

Which definition of rurality should I use?

The Relative Performance of 8 Federal Rural Definitions in Identifying Rural-urban Disparities

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Health Equity Seminar Series

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What is Rural?

- Concept of rural
 - Attribute of a place or the residents of a place
 - Population and/or population density
 - Distance and/or isolation
 - Physical landscape
 - Economic connectedness

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, roughly 20% of the US popula-

periences. The term suggests pastoral landscapes, unique demographic structures and settlement patterns, isolation, low population density, extractive economic activities, and distinct sociocul-

turally to the situation at hand can we discern differences in health care concerns and outcomes across rural areas and between rural and urban locales. The definition of rurality used for one

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.

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-

tion 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-

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.

Hart, L. G., Larson, E. H., & Lishner, D. M. (2005). Rural Definitions for Health Policy and Research. *American Journal of Public Health, 95*(7), 1149–1155. <https://doi.org/10.2105/AJPH.2004.042432>

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
- 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

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

DOI: 10.1377/hlthaff.2019.00910
HEALTH AFFAIRS 38,
NO. 12 (2019): 1985-1992
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The People-to-People Health
Foundation, Inc.

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

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

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.

Why Important?

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

Am I Rural?

Our Study

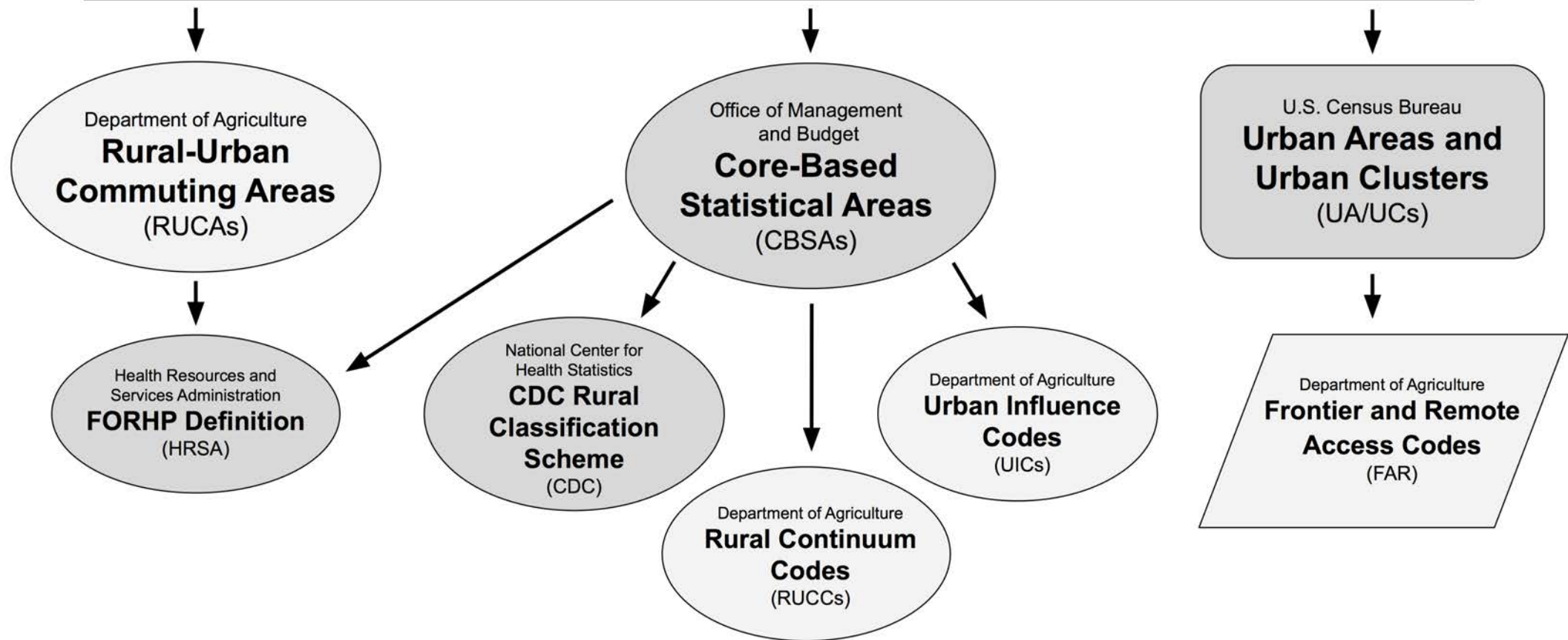
- Main goals
 - Evaluate the extent of agreement among federal definitions of rural
 - Evaluate how population characteristics vary across the definitions

