About the NC Rural Health Research Program

- 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

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

- 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 quality for FORHP grant

- Is it “rural”?
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 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

one dot = 100 people by census tract
Rural = Champus
ZIP Pop Density (Nielsen 2015)
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
Targets!

Rural = Not a Metropolitan Area 2013
Micropolitan in pale green
If we view as a continuum: sand = urban, forest = rural, light green = ¯\_(ツ)_/¯
Avoid the temptation of using local measures or building your own

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

TIP: The practicality of your data’s resolution

- 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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North Carolina rural is different from US rural

- 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”
ZIPs more than 60 mins from a 50K Urban

Frontier and Remote (FAR) ZIP Code Areas, 2010

FAR Level One
Remote from urban areas of 50,000 or more people

FAR level one includes ZIP code areas with majority populations living 60 minutes or more from urban areas of 50,000 or more.

Source: Economic Research Service, U.S. Department of Agriculture, using data from the U.S. Census Bureau and ESRI.
Census blocks with zero population

http://mapsbynik.tumblr.com/image/82791188950
Handy-dandy poster on ruralness
(& disparities depend on the rurality definition)

http://go.unc.edu/ncruralpubs
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

Mortality fell faster in NC Metro Counties than in Nonmetro

Source: CDC Wonder. Metro status as of 2005
Rural mortality falling more slowly than urban

Gap = 6%

Gap = 18%

Source: CDC WONDER / Compressed Mortality File
Rural mortality falling more slowly than urban

Source: CDC WONDER / Compressed Mortality File
Rural mortality falling more slowly than urban

Mortality fell 50% faster in metro areas than in nonmetro areas.

Source: CDC WONDER / Compressed Mortality File
Rural mortality falling more slowly than urban

Slower mortality declines, with flat slope in rural

Slope = -9

Slope = -14

Slope = -3

Source: CDC WONDER / Compressed Mortality File
Quiz time!

- 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

<table>
<thead>
<tr>
<th>Cause</th>
<th>Nonmetro</th>
<th>Metro</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI</td>
<td>39.5</td>
<td>28.6</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>16.1</td>
<td>13.3</td>
</tr>
<tr>
<td>Diabetes</td>
<td>28.4</td>
<td>21.2</td>
</tr>
<tr>
<td>Ess HTN/Renal</td>
<td>7.6</td>
<td>9.9</td>
</tr>
<tr>
<td>HTN</td>
<td>9.6</td>
<td>8.0</td>
</tr>
<tr>
<td>MVA</td>
<td>20</td>
<td>12.5</td>
</tr>
<tr>
<td>Other ischemic</td>
<td></td>
<td>48.3</td>
</tr>
<tr>
<td>Poisoning</td>
<td>16.3</td>
<td>13.1</td>
</tr>
<tr>
<td>Suicide / Firearm</td>
<td>6.8</td>
<td>9.0</td>
</tr>
</tbody>
</table>

Common causes of death where nonmetro is lower

North Carolina

<table>
<thead>
<tr>
<th>Cause</th>
<th>Nonmetro</th>
<th>Metro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alzheimer's</td>
<td>31.8</td>
<td>31.9</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>11.5</td>
<td>11.8</td>
</tr>
<tr>
<td>Falls</td>
<td>8.7</td>
<td>10.5</td>
</tr>
<tr>
<td>Heart Failure</td>
<td>18.7</td>
<td>20.5</td>
</tr>
</tbody>
</table>

Contextual data in rural settings (Methods)
Three common “gotchas”

- 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

- 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

Some common issues with data analysis in rural settings

- **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?

Map from https://www.nebraskahospitals.org/about_us/member_hospitals.html
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

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 $b_{rural}$ is sometimes lazy and prejudiced
Current (and perennial!) issues in rural health
Current hot(?) topics – a partial list

- **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

- 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
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 will convene to focus on how we can further advance our science, student opportunities, and funding potential.

Brinkhous-Bullitt Room 219
February 20th 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

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/
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Julie Perry
Resources

North Carolina Rural Health Research Program
http://www.shepscenter.unc.edu/programs-projects/rural-health/

Rural Health Research Gateway
www.ruralhealthresearch.org

Rural Health Information Hub
www.ruralhealthinfo.org/

National Rural Health Association
www.ruralhealthweb.org

National Organization of State Offices of Rural Health
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

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