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

What is *rural*?

6

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Rural Definitions for Health Policy and Research

The term "rural" suggests many things to many people, such as agricultural landscapes, isolation, small towns, and low population density.

However, defining "rural" for health policy and research purposes requires researchers and policy analysts to

L. Gary Hart, PhD, Eric H. Larson, PhD, and Denise M. Lishner, MSW

THE UNITED STATES HAS evolved from a rural agricultural society to a society dominated by its urban population. Depending on which definition is used,

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(Am J Public Health. 2005;95:1149–1155. doi:10.2105/AJPH.2004.042432)

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. Defining rurality can be elusive and frequently relies on stereotypes and personal ex-

basis for many policy decisions, including criteria for the allocation of the nation's limited resources. It is important to specify which aspects of rurality are relevant to the phenomenon being examined and then use a definition that captures those elements. Only by defining "rural" appropri-

By treating these diverse types of rural cities and towns and the problems they confront similarly, policy analysts may fail to identify each site's distinct health care concerns and effective methods for resolving those problems. Access to medical specialists and surgical services is a case in point.

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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*?

6

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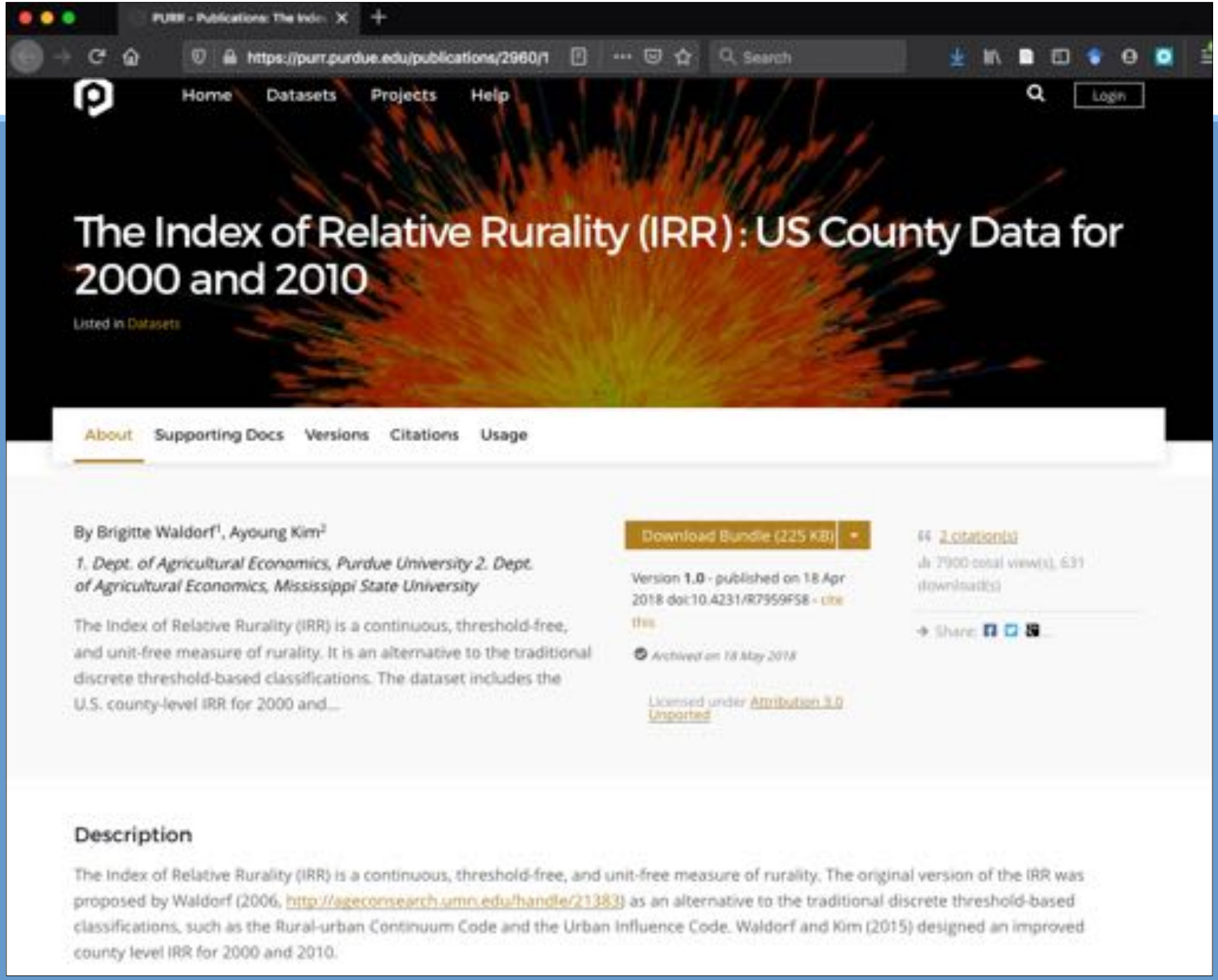
Who is Rural?

- 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



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Social Science & Medicine 215 (2018) 123–132

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journal homepage: www.elsevier.com/locate/socscimed

Validation of a new continuous geographic isolation scale: A tool for rural health disparities research

Nathan J. Doogan[a,*], Megan E. Roberts[a], Mary Ellen Wewers[a], Erin R. Tanenbaum[b], Elizabeth A. Mumford[b], Frances A. Stillman[b]

[a] College of Public Health, The Ohio State University, Columbus, OH, USA
[b] NORC at the University of Chicago, USA

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ABSTRACT

The purpose of this study was to develop and test a new continuous measure for rural health disparities research that characterizes geographic areas according to a perspective of access to resources. We call the measure *Isolation* and anticipate it will be useful as an alternative to commonly used rural classification schemes (e.g., the Census Bureau's measure). Following the best known standards for measuring rurality, it captures the trade-off between access to resource-rich, high-population-density areas and the cost of travel to those areas; thus even intrinsically low-resource areas may have high access to nearby resources. Validity was tested with proxies such as distance to hospitals, physician availability, and access to high quality food. The *Isolation* scale demonstrated good construct validity (i.e., both convergent and criterion validity). Fit statistics indicated that, compared to other commonly-used urban/rural definitions, the *Isolation* scale was the best overall measure when predicting several proxies for rurality, even when categorized. We also show that the measure does a substantially better job at explaining national health outcome data at the state level. This new continuous *Isolation* scale shows considerable promise for improving our conceptualization, theorization, and measurement of the features of rurality that are pertinent to rural health disparities research, and can also be useful to policy makers who may find value in using isolation thresholds that are most relevant to their policy planning needs.

Doogan, N. J., Roberts, M. E., Wewers, M. E., Tanenbaum, E. R., Mumford, E. A., & Stillman, F. A. (2018). Validation of a new continuous geographic isolation scale: A tool for rural health disparities research. Social Science & Medicine, 215, 123–132.