Definitions of Rural

- USDA Economic Research Service
 - Rural Urban Commuting Areas (RUCAs)
 - Rural-Urban Continuum Codes (RCCs)
 - Urban Influence Codes (UICs)
 - Frontier and Remote Access Codes (FAR)
- Federal Office of Rural Health Policy (HRSA)
- National Center for Health Statistics (CDC)
- Core-Based Statistical Areas (CBSA) from OMB
- Urban Areas/Urban Clusters (UA/UC) from the Census Bureau

8

Census Data



○ = Census Geography

□ = Variable Geography

▭ = ZIP Code Geography

Light shading indicates a multi-level definition.
Dark shading indicates a dichotomous definition.

Data Preparation

- Constructed binary, census tract-level layers for each rural definition
 - Converted multi-level measures to binary
 - Based on suggested (or recommended or accepted) use and literature
 - $UIC \geq 9$, $RCC \geq 7$, $RUCA \geq 4$
 - Required some GIS processing
 - Mismatching geographic units

Data Preparation

- **Rurality Agreement**
 - Number of times identified as being rural for each tract out of 8 definitions
 - 0 = never identified as rural
 - 8 = always identified as rural
 - **Consensus of rurality, not magnitude of rurality**
 - 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 agreement

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	←	100	58	17	9	54	24	16
RUCA	50,827,445	100	86	100	24	13	61	30	23
RCC	12,839,851	←	100	94	100	54	78	67	56
UIC	6,897,898	←	100	98	100	100	79	96	66
UA/UC	73,256,242	←	56	42	14	8	100	20	11
CBSA	18,209,930	98	98	84	47	36	80	100	28
FAR	11,977,592	←	98	99	60	38	66	43	100

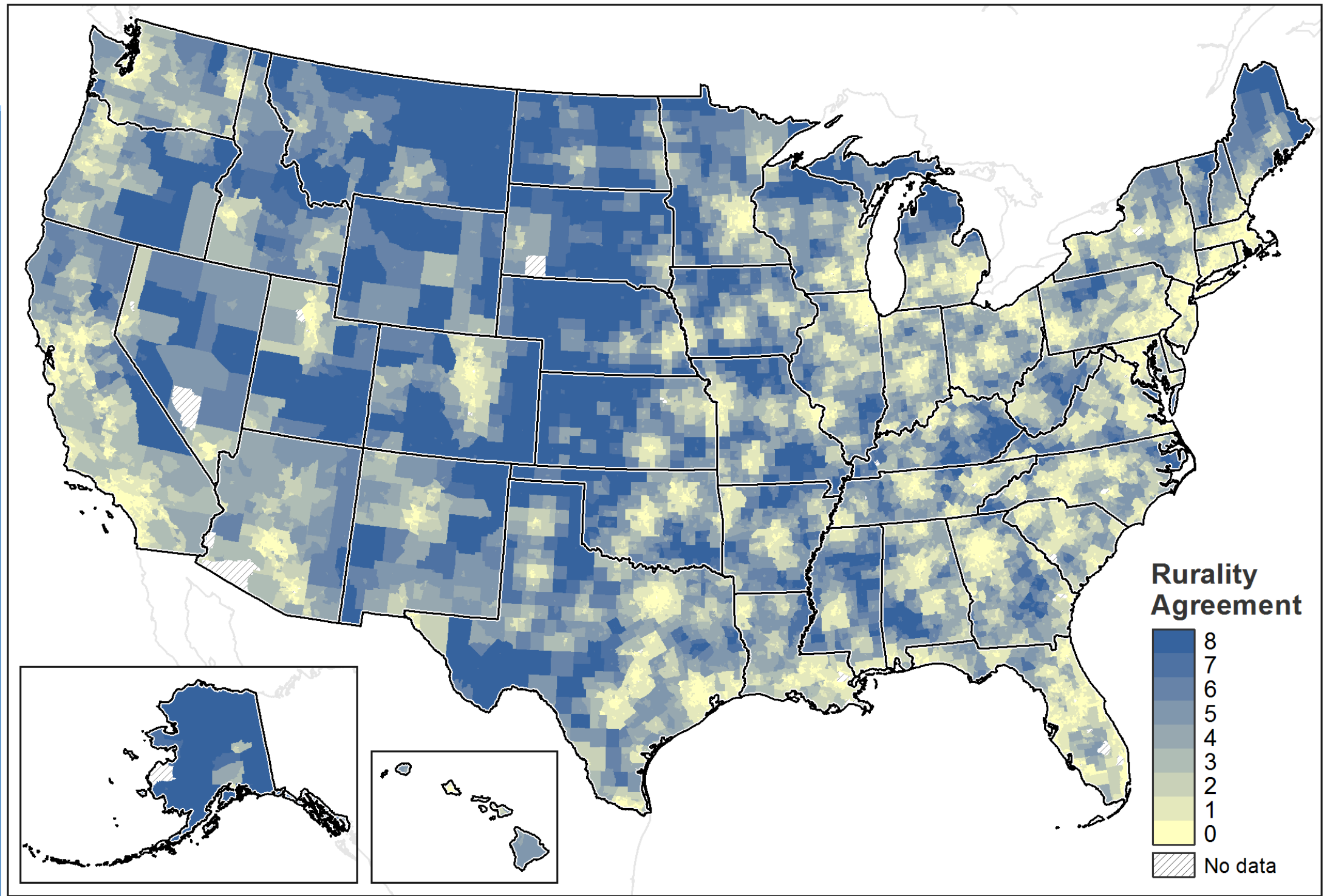
- Substantial differences in the number of rural dwellers

