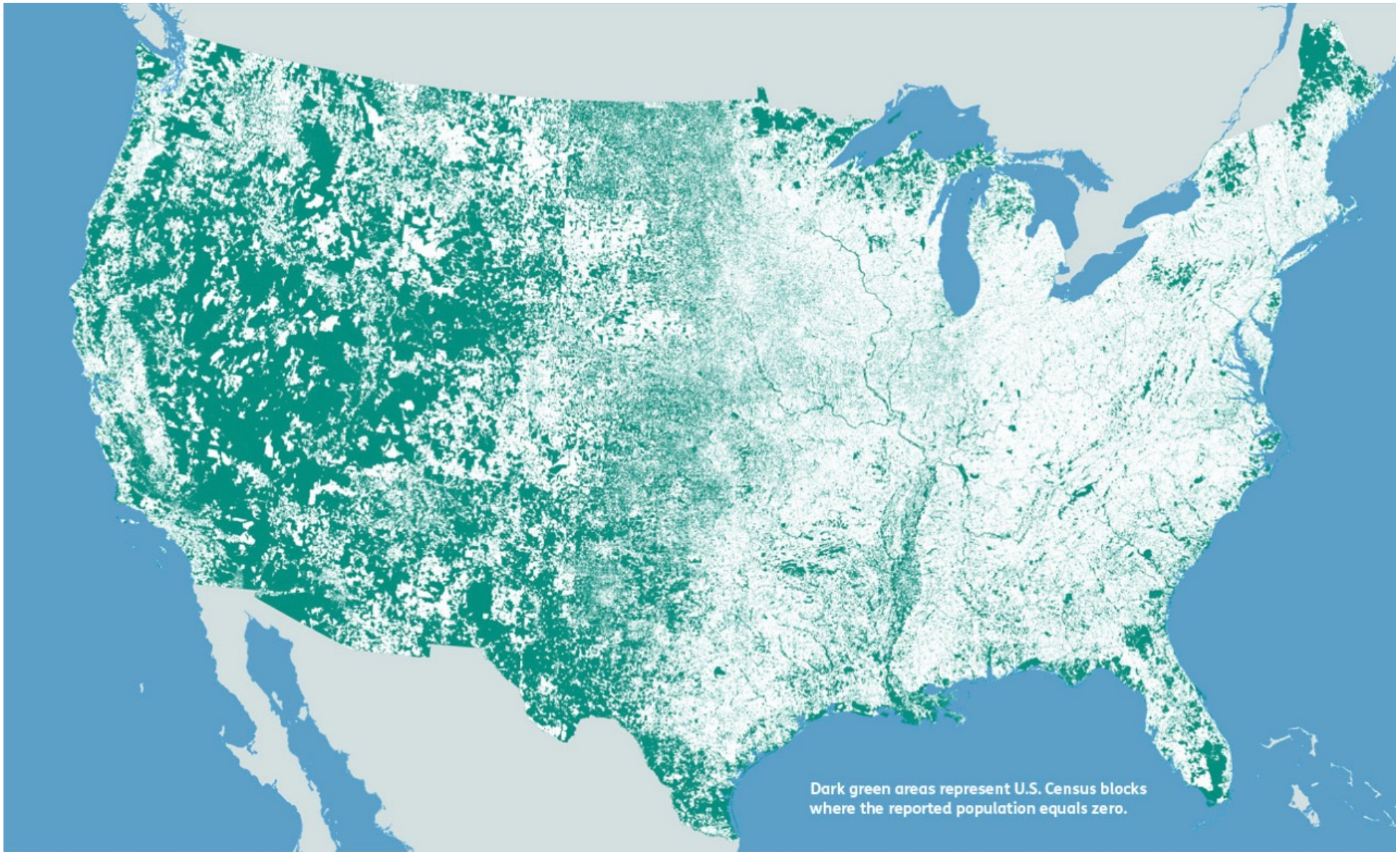
Sources: Census Tract Boundaries - U.S. Census Bureau, 2010.  
 RUCA Designations - U.S. Department of Agriculture, Economic Research Service, 2013.  
 Prepared by the North Carolina Rural Health Research and Policy Analysis Center,  
 Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

# ZIPs more than 60 mins from a 50K Urban





# Census blocks with zero population



<http://mapsbynik.tumblr.com/image/82791188950>



# Handy-dandy poster on ruralness (& disparities depend on the rurality definition)

## Delineating Rural Areas in the United States

One challenge in addressing rural-urban disparities is the lack of a common definition. Multiple federal systems exist using different levels of geography (e.g. county versus census tract). Multiple definitions of the "rurality" of a place or population means that the degree of the disparity may vary (or even switch direction) depending on the definition. Here, we consider some of the more common federal rural definitions and use representative population characteristics to demonstrate the sensitivity of the disparity to the specific rural definition.

Randy K. Randolph, MRP, Applications Specialist  
Kristie W. Thompson, MA, Research Associate  
Sharita R. Thomas, MPP, Research Associate  
G. Mark Holmes, PhD, Director

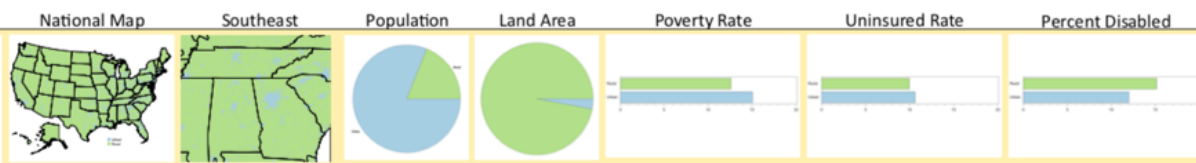


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HEALTH SERVICES RESEARCH

### Binary Systems—Rural/Urban

#### Urbanized Areas and Clusters: US Census Bureau

This system includes Urbanized areas (UAs) with 50,000 or more people and Urbanized Clusters (UCs) of 2,500 to 49,999 people in densely settled integrated communities. It is a unique geography that is not constituted of counties, cities, census tracts, or ZIP Codes. Rural areas are considered to be areas outside UA and UC areas.



**Core Based Statistical Areas: US Office of Management and Budget**  
CBSAs include Metropolitan areas with one or more counties in an economically integrated area of 50,000 residents and Micropolitan areas of 10,000 to 49,999 residents. Remaining areas are called NonCore areas. The combination of Micropolitan and NonCore areas constitute rural areas in this system.



**Rural-Urban Commuting Areas & CBSAs: Multiple Institutions**  
Rural-Urban Commuting Areas (RUCAs) are a sub-county, 1 to 10 classification that is further described below. This modification of the CBSA system classifies portions of Metropolitan counties with RUCAs of 4 or greater as rural, as well as Micropolitan and NonCore counties. This is the preferred system of CMS and the Office of Rural Health Policy.



**Rural-Urban Commuting Areas: US Dept. of Agriculture**  
Rural-Urban Commuting Areas (RUCAs) are a subcounty, 1 to 10 classification combining CBSAs and UA/UCs that is defined by Census Tracts (used here) and adapted to ZIP Codes. The major categories can be further broken into 21 subcategories designations offering great flexibility. This method is offered by the University of Washington.



### Multi Level Systems

#### National Centers for Health Statistics

National Centers for Health Statistics (NCHS) Urban-Rural Classification Scheme for Counties is an adapted version of the CBSA system, offering stratification of urban counties. This system is useful for the current, growing interest in characterizing suburban and exurban counties' differences from the metropolitan core.