Observable

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Evan Galloway

Fork

Published Nov 20, 2019 2 files

Geographic Isolation - North Carolina

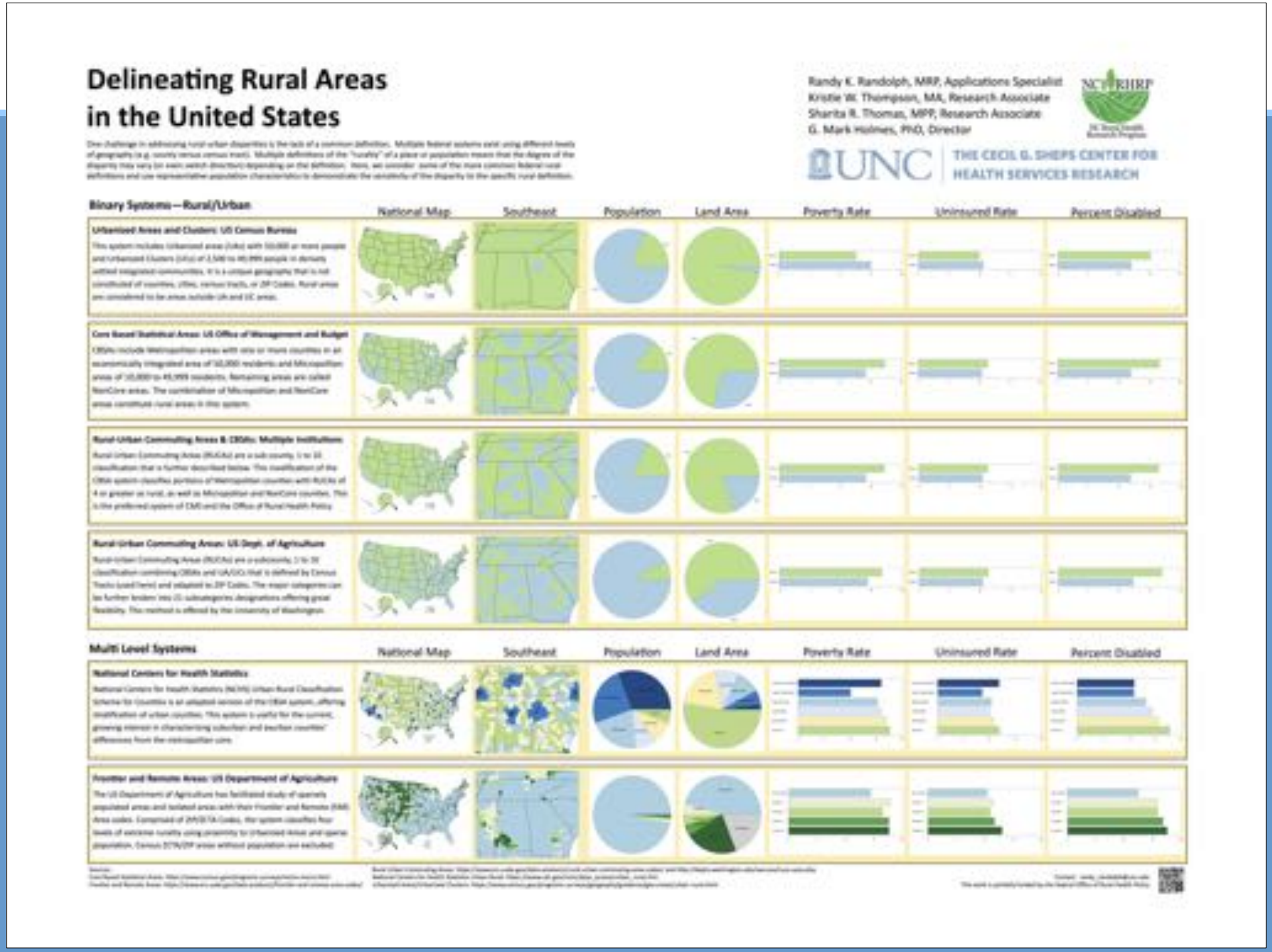
Data from:

Doogan, N. J., Roberts, M. E., Wewers, M. E., Tanenbaum, E. R., Mumford, E. A., & Stillman, F. A. (2018). Validation of a new continuous geographic isolation scale: A tool for rural health disparities research. Social Science & Medicine, 215, 123–132. https://doi.org/10.1016/j.socscimed.2018.09.005

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

Who is Rural?

- In reality, rurality is a spectrum
  - Continuous approaches
- However, in <u>even more real</u> reality, rurality is binary
  - Eligibility for various funding sources/programs based on rural status
    - Numerous definitions used across federal and state agencies and programs



https://www.shepscenter.unc.edu/product/delineating-rural-areas-in-the-united-states/

RURAL HEALTH

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

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POLICY INSIGHT

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

It is not unusual for a location to meet the rurality criteria for one program (such as CMS) but not another (such as HRSA).

A America has increased over the past few years. These issues have, unfortunately, focused on negative

rural as a continuum, fostering the notion that what is rural depends upon context, agency, or area of work being studied.[10]

both at the University of North Carolina at Chapel Hill.

Bennett, K. J., Borders, T. F., Holmes, G. M., Kozhimannil, K. B., & Ziller, E. (2019). What Is Rural? Challenges And Implications Of Definitions That Inadequately Encompass Rural People And Places. Health Affairs, 38(12), 1985–1992.

Who *thinks* they are Rural?

- Perceptions of residents deviate from federal definitions
  - Local context
  - Geographic scale

THE JOURNAL OF RURAL HEALTH

BRIEF REPORT

Concordance of Rural-Urban Self-identity and ZIP Code-Derived Rural-Urban Commuting Area (RUCA) Designation

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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

Disclosures: The authors declare no conflicts of interests.

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For further information, contact: Julie Weiss,

Abstract

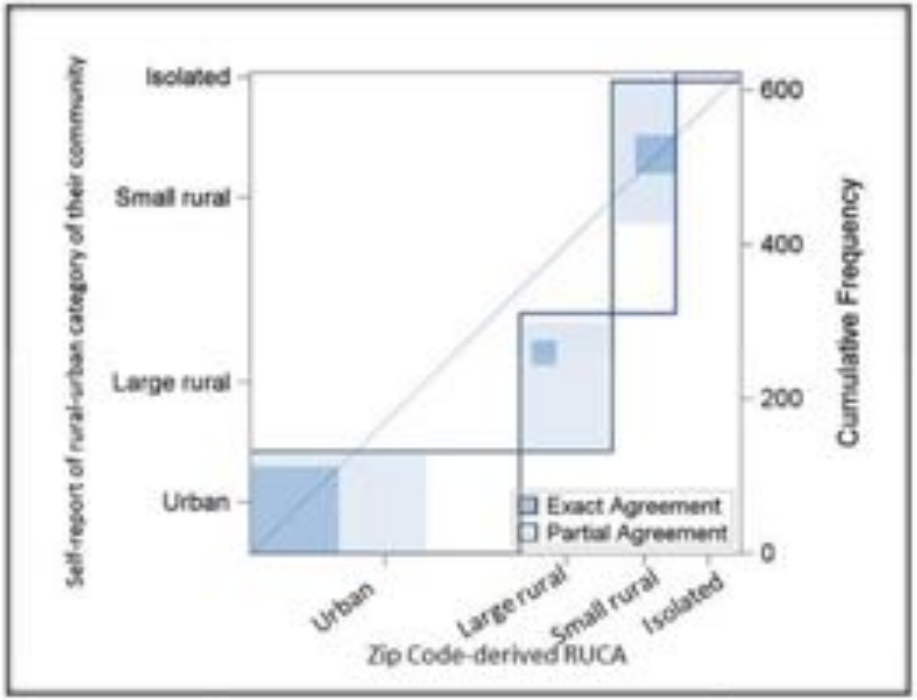
Purpose: This study examined the concordance between individuals' self-reported rural-urban category of their community and ZIP Code-derived Rural-Urban Commuting Area (RUCA) category.

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

Onega, T., Weiss, J. E., Alford-Teaster, J., Goodrich, M., Eliassen, M. S., & Kim, S. J. (2020). Concordance of Rural-Urban Self-identity and ZIP Code-Derived Rural-Urban Commuting Area (RUCA) Designation. The Journal of Rural Health, 36(2), 274–280.

Figure 1 Agreement of ZIP Code-Derived RUCA and Self-Report of Rural-Urban Category of Community.



Concordance of ZIP Code-derived RUCA and Self-report of Rural-Urban Category of Community

ZIP Code-derived RUCA	Self-report of Rural-Urban Category of Community				
	Urban	Large rural	Small rural	Isolated	Total
	N (Row %)	*N (Row %)*	*N (Row %)*	*N (Row %)*	N (Col %)
Urban	**112 (32.7)**	111 (32.5)	116 (33.9)	3 (1.0)	342 (55.0)
Large rural	15 (12.8)	**32 (27.4)**	64 (54.7)	6 (5.1)	117 (18.8)
Small rural	5 (6.2)	25 (30.9)	**50 (61.7)**	1 (1.2)	81 (13.0)
Isolated	0 (0.0)	11 (13.4)	70 (85.4)	**1 (1.2)**	82 (13.2)
Total	132 (21.2)	179 (28.8)	300 (48.2)	11 (1.8)	622 (100.0)

Exact Agreement

Partial Agreement (defined as one category of discordance on an ordinal scale)