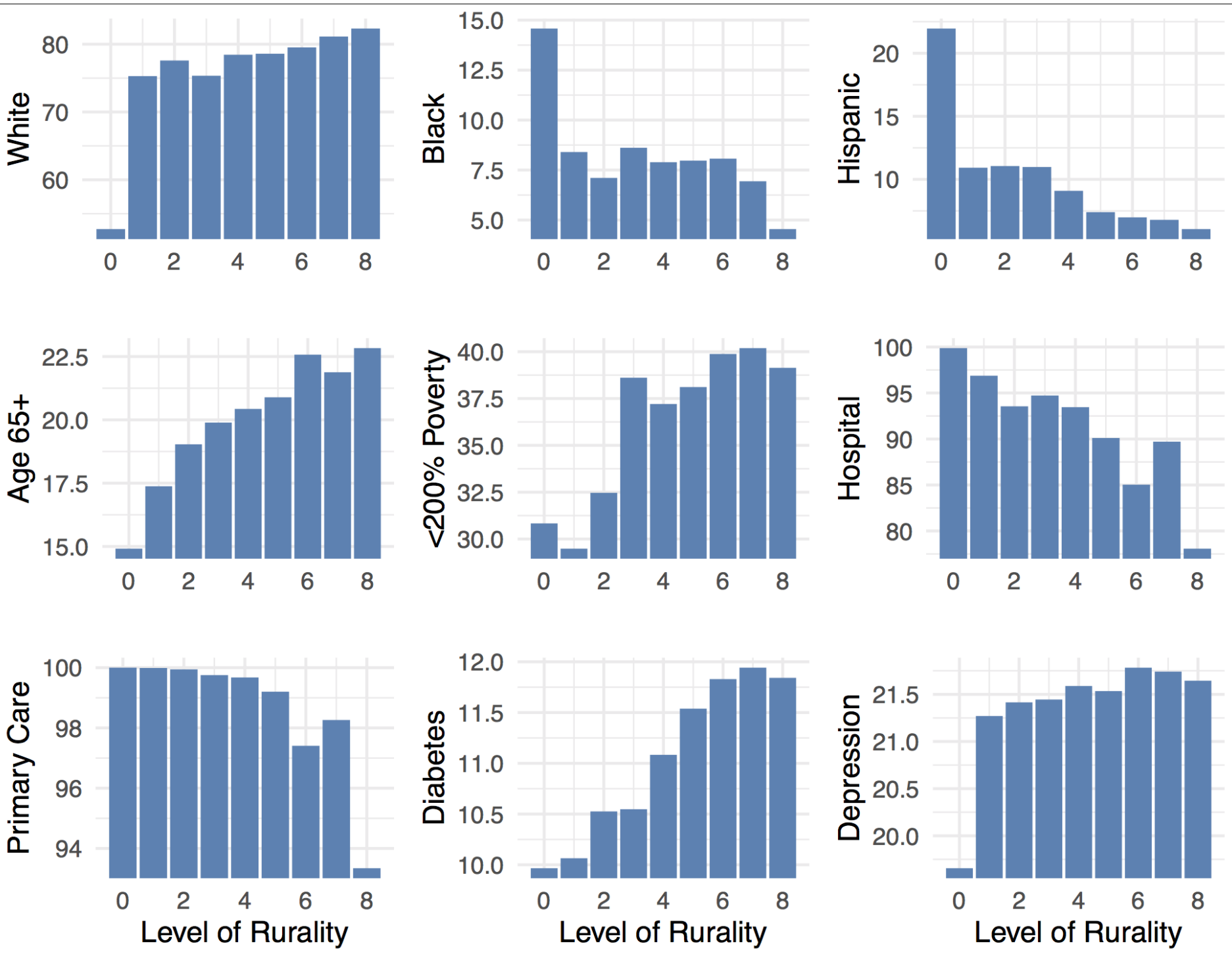
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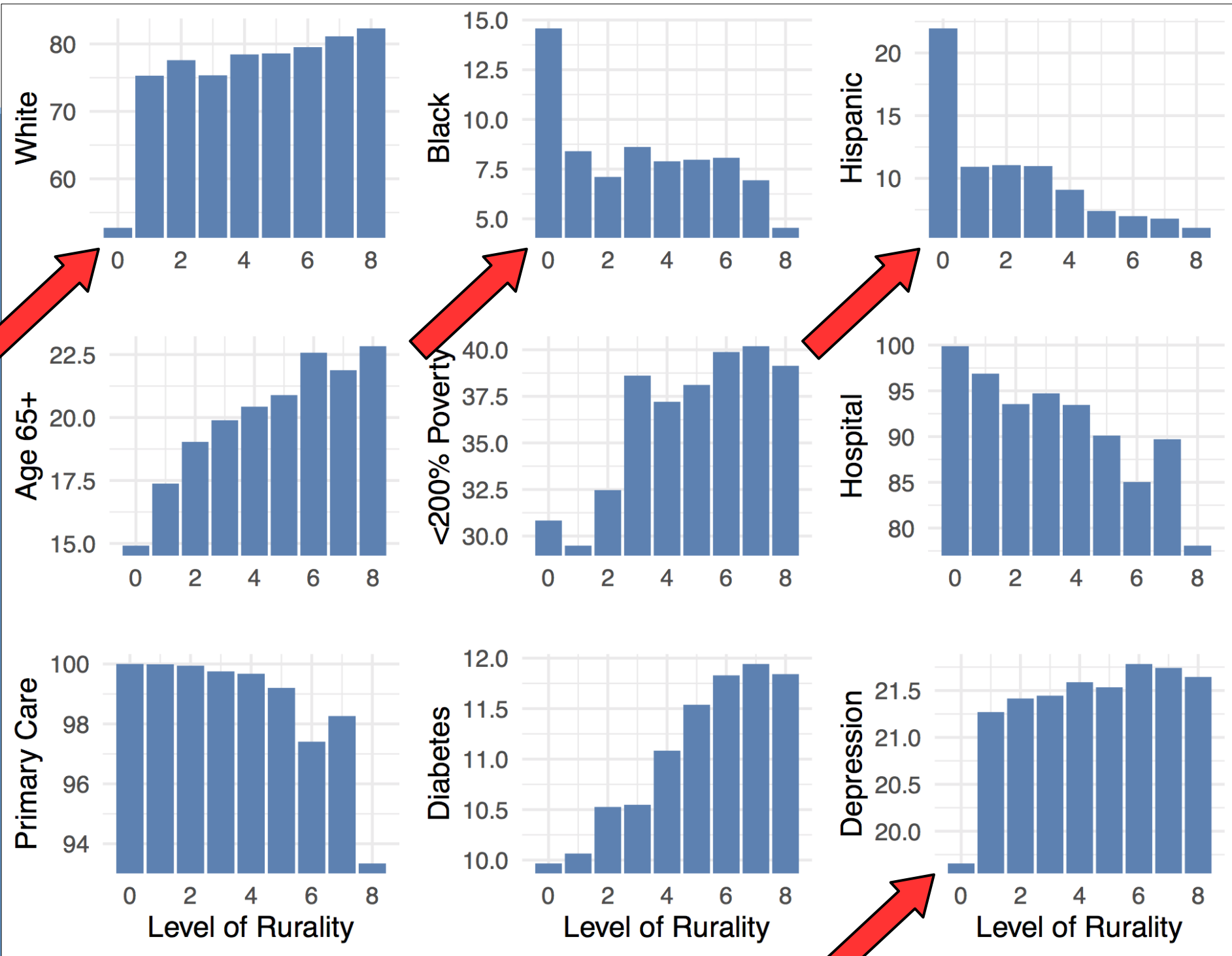
Rows are used as the “base” population for calculating agreement, e.g., 87% of the rural population identified by the HRSA definition was also identified in the CDC definition, while 65.2% of the rural population identified by the CDC definition was also identified in the HRSA definition