#### Frontier and Remote Areas: US Department of Agriculture

The US Department of Agriculture has facilitated study of sparsely populated areas and isolated areas with their Frontier and Remote (FAR) Area codes. Comprised of ZIP/ZIPA Codes, the system classifies four levels of extreme rurality using proximity to Urbanized Areas and sparse population. Census ZCTA/ZIP areas without population are excluded.



Sources:  
Core Based Statistical Areas: <https://www.census.gov/programs-surveys/metro-micro.html>  
Frontier and Remote Areas: <https://www.usda.gov/data-products/frontier-and-remote-area-codes/>

Rural-Urban Commuting Areas: <https://www.usda.gov/data-products/rural-urban-commuting-area-codes/> and <http://depts.washington.edu/urrc/uruc-us.php>  
National Centers for Health Statistics Urban-Rural: [https://www.cdc.gov/nchs/data/accs/urban\\_rural.htm](https://www.cdc.gov/nchs/data/accs/urban_rural.htm)  
Urbanized Areas/Urbanized Clusters: <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html>

Contact: [randy\\_randolph@unc.edu](mailto:randy_randolph@unc.edu)  
This work is partially funded by the federal Office of Rural Health Policy



# Takeaway: How we measure rural matters

- Yes, somewhat esoteric, but the definition can be important to the conclusion
- Casual readers probably don't care but the degree of rurality may affect your conclusion
  - Counties are convenient but clunky

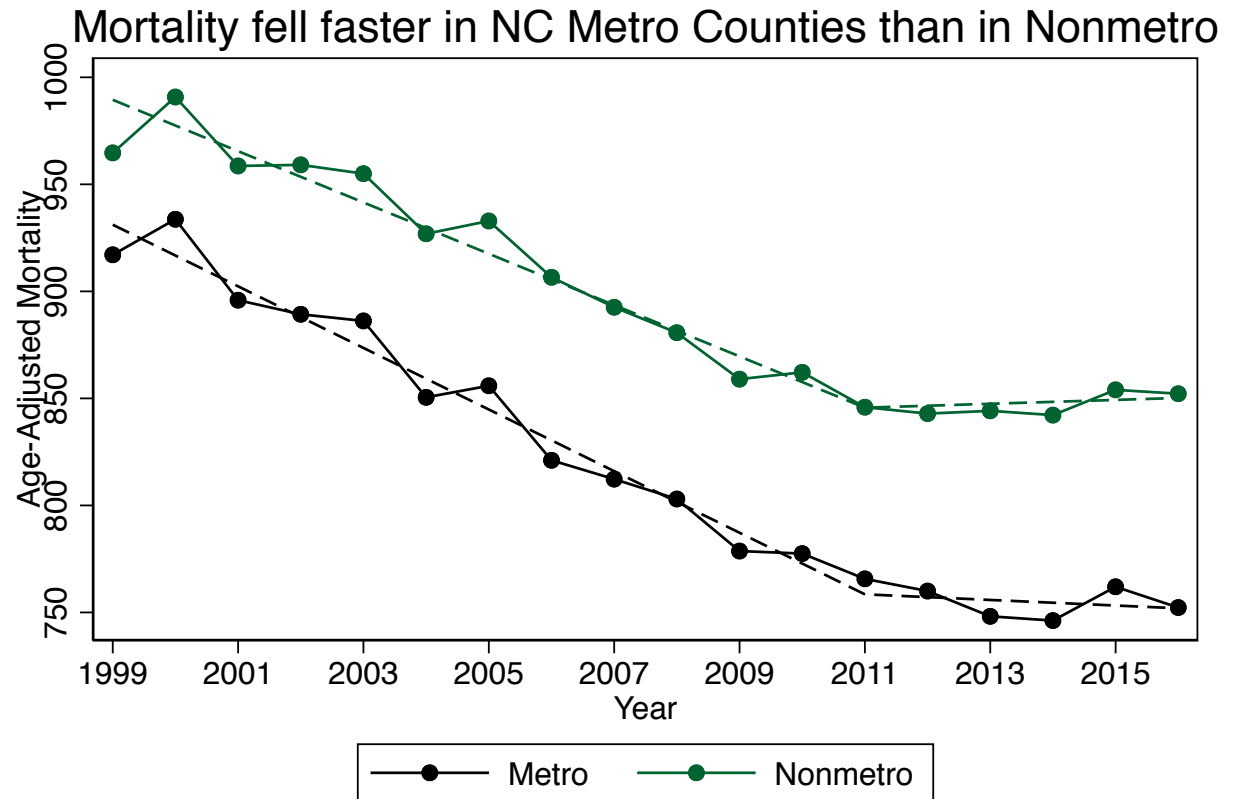


Coconino County, Arizona: A Metropolitan County

# The Rural Context

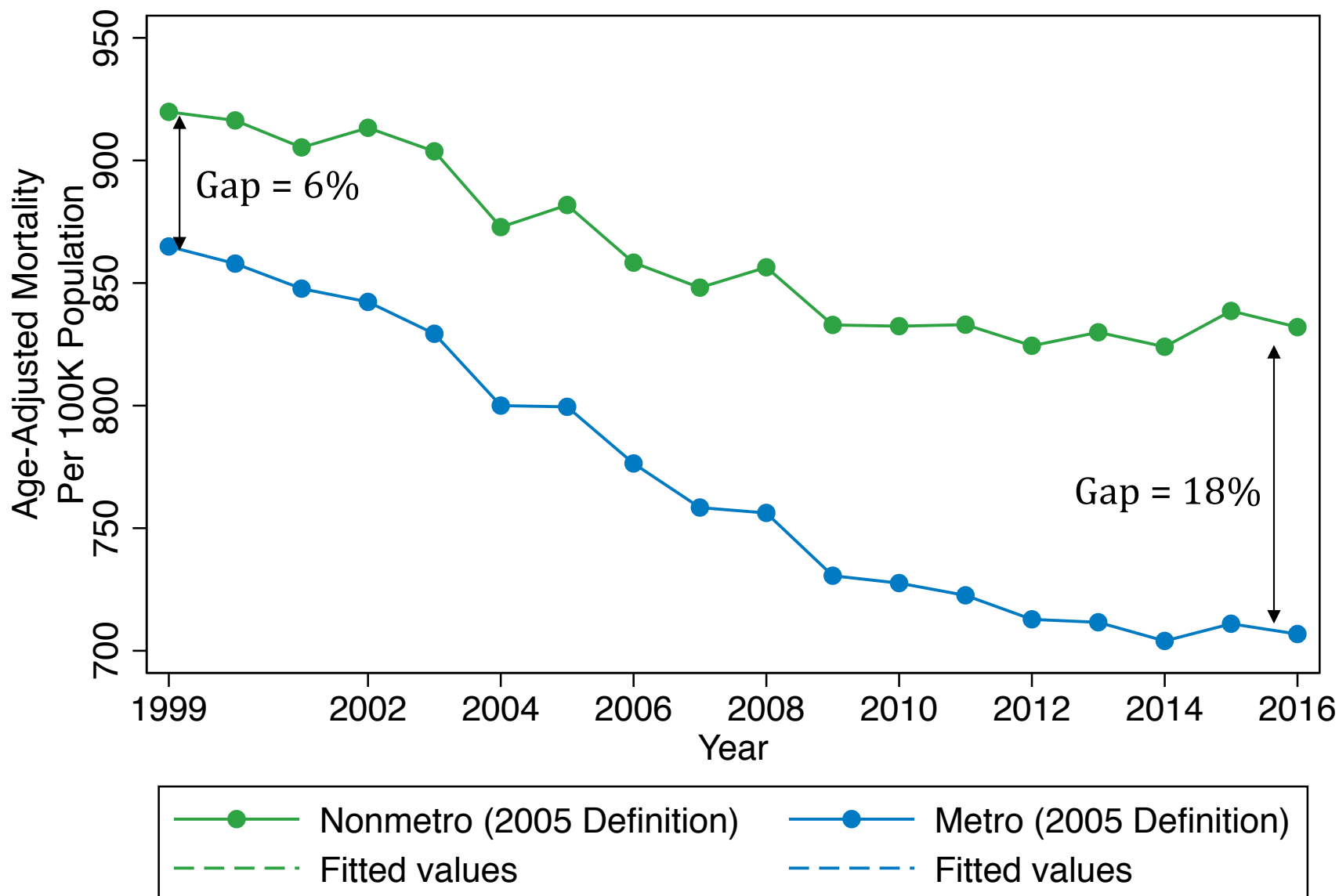
# Rural Health at a Glance

- ▶ Rural areas poorer health on almost every measure
  - ▶ Older, poorer, more isolated
  - ▶ **Persistently higher mortality**
- ▶ Less healthcare infrastructure
  - ▶ Fewer docs, smaller hospitals
  - ▶ Half of rural hospitals lose money
- ▶ 163 rural hospital closures since 2005
  - ▶ 11 in NC