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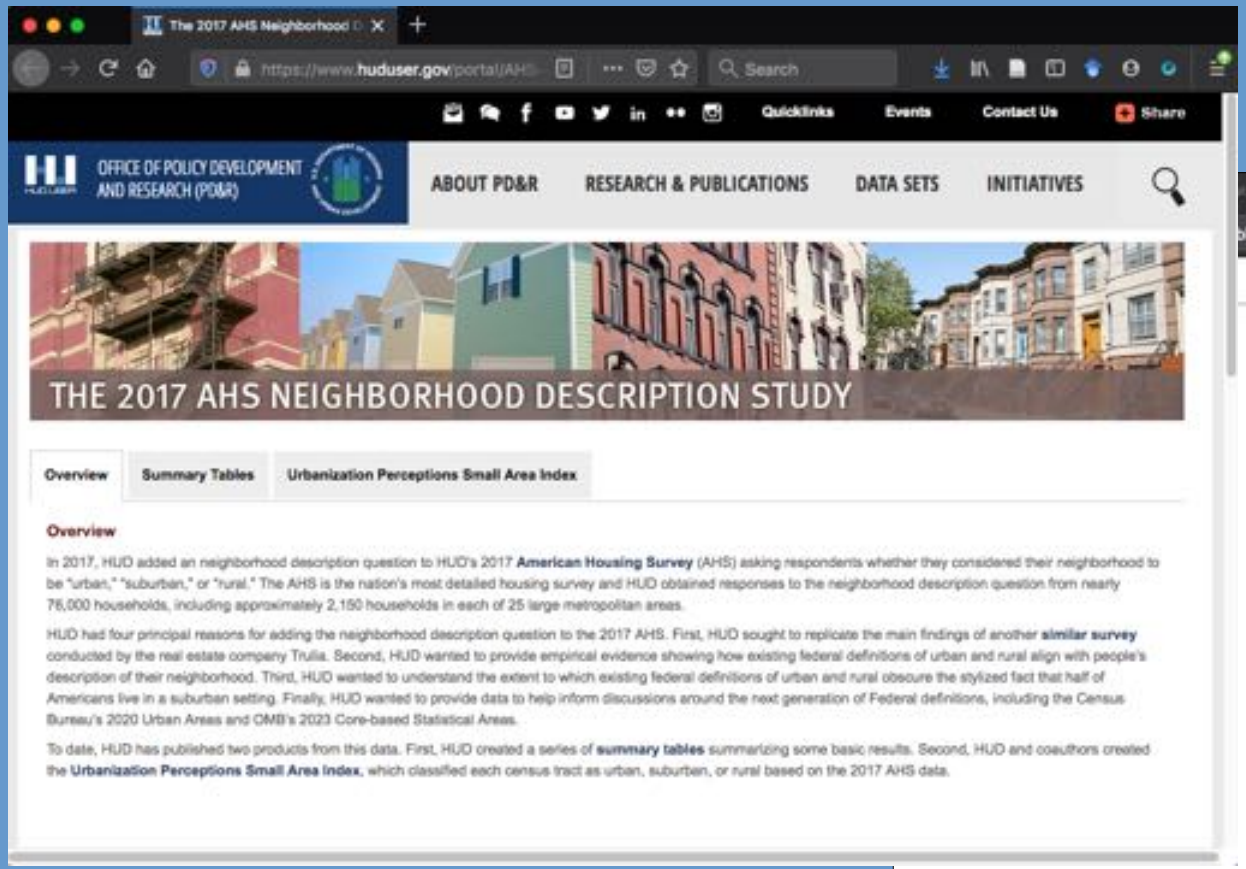
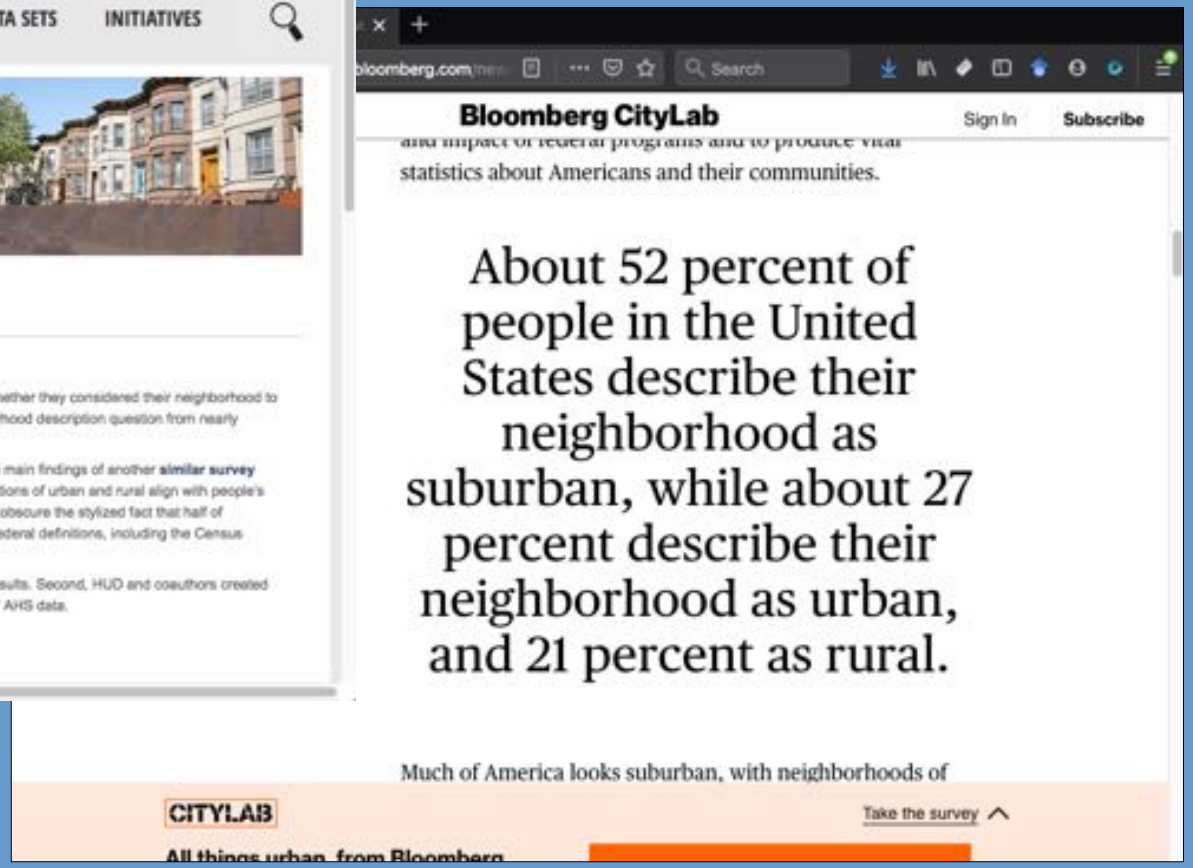
https://www.huduser.gov/portal/AHS-neighborhood-description-study-2017.html





https://www.bloomberg.com/news/articles/2018-11-14/u-s-is-majority-suburban-but-doesn-t-define-suburb

Why Important?

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

Why Important?

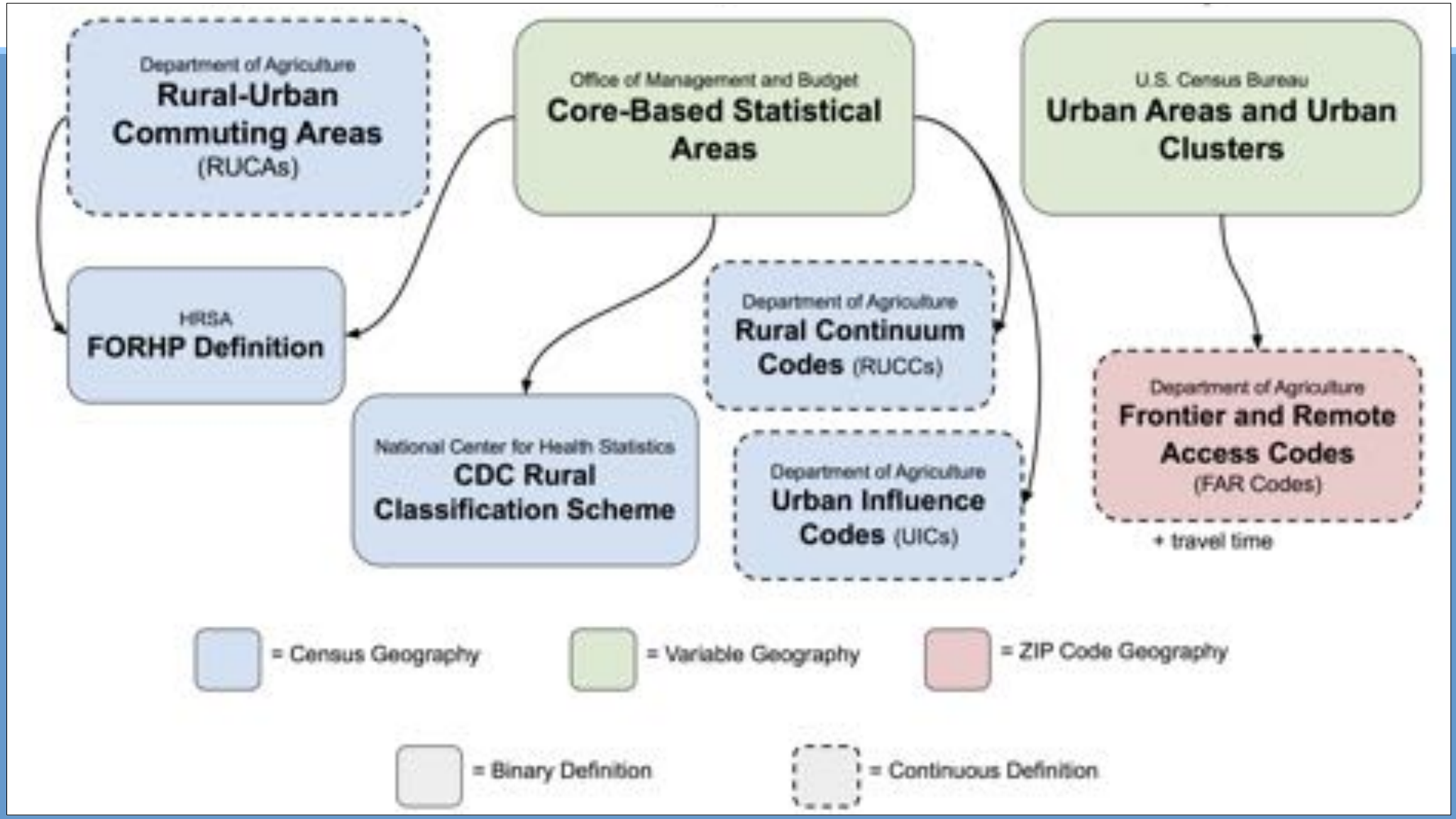
- Funding eligibility
- Evaluating disparities
  - Health care access and utilization
  - Health outcomes
  - Health care workforce
- So people can study "geography" :/