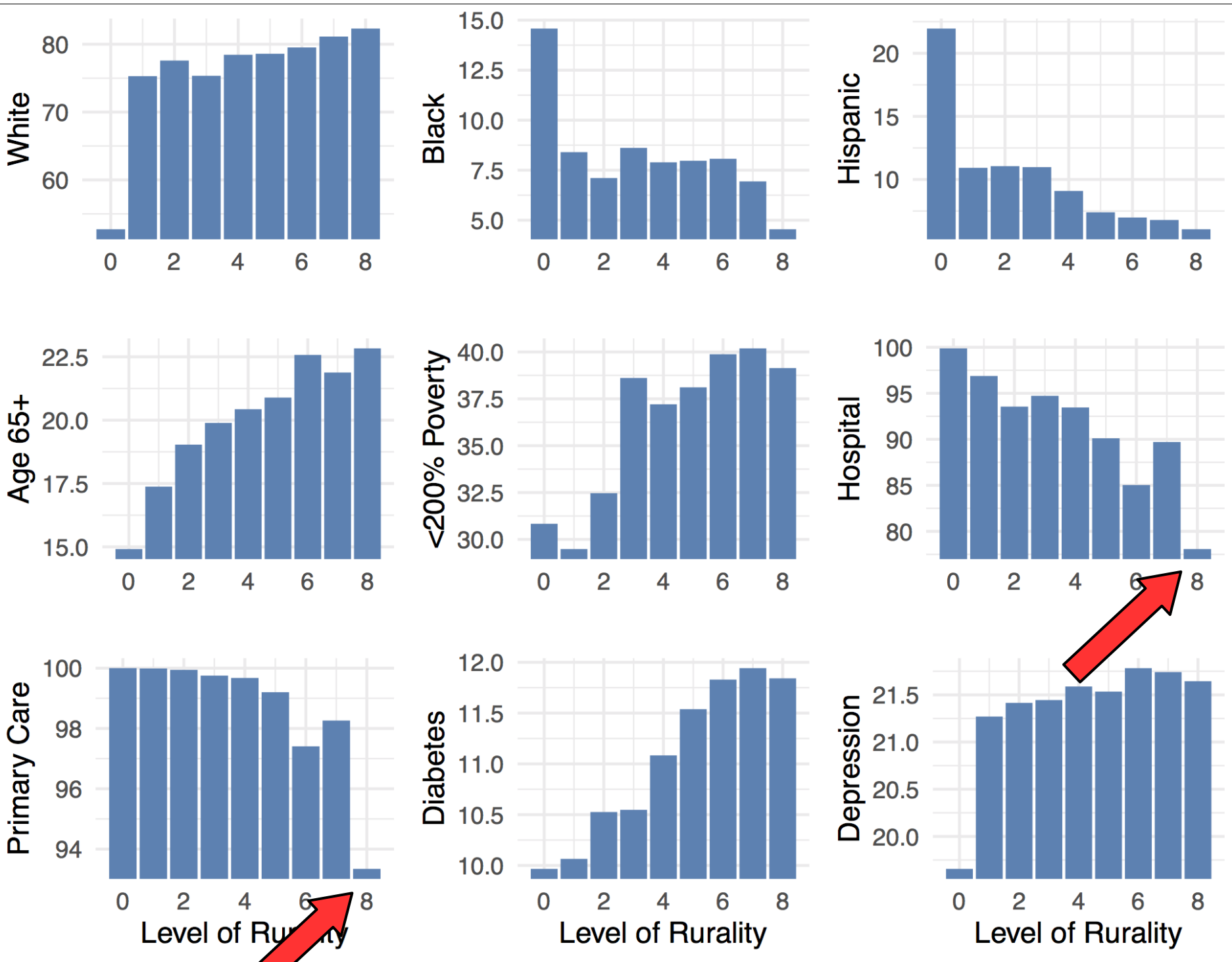
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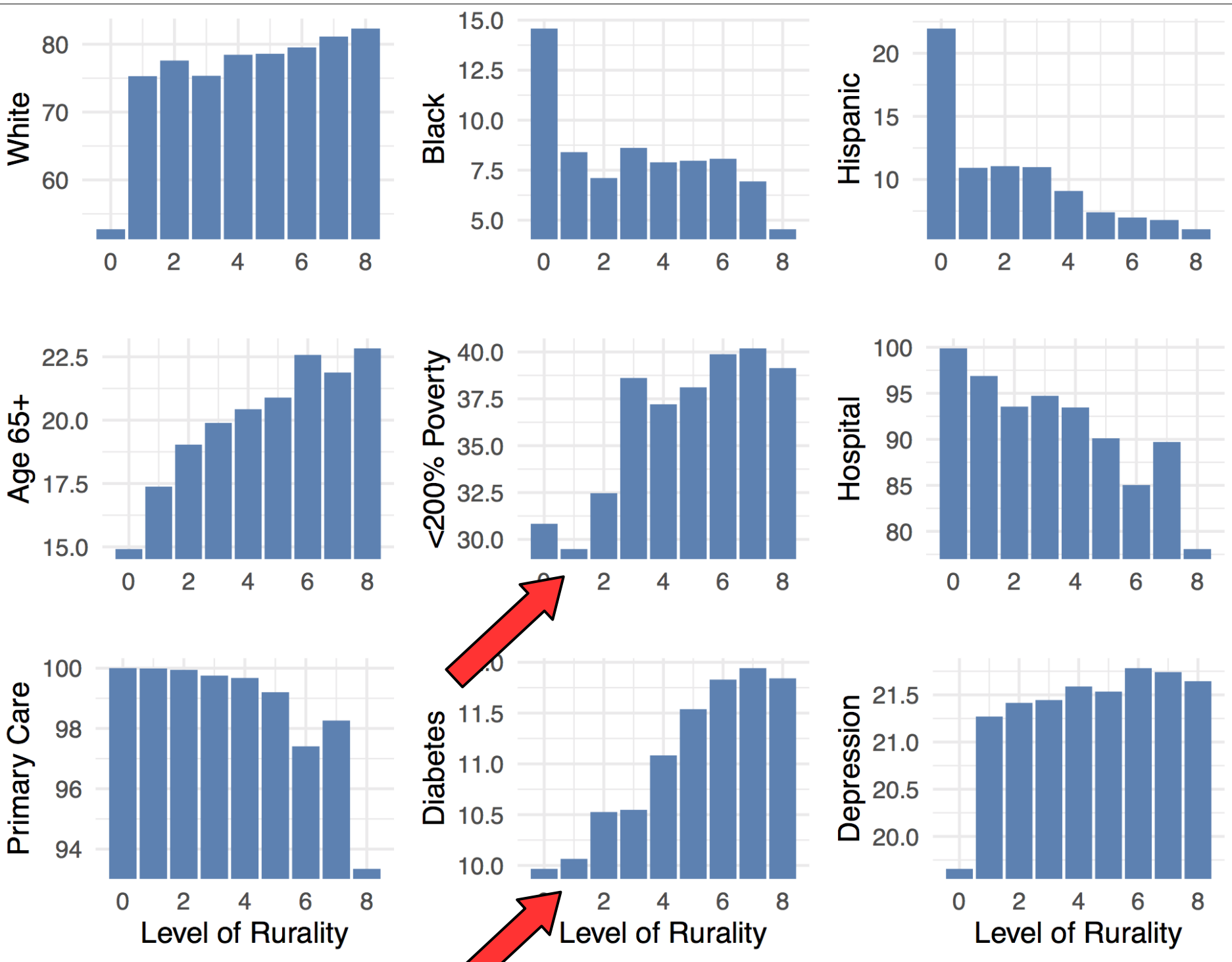