Source: CDC Wonder. Metro status as of 2005

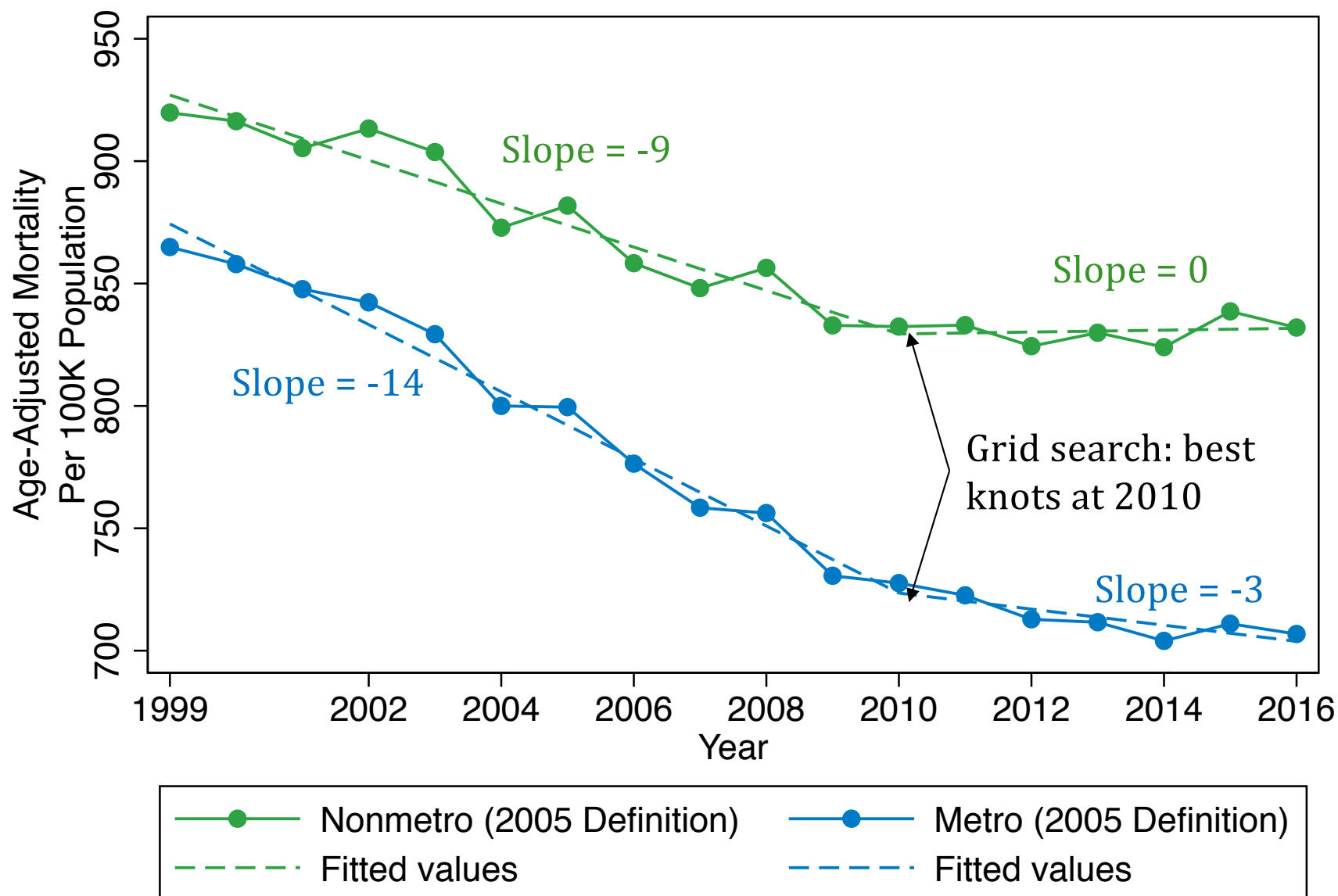
# Rural mortality falling more slowly than urban



