Which definition of rurality should I use?

Evaluation of eight federal rural definitions

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UNC Rural Health Research Seminar Series

Julianna C. Long
G. Mark Holmes
The term “rural” suggests many things to many people, such as agricultural landscapes, isolation, small towns, and low population density.
Although many policymakers, researchers, and policy analysts would prefer one standardized, all-purpose definition, “rural” is a multifaceted concept about which there is no universal agreement.

What is Rural?

- **Rural as a concept**
  - An attribute of a place or the residents of a place
  - Population and/or population density
  - Distance and/or isolation
  - Physical landscape
  - Economic connectedness
Who

What is rural?

http://www.shepscenter.unc.edu/download/19767/
Who is Rural?

• Identifying rural regions and residents
  - Requires operationalizing the concept of rural using measurable characteristics
  
  • Measures that capture appropriate characteristics of regions/people
  
  • Weighting and rating scheme (to combine and/or integrate measures)
  
  • Thresholds (in many cases)
Who is Rural?

- In reality, rurality is a spectrum
  - Continuous approaches
The Index of Relative Rurality (IRR): US County Data for 2000 and 2010

By Brigitte Waldorf¹, Ayoung Kim²

1. Dept. of Agricultural Economics, Purdue University. 2. Dept. of Agricultural Economics, Mississippi State University

The Index of Relative Rurality (IRR) is a continuous, threshold-free, and unit-free measure of rurality. It is an alternative to the traditional discrete threshold-based classifications. The dataset includes the U.S. county-level IRR for 2000 and...

Description

The Index of Relative Rurality (IRR) is a continuous, threshold-free, and unit-free measure of rurality. The original version of the IRR was proposed by Waldorf (2006, http://ageconsearch.umn.edu/handle/21383) as an alternative to the traditional discrete threshold-based classifications, such as the Rural-urban Continuum Code and the Urban Influence Code. Waldorf and Kim (2015) designed an improved county level IRR for 2000 and 2010.

https://purr.purdue.edu/publications/2960/1
Validation of a new continuous geographic isolation scale: A tool for rural health disparities research

Geographic Isolation - North Carolina

Data from:


https://observablehq.com/@gallowayevan/geographic-isolation-north-carolina
Who is Rural?

• In reality, rurality is a spectrum
  - Continuous approaches

• However, in even more real reality, rurality is binary
  - Eligibility for various funding sources/programs based on rural status

• Numerous definitions used across federal and state agencies and programs
Delineating Rural Areas in the United States

One challenge in examining rural-urban disparities is the lack of a common definition. Multiple federal systems exist using different levels of geography (e.g., census tracts vs. zip codes). Multiple definitions of the “rurality” of a place or population mean that the degree of the disparity may vary for even school districts depending on the definition. Here, we consider some of the most common federal rural definitions and use representative acquisition characteristics to demonstrate the consistency of the disparity to the specific rural definition.

Binary Systems — Rural/Urban
- Urbanised Areas and Clusters: US Census Bureau
  - This system includes Urbanised areas (UA) with 10,000 or more people and Urbanised Clusters (UCC) of 2,500 to 4,999 people in densely settled communities of 2,500 people or more. Urbanised areas are considered to be areas outside urbanised areas.

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

Rural-Urban Commuting Areas & CBGs: Multiple Institutions
- Rural-Urban Commuting Areas (RUCAs) are a subcounty, sub–CBSA classification that further describes below. The classification of the CBG system classifies portions of Metropolitan counties with NonCore areas of 4 or greater as rural, as well as Metropolitan and NonCore counties. This is the preferred system of OMB and the Office of Rural Health Policy.

Rural-Urban Commuting Areas: US Dept. of Agriculture
- Rural-Urban Commuting Areas (RUCAs) are a subcounty, sub-CBSA classification combining 2000s and 2010s that is defined by commuting flows (outward) and resident to zip codes. The major categories can be further broken into 11 subcategories designations offering great flexibility. The method is offered by the University of Washington.

Multi-Level Systems
- National Centers for Health Statistics

- Frontier and Remote Areas: US Department of Agriculture
  - The US Department of Agriculture has facilitated study of sparsely populated areas and remote areas with their Frontier and Remote Economic Area codes. Combined with ZIP codes, the system classifies four levels of extreme rural using proximity to observed and sparse population. Census 2010/2019 areas without population are excluded.

https://www.shepscenter.unc.edu/product/delineating-rural-areas-in-the-united-states/
It is not unusual for a location to meet the rurality criteria for one program (such as CMS) but not another (such as HRSA).