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


Department of Agriculture
Rural-Urban Commuting Areas
(RUCAs)
Office of Management and Budget
Core-Based Statistical Areas
U.S. Census Bureau
Urban Areas and Urban Clusters
HRSA
FORHP Definition
Department of Agriculture
Rural Continuum Codes (RUCCs)
National Center for Health Statistics
CDC Rural Classification Scheme
Department of Agriculture
Urban Influence Codes (UICs)
Department of Agriculture
Frontier and Remote Access Codes
(FAR Codes)
+ travel time
= Census Geography
= Variable Geography
= ZIP Code Geography
= Binary Definition
= Continuous Definition

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

Data Preparation

- 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

Definition	Population	HRSA	CDC	RUCA	RCC	UIC	UA/UC	CBSA	FAR
HRSA	56,860,884	100	87	89	23	12	64	32	21
CDC	75,517,281	65	100	58	17	9	54	24	16
RUCA	50,827,445	100	86	100	24	13	61	30	23
RCC	12,839,851	100	100	94	100	54	78	67	56
UIC	6,897,898	100	100	98	100	100	79	96	66
UA/UC	73,256,242	49	56	42	14	8	100	20	11
CBSA	18,209,930	98	98	84	47	36	80	100	28
FAR	11,977,592	100	98	99	60	38	66	43	100

Rows are used as the “base” population for calculating agreement, e.g., 87% of the rural population identified by the HRSA definition was also identified in the CDC definition, while 65.2% of the rural population identified by the CDC definition was also identified in the HRSA definition