Source: CDC WONDER / Compressed Mortality File

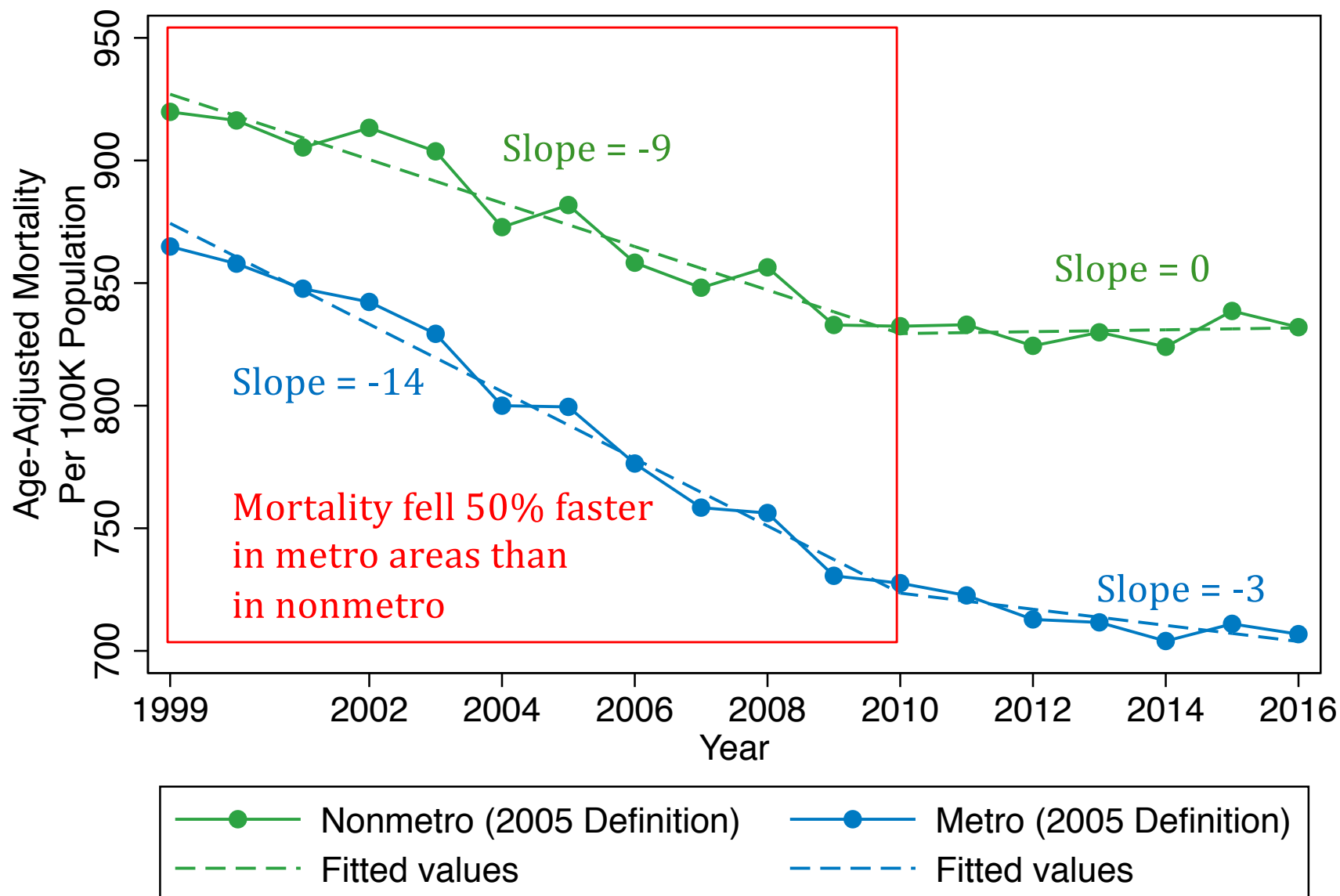


# Rural mortality falling more slowly than urban



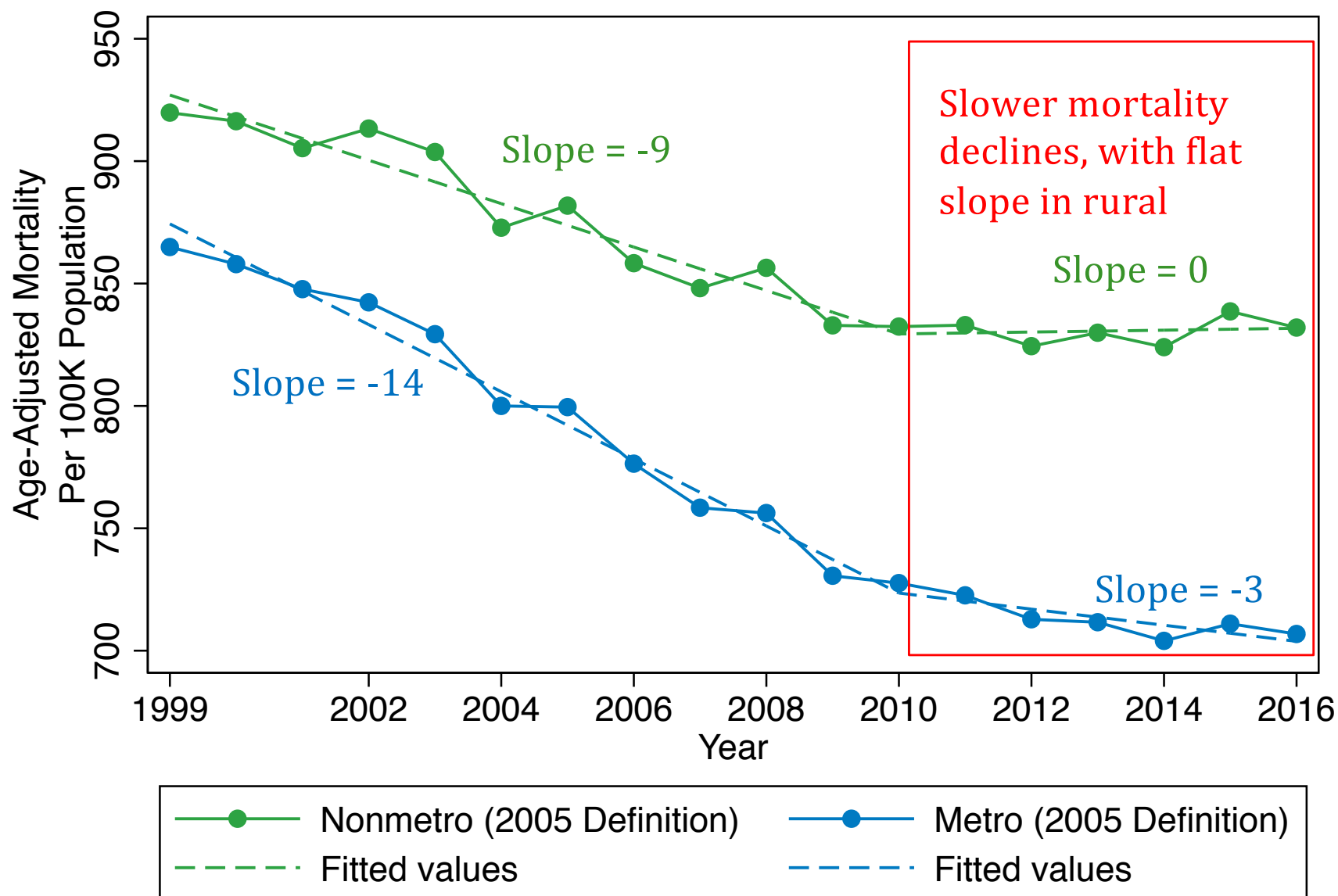
Source: CDC WONDER / Compressed Mortality File

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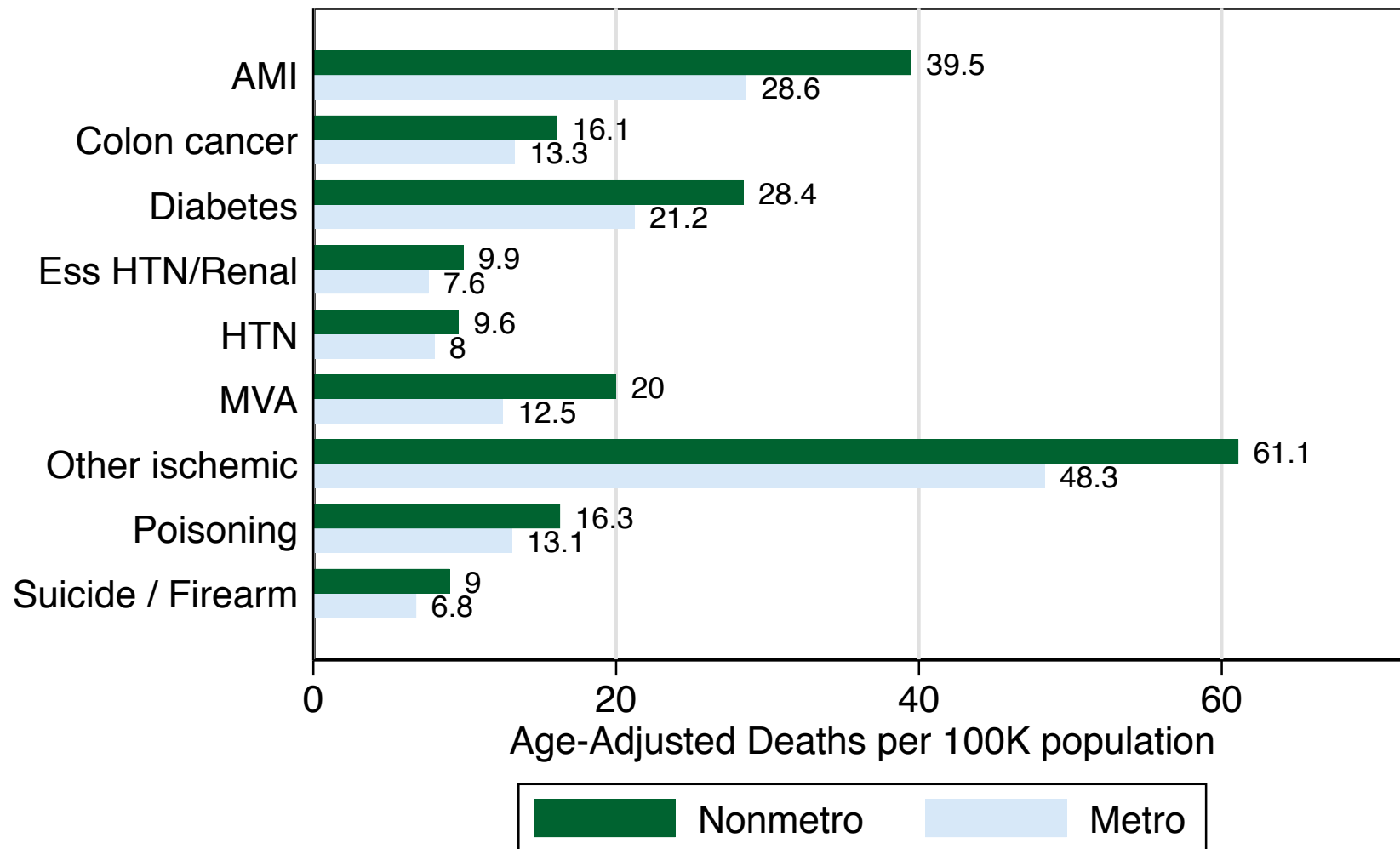
Source: CDC WONDER / Compressed Mortality File