TABLE 2. Differences in Weighted Averages of Measures by Various Definitions of Rurality

Definition Rural Definition	Population Characteristics					Percent Within 30 min of			
	BA Degree	< 200% Poverty	Pop Change	Pop Density	Health Ins	Hospital	Hosp, 100 Beds	Dentist	Primary Care
CDC	-11.43	7.01	-4.85	-5.93	1.16	-5.25	-28.99	-32.845	-2.81
UA/UC	-10.30	-1.07	-2.28	-6.78	0.27	-8.71	-29.76	-31.55	-3.18
HRSA	-13.51	7.48	-5.69	-5.95	1.65	-7.71	-40.50	-48.15	-4.04
RUCA (≥ 4)	-12.95	7.73	-5.57	-5.76	1.60	-6.45	-39.07	-47.08	-3.86
CBSA	-14.18	7.91	-6.48	-5.55	2.56	-10.77	-52.91	-69.21	-7.38
RCC (≥ 7)	-12.55	7.72	-6.14	-5.39	2.20	-11.71	-49.52	-64.60	-9.23
FAR	-10.02	7.04	-4.84	-5.12	1.89	-12.36	-42.59	-57.56	-10.43
UIC (≥ 9)	-12.68	7.91	-6.49	-5.35	2.59	-13.40	-55.42	-71.03	-12.38