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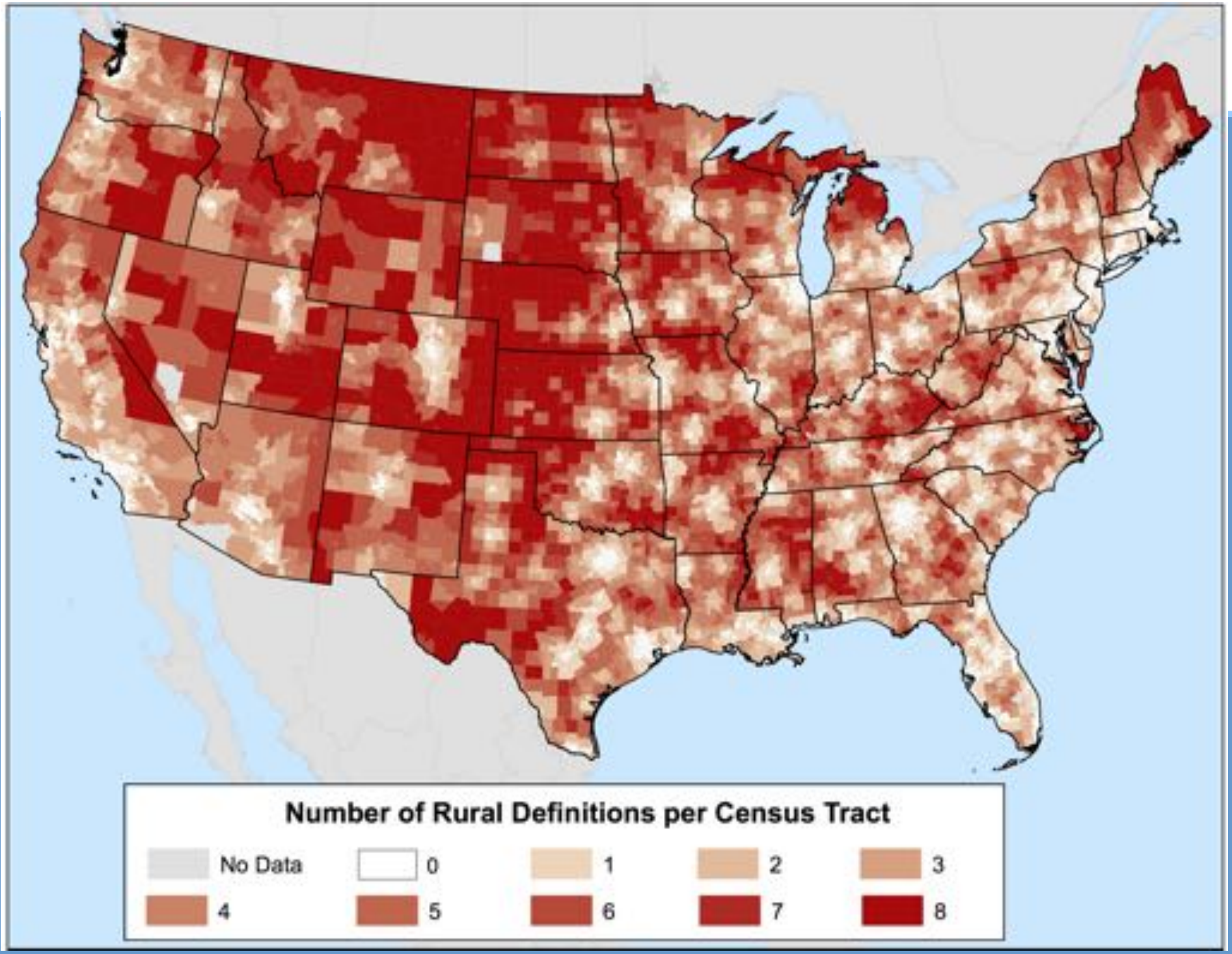
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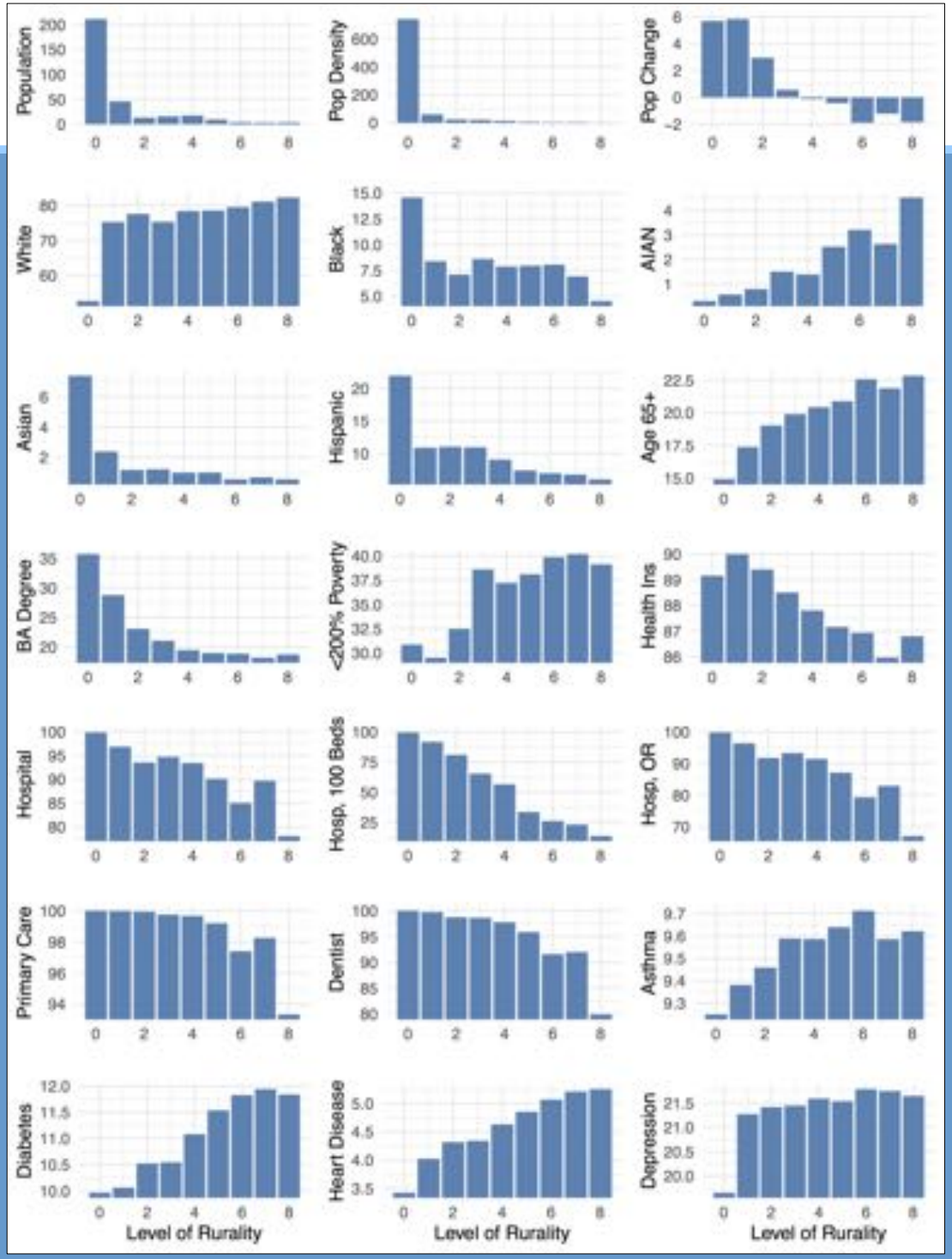
Population
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Black
AIAN
Asian
Hispanic
Age 65+
BA Degree
<200% Poverty
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Hosp, 100 Beds