# Quiz time!

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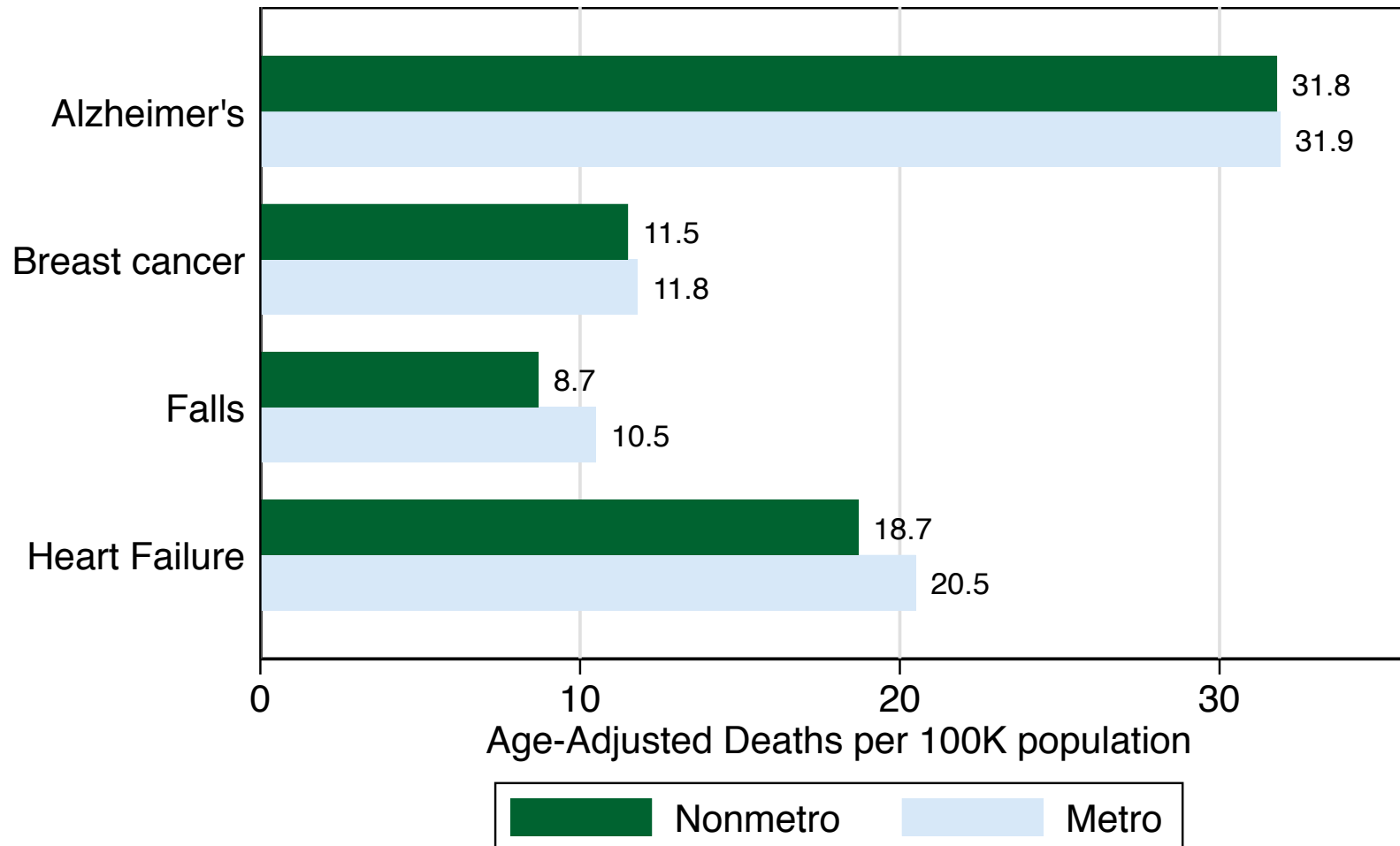
- What are common causes of death where
  - Age-adjusted rates are >20% higher in nonmetro?
  - Age-adjusted rates are lower in nonmetro?
- Potentials (these are big buckets):
  - Cancers
  - Heart diseases
  - Injuries (intentional and unintentional)
  - Chronic diseases
  - Mental health / substance abuse

## Common causes of death where nonmetro is 25% higher North Carolina



NC 2012-2016. 2013 Metro.

## Common causes of death where nonmetro is lower North Carolina



NC 2012-2016. 2013 Metro.