Who *thinks* they are Rural?

• Perceptions of residents deviate from federal definitions
  - Local context
  - Geographic scale
Concordance of Rural-Urban Self-identity and ZIP Code-Derived Rural-Urban Commuting Area (RUCA) Designation

Tracy Onega, PhD MA MS1,2,3,4 Julie E. Weiss, MS1,3 Jennifer Alford-Teaster, MPHMA1,3,4 Martha Goodrich, MS1,3 M. Scottie Eliassen, MS1,5 & Sunny Jung Kim, PhD MS MA6,7

1 Department of Biomedical Data Science, Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire
2 Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire
3 Norris Cotton Cancer Center, Lebanon, New Hampshire
4 Department of Epidemiology, Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire
5 Departments of Community and Family Medicine and Medical Education, Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire
6 Department of Health Behavior and Policy, School of Medicine, Virginia Commonwealth University, Richmond, Virginia
7 Massey Cancer Center, Virginia Commonwealth University, Richmond, Virginia

Abstract

Purpose: This study examined the concordance between individuals’ self-reported rural-urban category of their community and ZIP Code-derived Rural-Urban Commuting Area (RUCA) category.

Methods: An Internet-based survey, administered from August 2017 through November 2017, was used to collect participants’ sociodemographic characteristics, self-reported ZIP Code of residence, and perception of which RUCA category best describes the community in which they live. We calculated weighted kappa (κ) coefficients (95% confidence interval [CI]) to test for concordance between participants’ ZIP Code-derived RUCA category and their selection of RUCA descriptor. Descriptive frequency distributions of participants’ demographics are presented.

Findings: A total of 622 survey participants, residents of New Hampshire


About 52 percent of people in the United States describe their neighborhood as suburban, while about 27 percent describe their neighborhood as urban, and 21 percent as rural.
Why Important?

- Funding eligibility
- Evaluating disparities
  - Health care access and utilization
  - Health outcomes
  - Health care workforce
Why Important?

- Funding eligibility
- Evaluating disparities
  - Health care access and utilization
  - Health outcomes
  - Health care workforce

So people can study “geography” :/
Our Study

• Main goals
  - Evaluate the extent of agreement among federal definitions of rural
  - Evaluate how population characteristics vary across the definitions
Definitions of Rural

• USDA Economic Research Service
  - Rural Urban Commuting Areas (RUCAs)
  - Rural Continuum Codes (RUCCs)
  - Urban Influence Codes (UICs)
  - Frontier and Remote Access Codes (FAR)

• Federal Office of Rural Health Policy

• National Center for Health Statistics at CDC

• Core-Based Statistical Areas from OMB

• Urban Areas/Urban Clusters from the Census Bureau
Data Preparation

• Constructed binary tract-level layers for each rural definition
  - Converting faux-continuous measures to binary
    • Based on suggested (or recommended or accepted) use and literature
  - Required some GIS processing
    • Mismatching geographic units
• Level of Rurality
  - Number of times identified as being rural for each tract out of 8 definitions
  - 0 = never identified as rural
  - 8 = always identified as rural

• Consider this as agreement (consensus) of rurality, not magnitude of rurality
  - However, consensus tends to be higher in more remote and scarcely populated regions
Data Preparation

• Population characteristics
  - Population, pop density, pop change (2010 to 2018)
  - Percent (non-Hispanic) White, Black, American Indian and Alaska Native (AIAN), and Asian, and Hispanic; age 65 years and older
  - Percent with a bachelor’s degree and living in a household making less than 200% of the federal poverty level
  - Percent with health insurance (age 0-64); 30 minute travel time access to a primary care provider, dentist, acute care hospital, hospital with at least 100 beds, and hospital with an OR
  - Percent of the adult population (age 18+) with asthma, diabetes, heart disease, and depression
Data Analysis

- Overlay rural definitions and levels of rurality with population information
  - Agreement among total population
  - Variation of population characteristics among levels of rurality
  - Urban/Rural disparities in population characteristics
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<thead>
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Most Urban cliff/ledge
Most Rural cliff/ledge
Gradual Increase
Gradual Decrease
### Difference between urban and rural populations