The rows are given in decreasing number of the rural population.

Rural-urban differences in population characteristics by rural definition. All data represent differences in weighted averages of measures by various definitions of rurality. Measures include: “BA Degree” is the age +25 population with a bachelor’s degree (%); “< 200% poverty” is the population living in households with incomes < 200% of the federal poverty level; “Pop Change” is change in total population from 2010 to 2018 (%); “Pop Density” is population density (people/km²); “Health Ins” is the percentage of population age below 65 with health insurance; “Hospital” is people with 30-minute travel time access to an acute care hospital (%); “Hosp, 100 Beds” is 30-minute access to a hospital with at least 100 beds (%); “Primary Care” and “Dentists” are 30-minute access to a primary care physician and dentist respectively (%).

CBSA indicates Core-Based Statistical Area; CDC, Centers for Disease Control and Prevention; FAR, Frontier and Remote; HRSA, Health Resources and Services Administration; RCC, Rural Continuum Code; RUCA, Rural-Urban Commuting Area; UA/UC, Urban Area/Urban Cluster; UIC, Urban Influence Code.

The largest absolute difference are highlighted in dark gray.

The second-largest absolute difference are highlighted in light gray.

Notable Findings

- High variation in the size of the rural population among definitions
 - Some overlap in the people identified
- Rurality agreement was interesting and may even be useful
 - Another approach to consider
- Disparities vary by definition
 - Also consider size of rural population

Conclusions

- 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
- Suggestions
 - Use standard definitions
 - Consider your project/data

Thank You!

Questions or Comments?

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Who is Rural?

- In reality, rurality is a spectrum
 - Continuous approaches

The screenshot shows a web browser displaying the Purdue University Publications page for 'The Index of Relative Rurality (IRR): US County Data for 2000 and 2010'. The page features a navigation menu with 'Home', 'Datasets', 'Projects', and 'Help'. The main title is 'The Index of Relative Rurality (IRR): US County Data for 2000 and 2010'. Below the title, there is a 'Download Bundle (225 KB)' button and a '2 citation(s)' link. The authors listed are Brigitte Waldorf¹ and Ayoung Kim². The description states that the IRR is a continuous, threshold-free, and unit-free measure of rurality, designed as an alternative to traditional discrete threshold-based classifications. The page also includes a 'Description' section and a 'Check for updates' button.