# Contextual data in rural settings (Methods)

# Three common “gotchas”

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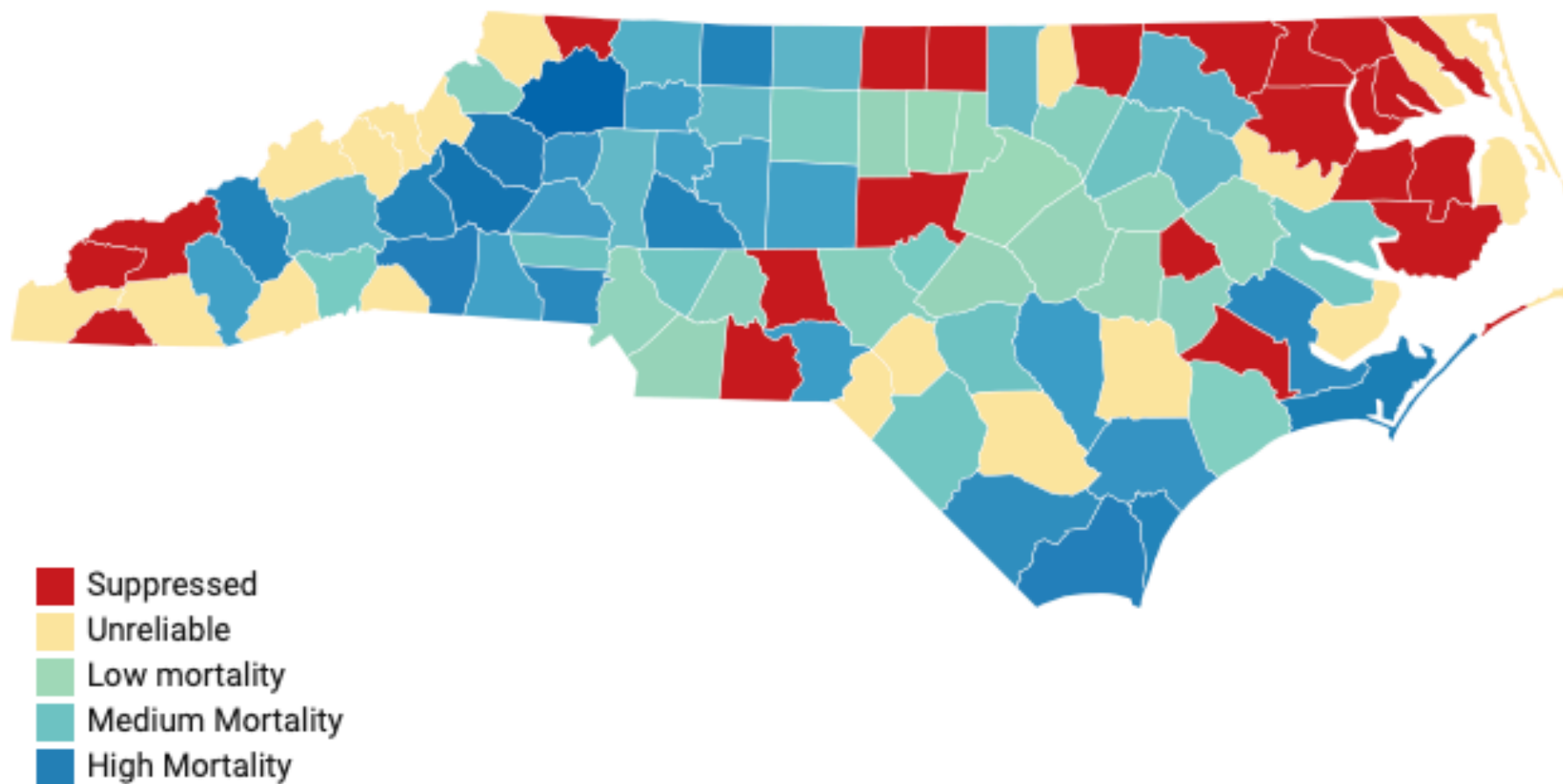
- Small numbers are often a problem
- Markets are more complicated
- Deconstruct the rural indicator



# Some common issues with data analysis in rural settings

## ► Small numbers problem

- Rural areas and providers often have insufficient numbers (suppression, precision)
- Example: Mortality rates (CDC WONDER Poisoning, 3-year).



# Some common issues with data analysis in rural settings

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- Small numbers problem
  - Has implications for policy and practice
    - And analysis – imprecision of small denominators
  - Fixed costs, “windshield time”
  - Exclusion from programs and policies (ACO, Star rating)

HEALTH AFFAIRS > VOL. 38, NO. 12: RURAL HEALTH

## OVERVIEW

# Structural Urbanism Contributes To Poorer Health Outcomes For Rural America

Janice Probst, Jan Marie Eberth, and Elizabeth Crouch

<https://www.healthaffairs.org/doi/10.1377/hlthaff.2019.00914>

# Some common issues with data analysis in rural settings

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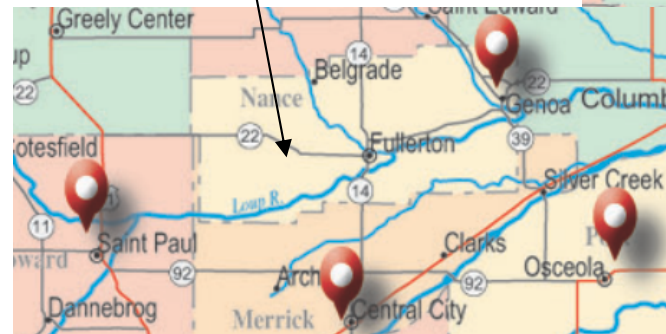
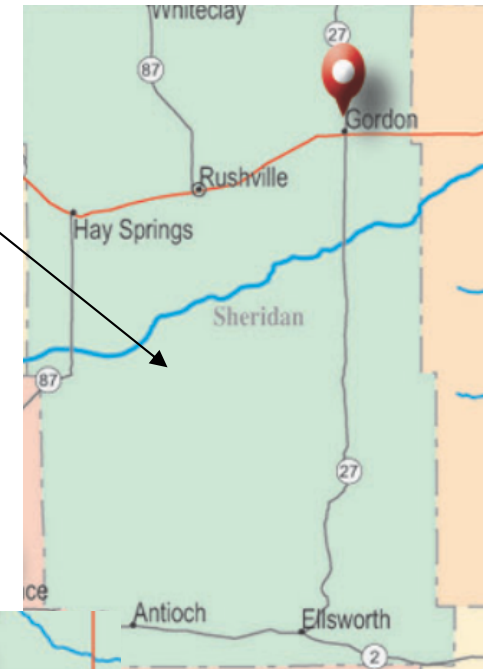
- Defining the “market” (examples)
  - Acute Care
    - In urban settings, the MSA may serve as a useful measure of the market for some services
    - More challenging assumption in rural areas
    - Split counties
    - Overlapping markets
    - Often weak market share among rural hospitals
  - Home Health / FQHC
    - AHRF (and similar) often list the home office / grantee
    - How to deal with satellite site, HH who drive by the town on the way to work?

# Why 1(county has hospital) not always great

What we think hospitals  
look like in rural counties



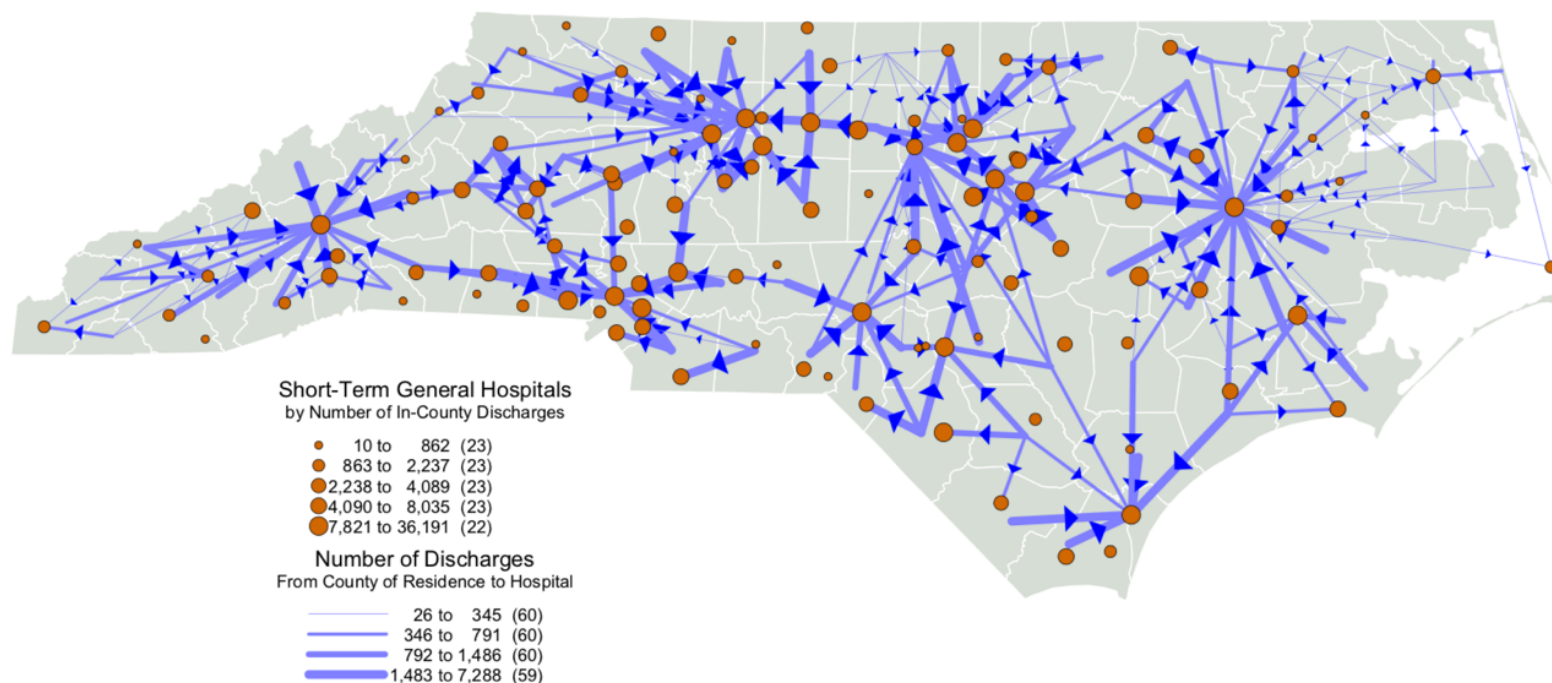
Which county – the green  
or the yellow – has better  
access to acute care  
hospitals?