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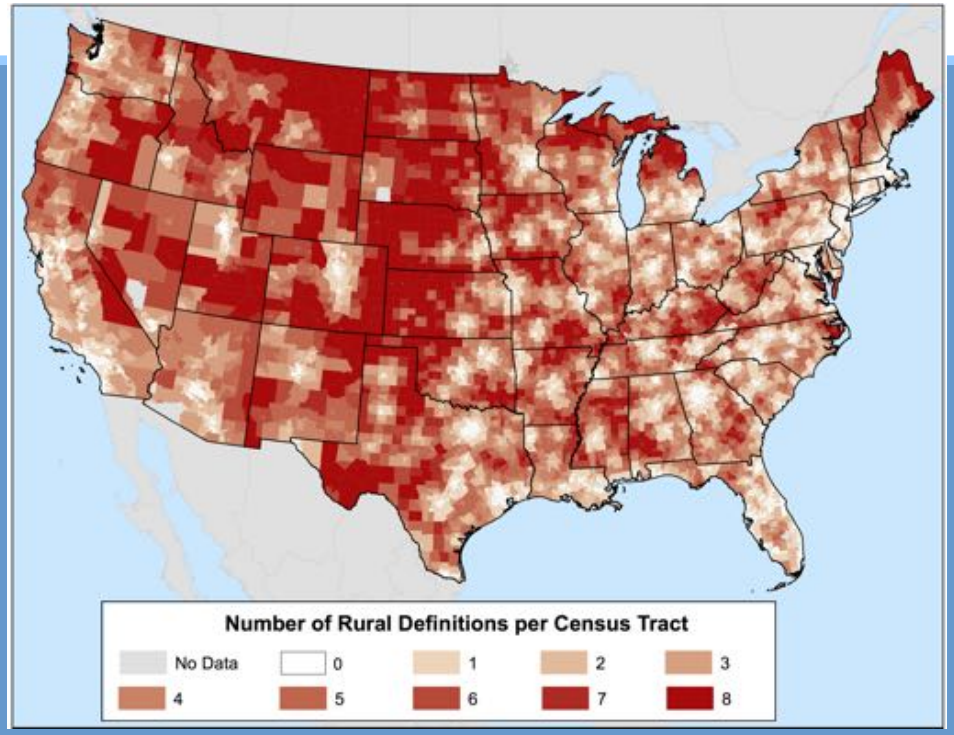
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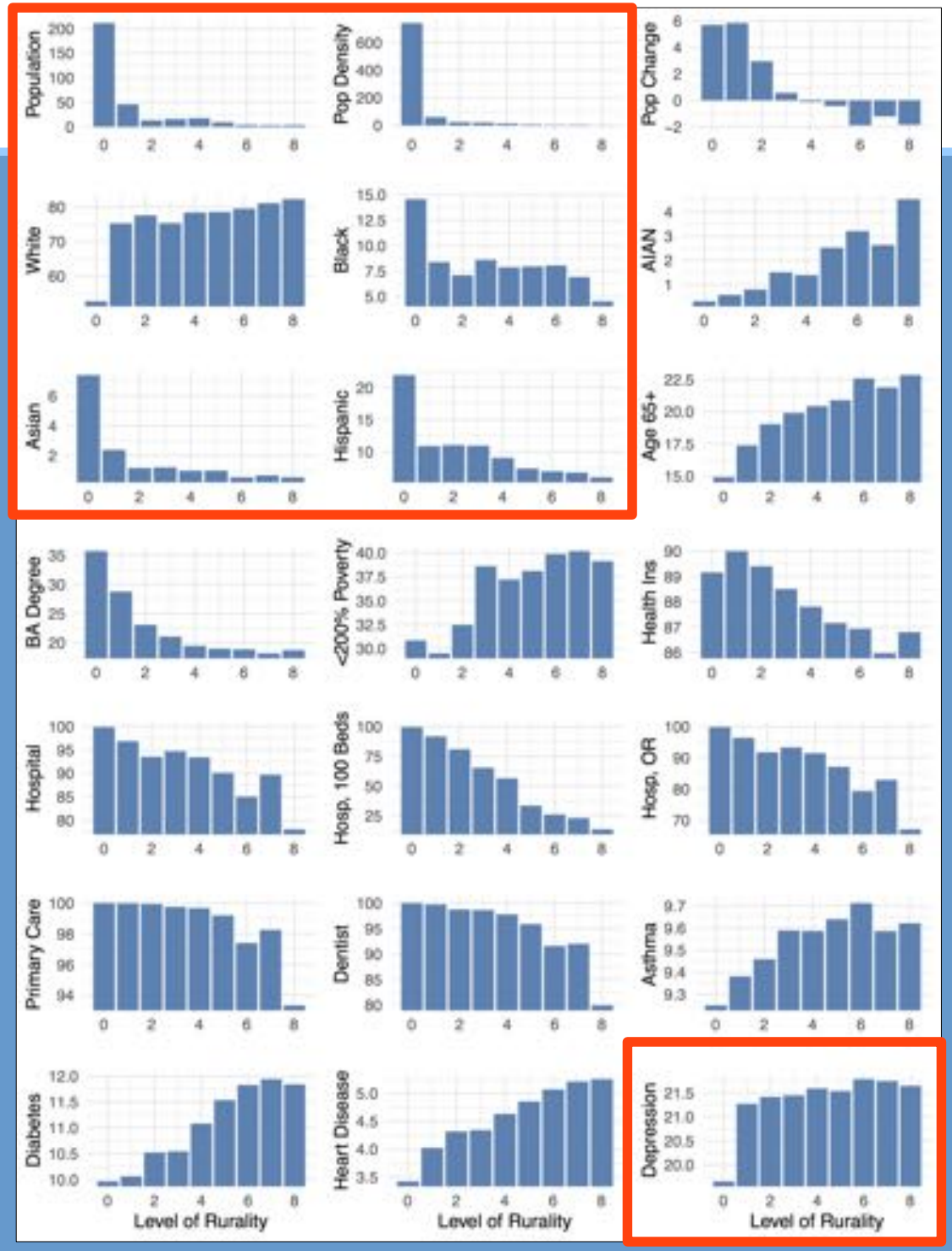
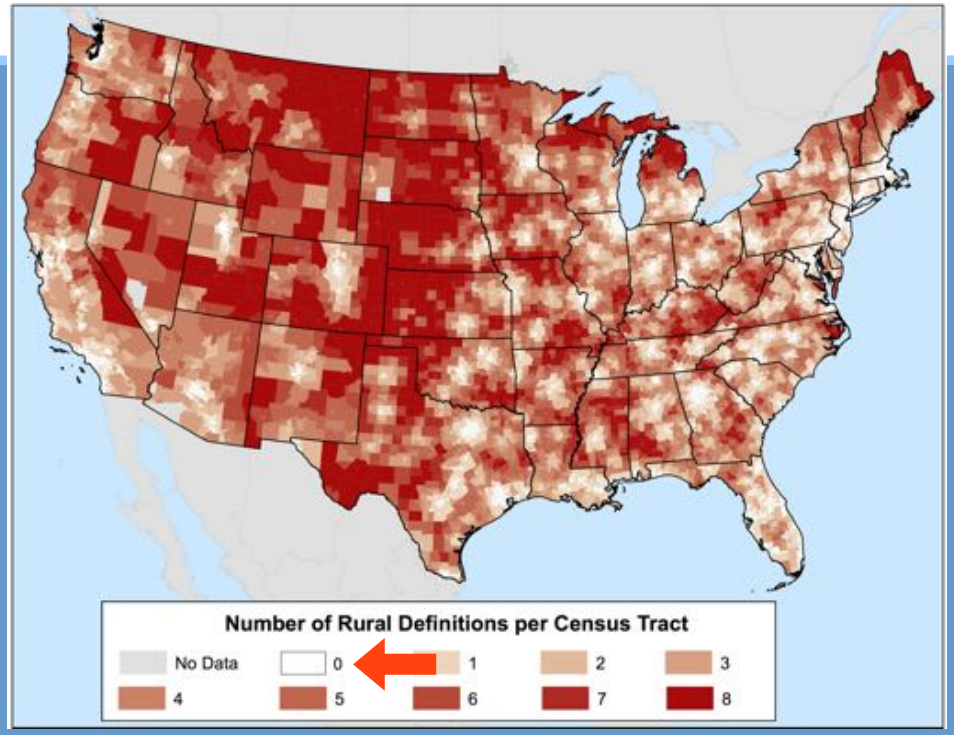
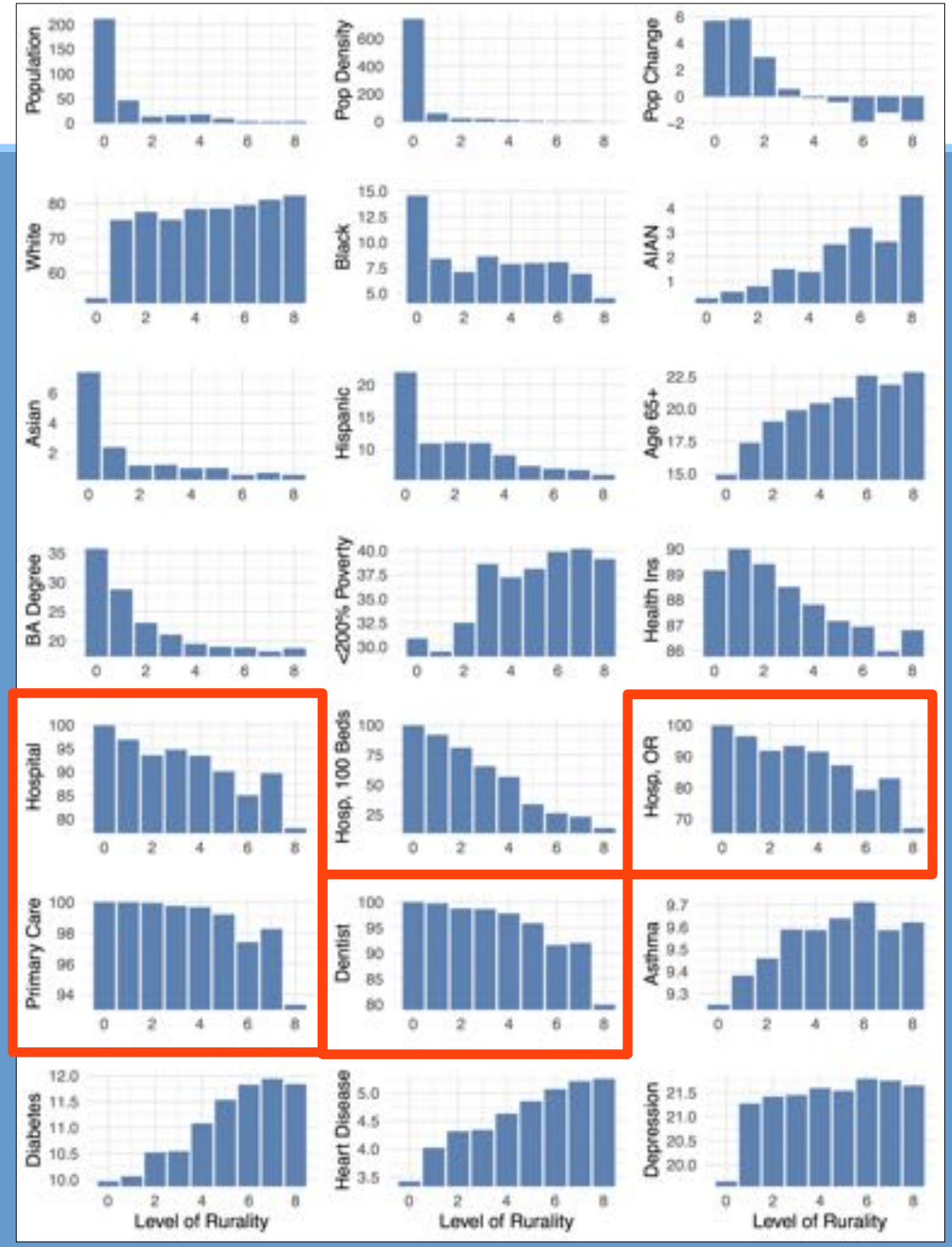
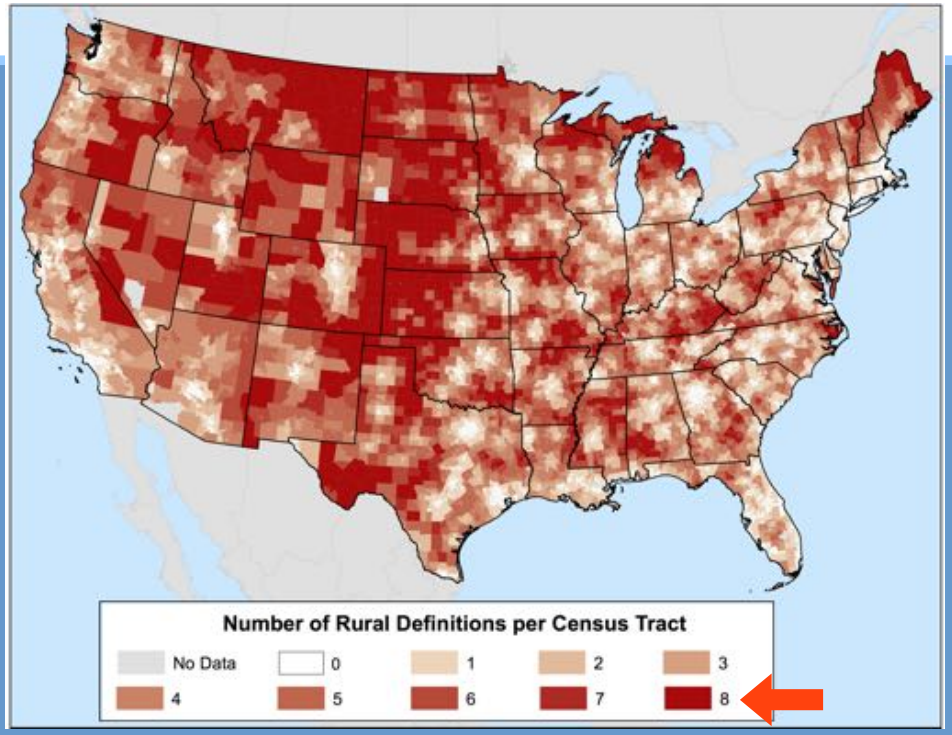