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<td>-5.8</td>
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<td>-5.1</td>
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<td>Definition</td>
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<td>Hospital</td>
<td>Hosp, 100 beds</td>
<td>Dentist</td>
</tr>
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<td>------------</td>
<td>------------</td>
<td>----------</td>
<td>----------------</td>
<td>---------</td>
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<td>UA/UC</td>
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<td>-31.5</td>
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<td>RCC</td>
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</table>

Difference between urban and rural populations
Notable Findings

• High variation in the size of the rural population among definitions
  - Some overlap in the people identified
• Level of rurality (agreement) was interesting and may even be useful
  - Another approach to consider
• Disparities vary by definition
  - Must consider size of rural population
Conclusions

- So... which definition of rurality should I use?
  - As expected, we did not uncover a “best” definition of rural
    - We did highlight their differences and similarities
  - Use standard definitions
  - Consider your project/data
Thank You!
Questions or Comments?

Which definition of rurality should I use?
Evaluation of eight federal rural definitions

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November 18th 2020
UNC Rural Health Research Seminar Series

Julianna C. Long
G. Mark Holmes
## Definitions

<table>
<thead>
<tr>
<th>Definition</th>
<th>Agency</th>
<th>Type</th>
<th>Unit/Variable</th>
<th>Decision</th>
<th>Notes</th>
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<tr>
<td>Rural-Urban Commuting Areas (RUCAs)</td>
<td>USDA</td>
<td>Continuous</td>
<td>Census Tract</td>
<td>Values greater than or equal to 4 were considered rural.</td>
<td>10 categories spanning urban metropolitan to rural non-metro. Incorporates population and commuting data as a proxy for ‘connectedness’.</td>
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<tr>
<td>Core-Based Statistical Areas (CBSAs)</td>
<td>OMB</td>
<td>Binary</td>
<td>Variable, typically counties</td>
<td>Nonmetro counties were considered rural.</td>
<td>Can include one or more counties – based on census geography, but not consistent.</td>
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<tr>
<td>Urban Areas/Urban Clusters (UAs/UCs)</td>
<td>Census Bureau</td>
<td>Binary</td>
<td>Variable</td>
<td>Tracts that did not have their population-weighted centroid inside of an UA/UC were considered rural.</td>
<td>The Census Bureau defines UAs/UCs each decennial census, and anywhere not inside these areas is considered rural.</td>
</tr>
<tr>
<td>Federal Office of Rural Health Policy (FORHP)</td>
<td>HRSA</td>
<td>Binary</td>
<td>Census</td>
<td>N/A</td>
<td>The FORHP definition we used includes nonmetro counties AND RUCAs greater than or equal to 4.</td>
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<td>National Center for Health Statistics Rural Classification Scheme</td>
<td>CDC</td>
<td>Binary</td>
<td>Census</td>
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<td>Rural-Urban Continuum Codes (RCCs)</td>
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<td>Census</td>
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<td>9 categories spanning urban metropolitan to rural non-metro.</td>
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<td>Urban Influence Codes (UICs)</td>
<td>USDA</td>
<td>Continuous</td>
<td>Census</td>
<td>Values greater than or equal to 9 were considered rural.</td>
<td>12 categories spanning urban metropolitan to rural non-metro.</td>
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<td>Frontier and Remote Access Codes (FAR Codes)</td>
<td>USDA</td>
<td>Continuous</td>
<td>ZIP Code</td>
<td>Any tracts with their population-weighted centroid inside of a ZIP code classified under any of the four FAR categories were considered rural.</td>
<td>4 categories spanning the most remote areas of the United States – no category includes metro or micropolitan areas. Population data are used in conjunction with travel time to approximate distance and isolation.</td>
</tr>
</tbody>
</table>
Classification

- **RUCAs**
  - 4 and above

- **RCCs**
  - 7 and above

- **UICs**
  - 9 and above
GIS Processing

• UA/UCs and CBSAs
  - All tracts with a pw centroid outside of what UA/UCs and CBSAs defined as urban areas

• FAR codes
  - All tracts with a pw centroid within any of the four rural classifications in the FAR scheme