# Discharge patterns of care

## Patient Origin for North Carolina Residents Inpatient Discharges by County of Residence and Hospital

Residents Discharged from North Carolina Hospitals: October 1, 2016 to September 30, 2017

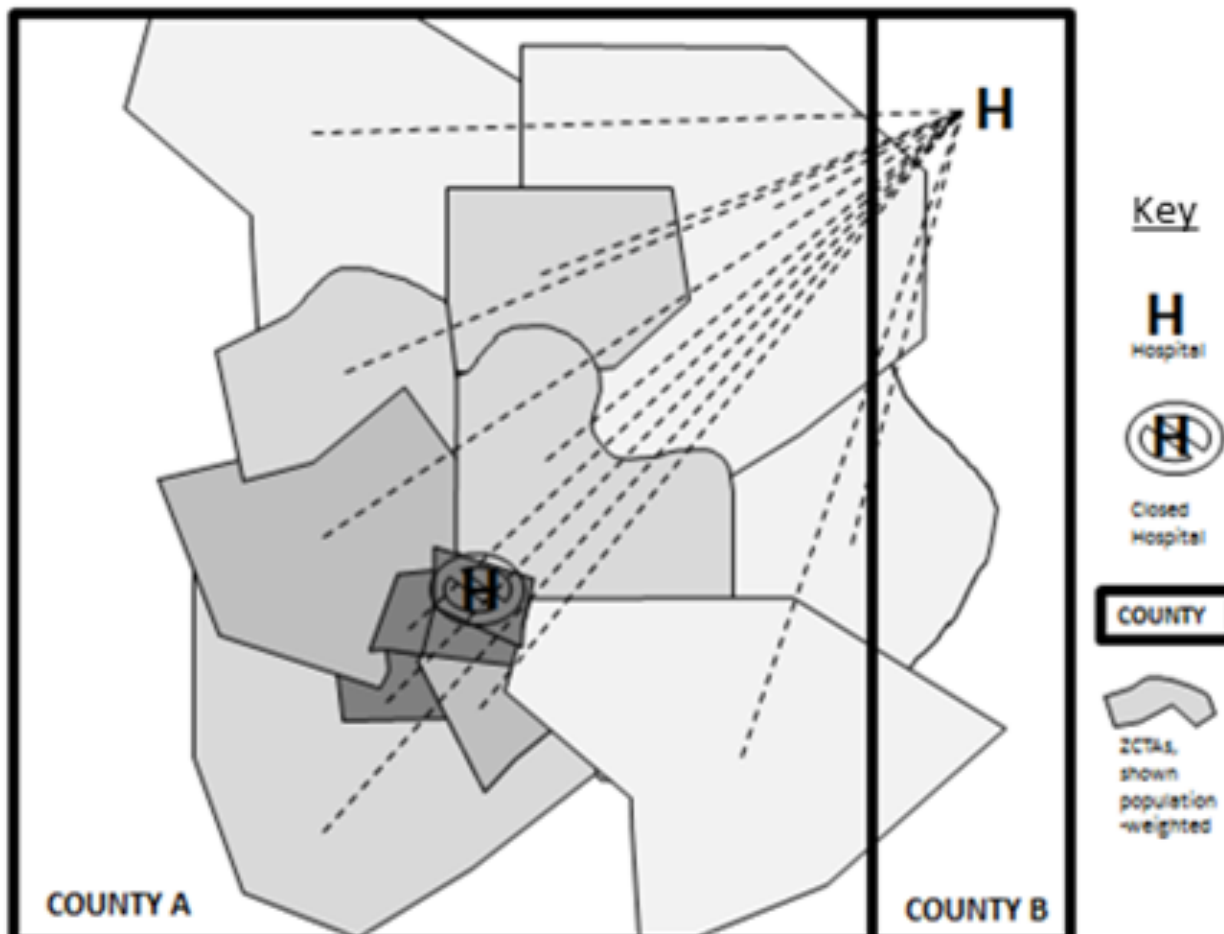


Note: For any county vectors are only drawn for hospitals receiving at least five percent of the county's Discharges.  
Discharges from Psychiatric, Rehabilitation, Long Term Care, and Substance Abuse Treatment Facilities are not included.  
Normal newborn discharges (DRG 795) excluded.

Source: IBM Watson Health, Fiscal Year 2017.

Produced By: Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

# Defining Markets: think structural



The impact of a closing hospital is probably better conceptualized as “differential distance” than as a county-wide effect.

Here, the closing hospital in A will have bigger effects near the middle but small in the Northeast.

“Percent of population in a county living within 15 miles of a hospital” might be better (eg. Holmes et al 2006)

# What do you think rural is measuring?

- Think carefully about why you are measuring rurality:
  - Lower population (critical mass)
  - More distant from certain health resource
    - (e.g. specialty care)
  - Culture
  - Socio-demographics
  - Environment (e.g. SDOH)
- To the extent possible, try to think structurally
  - e.g. “distance to nearest rad onc facility”
  - Challenge your assumptions! Interpretation of  $b_{\text{rural}}$  is sometimes lazy and prejudiced

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# Current (and perennial!) issues in rural health