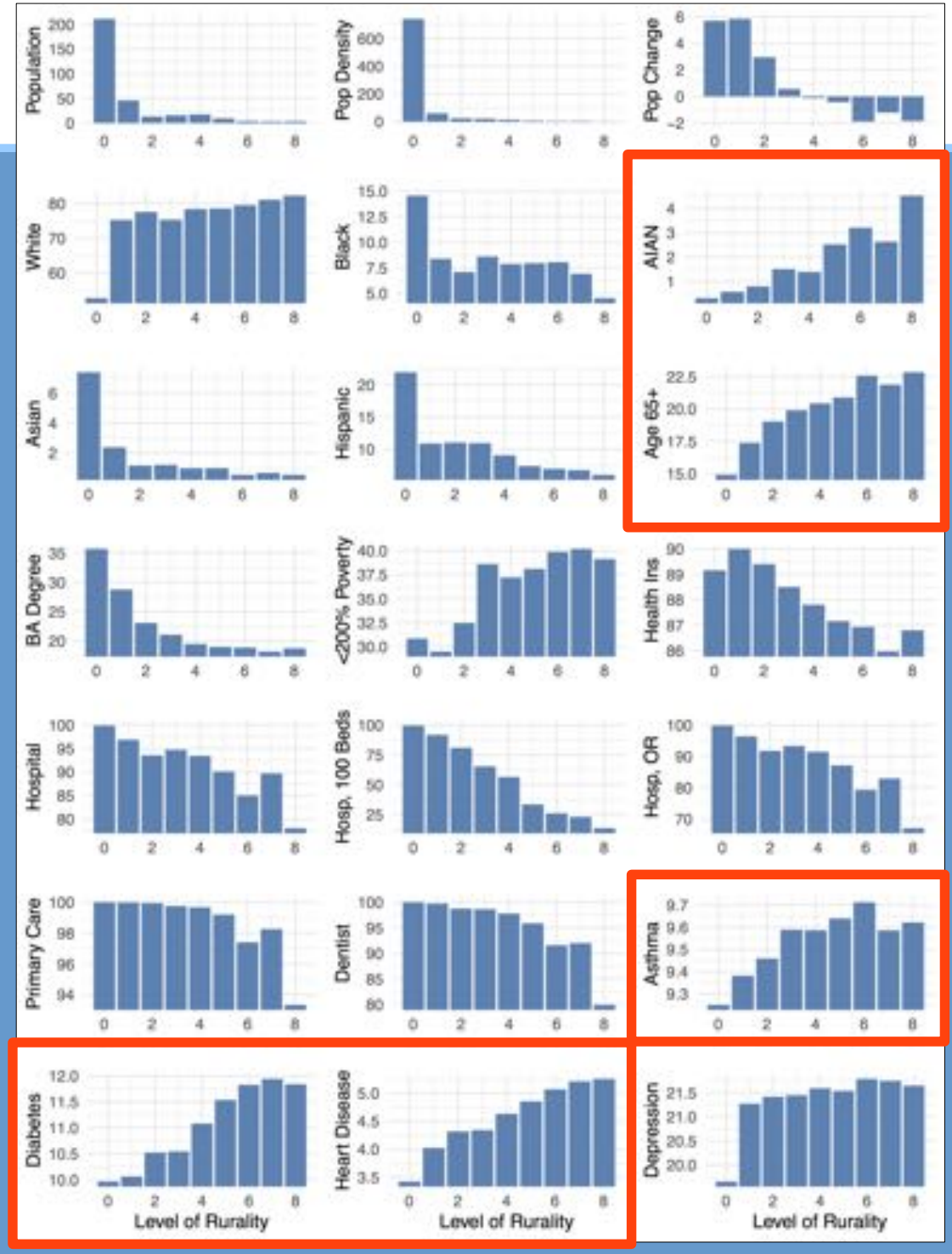


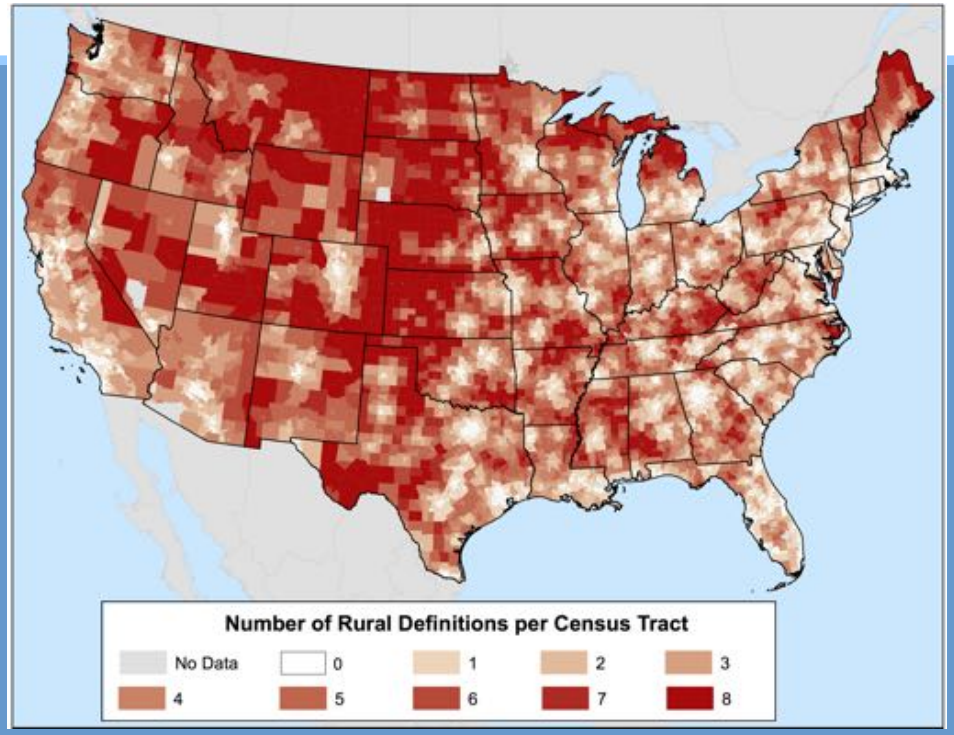
Most Urban cliff/ledge



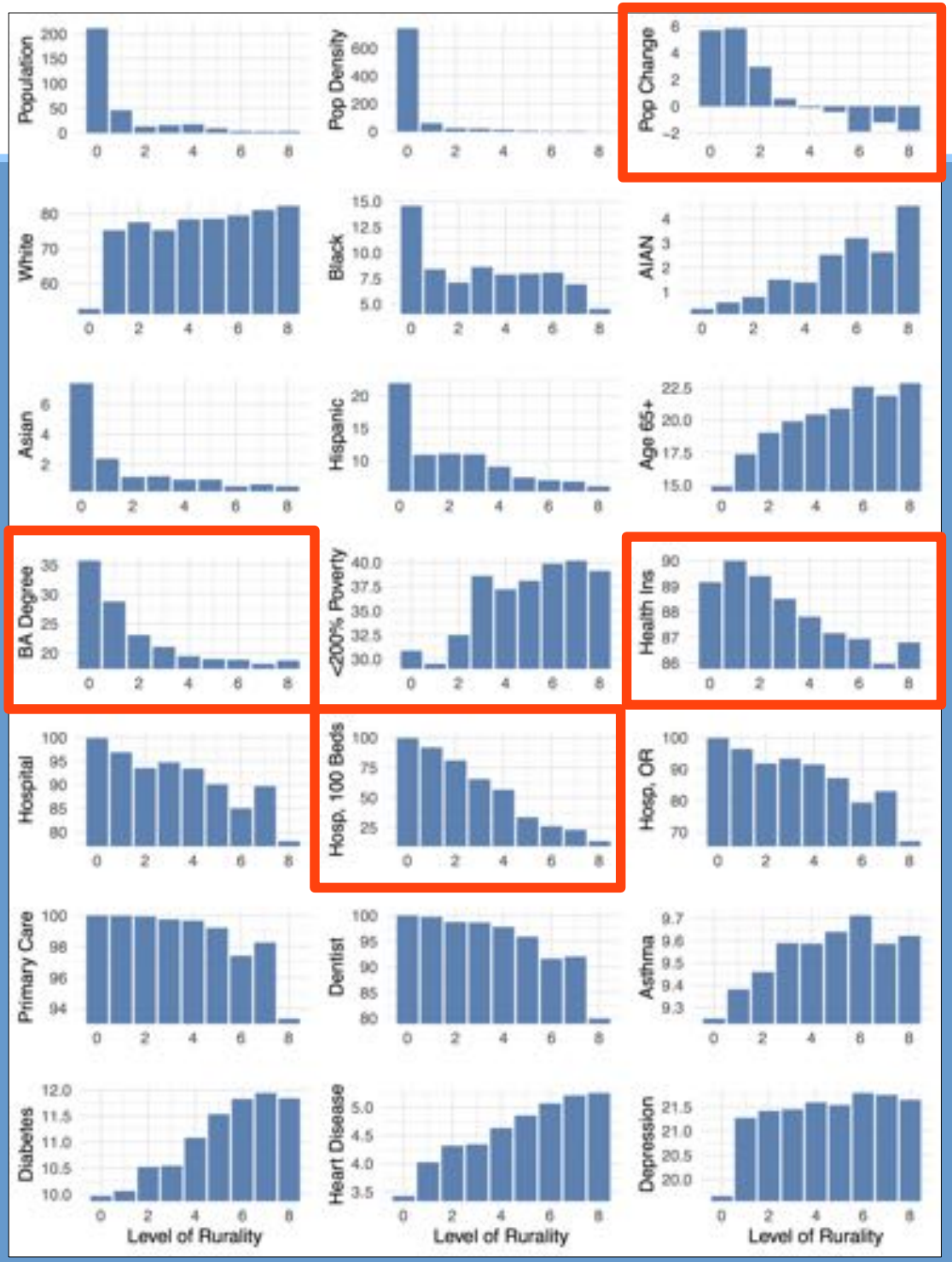


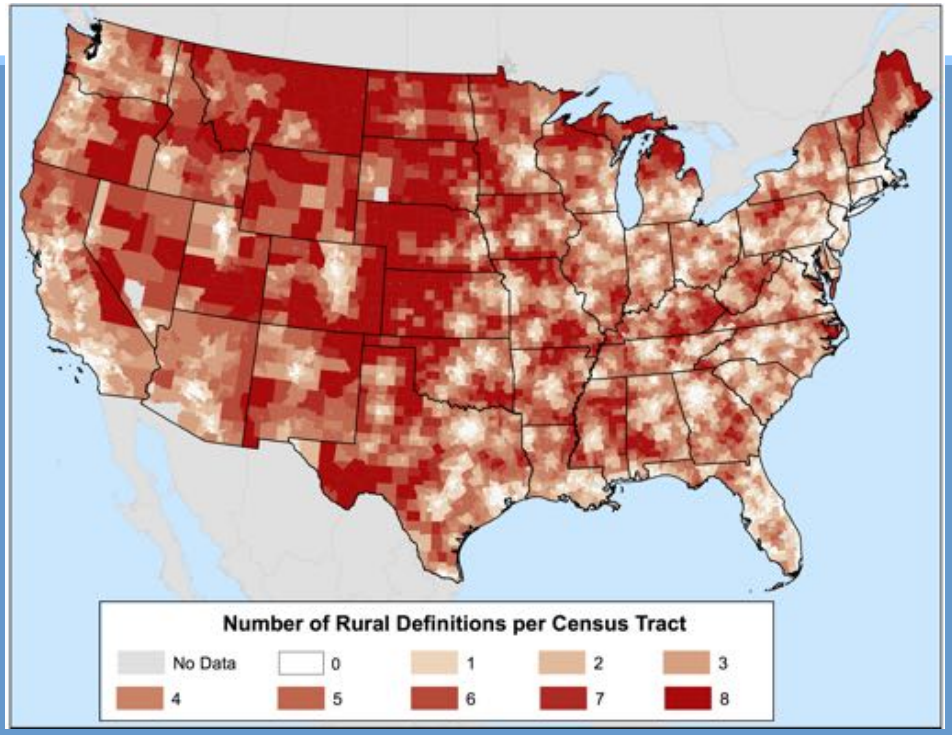
Most Rural cliff/ledge





Gradual Increase





Gradual Decrease

Definition	BA Degree	<200% Poverty	Pop Change	Pop Density
UA/UC	-10.3	-1.1	-2.3	-6.8
CBSA ←	-14.2	7.9	-6.5	-5.6
CDC	-11.4	7.0	-4.8	-5.9
RCC ←	-12.5	7.7	-6.1	-5.4
UIC ←	-12.7	7.9	-6.5	-5.3
RUCA	-13.0	7.7	-5.6	-5.8
HRSA	-13.5	7.5	-5.7	-6.0
FAR ←	-10.0	7.0	-4.8	-5.1

Difference between urban and rural populations

Definition	Health Ins	Hospital	Hosp, 100 beds	Dentist	Primary Care
UA/UC	0.3	-8.7	-31.5	-3.2	-0.7
CBSA ←	2.6	-10.8	-69.2	-7.4	-1.9
CDC	1.2	-5.2	-32.8	-2.8	-0.7
RCC ←	2.2	-11.7	-64.6	-9.2	-2.7
UIC ←	2.6	-13.4	-71.0	-12.4	-3.8
RUCA	1.6	-6.4	-47.1	-3.9	-1.0
HRSA	1.7	-7.7	-48.2	-4.0	-1.0
FAR ←	1.9	-12.4	-57.6	-10.4	-3.4

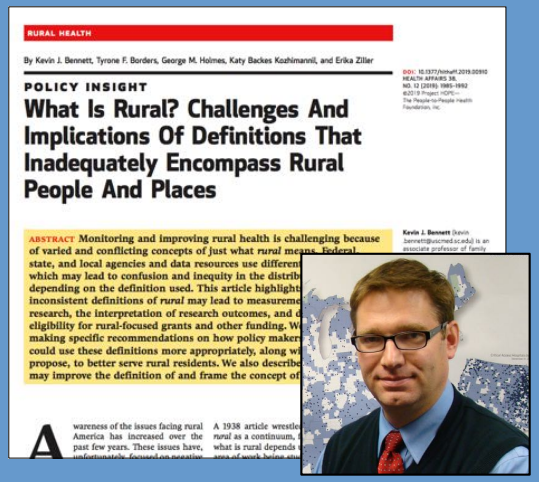
Difference between urban and rural populations

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



RURAL HEALTH

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

POLICY INSIGHT

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

ABSTRACT Monitoring and improving rural health is challenging because of varied and conflicting concepts of just what *rural* means. Federal, state, and local agencies and data resources use different … which may lead to confusion and inequity in the distrib… depending on the definition used. This article highlight… inconsistent definitions of *rural* may lead to measureme… research, the interpretation of research outcomes, and … eligibility for rural-focused grants and other funding. W… making specific recommendations on how policy maker… could use these definitions more appropriately, along wi… propose, to better serve rural residents. We also describe… may improve the definition of and frame the concept of …

Awareness of the issues facing rural America has increased over the past few years. These issues have, unfortunately, focused on negative …