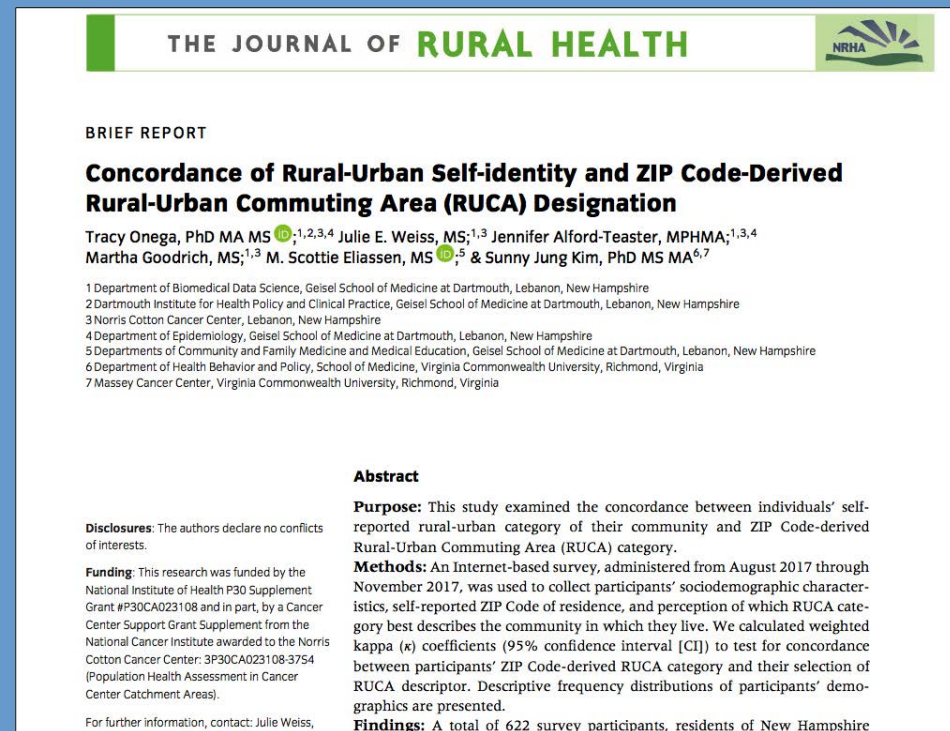
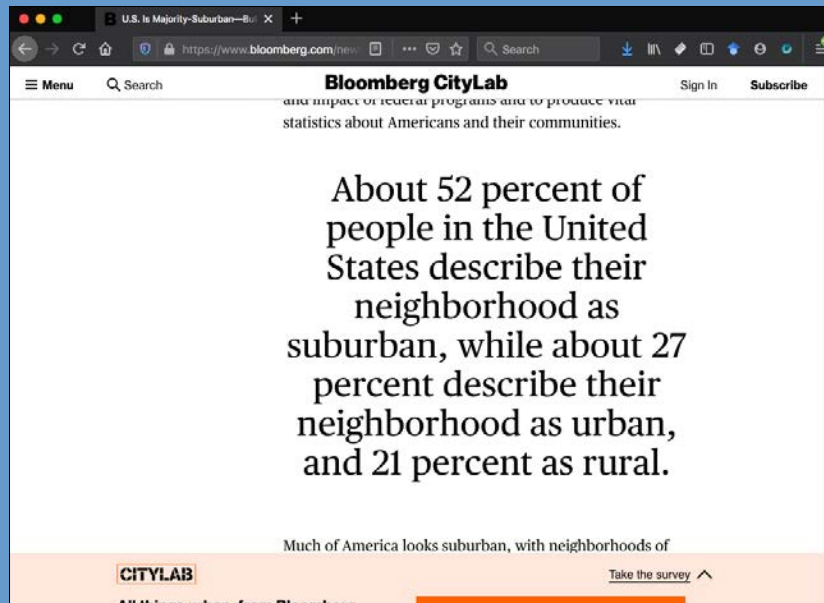
<https://purr.purdue.edu/publications/2960/1>

The screenshot shows the Elsevier journal page for 'Validation of a new continuous geographic isolation scale: A tool for rural health disparities research'. The page is from the journal 'Social Science & Medicine', volume 215 (2018), pages 123-132. The authors listed are Nathan J. Doogan^{a,*}, Megan E. Roberts^a, Mary Ellen Wewers^a, Erin R. Tanenbaum^b, Elizabeth A. Mumford^b, and Frances A. Stillman^b. The abstract states: '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.

Who *thinks* they are Rural?

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



Omega, 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.

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

Definitions

DEFINITION	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