# Current hot(?) topics – a partial list

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## ■ Access

- Hospital closures, service erosion (e.g. specialty care)
- Provider supply

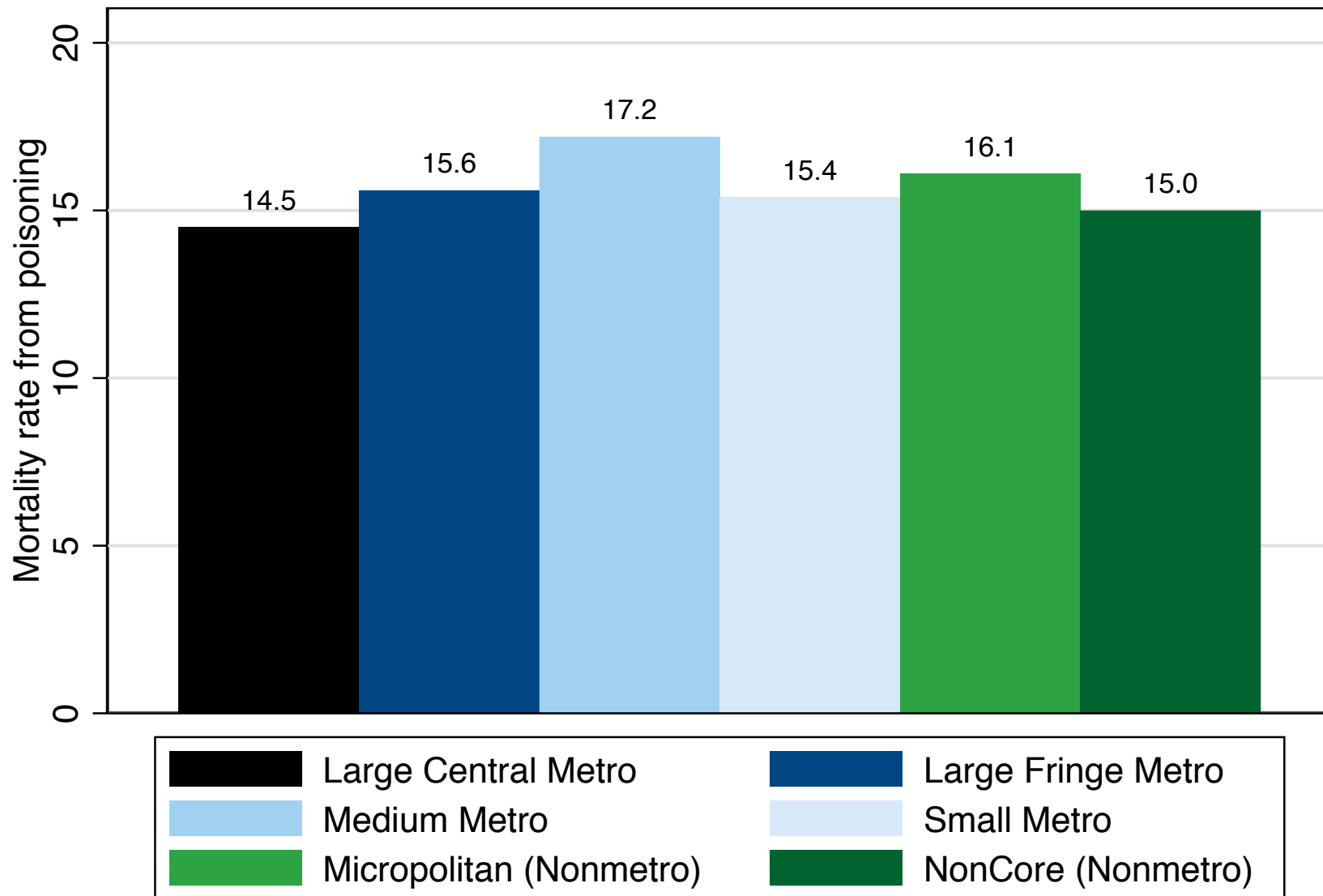
## ■ Outcomes

- Maternal health
- SUD (although the media often get this wrong)

## ■ Policy

- Financing (e.g. global budgets)
- APMs – will there ever be the volume?
- Systems view – economic development and health

# No, rural areas don't have higher mortality from poisoning (SUD)



Source: CDC CMF 2014-2016 (X40-X49)

# Final thoughts

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- ▶ Rural health is interesting because the ship can turn faster
- ▶ Don't believe the hype – popular media often paint one picture of rural America. Rich diversity of assets, strengths, as well as problems, contexts
- ▶ UNC long been a leader in this area
- ▶ Role for GIS/spatial analysis
- ▶ Can use MyChart to recruit in rural(-ish) areas
- ▶ Watch for a Rural Health Seminar Series launching this semester
  - ▶ <https://www.shepscenter.unc.edu/programs-projects/rural-health/unc-rural-health-research-seminar-series/>

# Kickoff: Thursday, February 20, 8A in BB 219

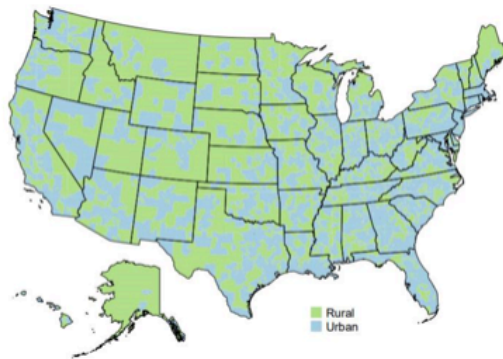
## UNC Rural Health Research Seminar Series

**Join us at our first monthly rural health research series** where we will convene to focus on how we can further advance our science, student opportunities, and funding potential.

**Brinkhous-Bullitt Room 219**  
**February 20<sup>th</sup> at 8 AM**

**Who should attend?** Any staff, students or faculty interested in rural health

**Purpose:** To raise awareness of the ongoing work, encourage connection and collaboration, and share current projects and research



Rural and urban areas in the United States, 2019

We are excited to announce the launch of a rural health research seminar series at UNC. This seminar is designed to unite researchers from across the university whose work pertains to the study of rural health and health care. Excellent research is already being conducted at the university in multiple disciplines, from health services research to nutrition, and from public policy to journalism, so this seminar series is designed to **raise awareness of the ongoing work** and to **encourage connection and collaboration** among the individuals and teams currently studying rural health. We hope the collaboration will stretch across both disciplines and institutions. We expect participation from researchers, staff and students from the Sheps Center for Health Services Research, the Center for Health Promotion and Disease Prevention, the North Carolina Network Consortium, the Lineberger Cancer Center among others. Given the ongoing interest and national attention focused on rural areas, we feel like this is a

timely and important opportunity to bring rural researchers together. The series will be **open to all** faculty, researchers and students who wish to attend, regardless of current involvement in rural health research.

We envision a series of monthly meetings beginning in February 2020. The first meeting will be on February 20, with subsequent meetings in March and April. In the first meeting we will explore potential opportunities and direction based on group interest. We envision that it will consist of introductions, both to the current rural health research projects and to the people involved in these projects. Subsequent meetings will serve as opportunities for people to share and present ongoing research, either to obtain feedback or simply to increase awareness of the ongoing work. Presenters can be faculty, researchers or students at the university, and they may also include those outside of the university, such as those from other universities, those in policy, or those in the commercial sector. Eventually, we hope to launch a statewide rural health conference.

# North Carolina Rural Health Research Program

## Location:

Cecil G. Sheps Center for Health Services Research

University of North Carolina at Chapel Hill

Website: <http://www.shepscenter.unc.edu/programs-projects/rural-health/>  
or <http://go.unc.edu/ncrhrc>

Email: [ncrural@unc.edu](mailto:ncrural@unc.edu)

Twitter : @NCRural

## Colleagues:

Mark Holmes, PhD

George Pink, PhD

Kristin Reiter, PhD

Erin Kent, PhD

Tyler Malone

Kathleen Knocke

Ann Howard

Sharita Thomas, MPP

Randy Randolph, MRP

Denise Kirk, MS

Kristie Thompson, MA

Julie Perry

# Resources

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## North Carolina Rural Health Research Program

<http://www.shepscenter.unc.edu/programs-projects/rural-health/>

## Rural Health Research Gateway

[www.ruralhealthresearch.org](http://www.ruralhealthresearch.org)

## Rural Health Information Hub

[www.ruralhealthinfo.org/](http://www.ruralhealthinfo.org/)

## National Rural Health Association

[www.ruralhealthweb.org](http://www.ruralhealthweb.org)

## National Organization of State Offices of Rural Health

[www.nosorh.org](http://www.nosorh.org)



The Rural Health Research Gateway provides access to all publications and projects from the Rural Health Research Centers, funded by the Federal Office of Rural Health Policy.

Visit Gateway for more information.

[www.ruralhealthresearch.org](http://www.ruralhealthresearch.org)

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