A 1938 article wrestle… *rural* as a continuum, … what is rural depends … area of work being …

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

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Definitions

DEFINTION	AGENCY	TYPE	UNIT	DECISION	NOTES
Rural-Urban Commuting Areas (RUCAs)	USDA	Continuous	Census Tract	Values greater than or equal to 4 were considered rural.	10 categories spanning urban metropolitan to rural non-metro. Incorporates population and commuting data as a proxy for 'connectedness'.
Core-Based Statistical Areas (CBSAs)	OMB	Binary	Variable, typically counties	Nonmetro counties were considered rural.	Can include one or more counties – based in census geography, but not consistent.
Urban Areas/Urban Clusters (UAs/UCs)	Census Bureau	Binary	Variable	Tracts that did not have their population-weighted centroid inside of an UA/UC were considered rural.	The Census Bureau defines UAs/UCs each decennial census, and anywhere not inside these areas is considered rural.
Federal Office of Rural Health Policy (FORHP)	HRSA	Binary	Census	N/A	The FORHP definition we used includes nonmetro counties AND RUCAs greater than or equal to 4.
National Center for Health Statistics Rural Classification Scheme	CDC	Binary	Census	N/A	
Rural-Urban Continuum Codes (RCCs)	USDA	Continuous	Census	Values greater than or equal to 7 were considered rural.	9 categories spanning urban metropolitan to rural non-metro.
Urban Influence Codes (UICs)	USDA	Continuous	Census	Values greater than or equal to 9 were considered rural.	12 categories spanning urban metropolitan to rural non-metro.
Frontier and Remote Access Codes (FAR Codes)	USDA	Continuous	ZIP Code	Any tracts with their population-weighted centroid inside of a ZIP code classified under any of the four FAR categories were considered rural.	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.

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