



BRADBURY-SULLIVAN
LGBT COMMUNITY CENTER
*Serving the LGBT Community
of the Greater Lehigh Valley*

522 West Maple Street
at Bayard Rustin Way
Allentown, PA 18101
(610) 347-9988
BradburySullivanCenter.org

The Impact of Different Definitions of Rurality on HIV Funding Eligibility for Queer and Trans Pennsylvanians

Authors

Olivia A. Sullivan, DrPH(c), MPH, EMT^{1,2,3}, Roo Parkhe⁴, Christina Graham, MPH¹, Chrystina Obleschuk, MPH¹, Kayla Simon, MPH¹, Kailyn Jones¹, Jennifer Keith, MPH⁴, Susan McLain, MPH⁵

Affiliations

¹ Bradbury-Sullivan LGBT Community Center

² Department of Community and Behavioral Health, College of Public Health, East Tennessee State University

³ Center for Rural Health Research, College of Public Health, East Tennessee State University

⁴ Research & Evaluation Group at Public Health Management Corporation

⁵ Pennsylvania Department of Health

Key Takeaways

- Funding for HIV prevention, testing, and treatment is often provided specifically to rural areas.
- Defining “rurality” can be challenging, and multiple definitions of rurality exist in the United States at both the federal and state level.
- The definition of rurality used at the county level significantly changes which counties in Pennsylvania are considered “rural,” as well as who is eligible for rural-specific funding opportunities in the Commonwealth of Pennsylvania.
- In Pennsylvania, care must be taken by funders in specifying their chosen definition of rurality, as well as by community organizations, local health departments, and others applying for grants in understanding how rural definitions apply to them so opportunities to submit applications for funding are not missed as part of efforts to equitably improve the health of queer and trans Pennsylvanians.

Bradbury-Sullivan LGBT Community Center is registered as a 501(c)3 non-profit organization as defined by IRS regulations. A copy of official registration and financial information may be obtained from the Pennsylvania Department of State by calling toll-free, within Pennsylvania, 1-800-732-0999. Registration does not imply endorsement.



Introduction

In the United States, over one million people were living with HIV as of 2021, and 13% of these people are estimated to not know their HIV status.¹ Disparities in HIV prevention, testing, and treatment exist by sex, sexual orientation, race and ethnicity, and location.¹ This is true for rural areas compared to urban areas of the United States. Stigma is often more prevalent in rural areas than in urban areas, potentially due to a lack of knowledge about HIV.² Healthcare providers in rural areas may not be as comfortable or competent in offering prevention, testing, and treatment for HIV as urban healthcare providers.³ People in rural areas report barriers in access to both care and medications for HIV, as well as for comorbidities.⁴ Among cisgender lesbian women, one study found no significant difference between rural and urban lesbians in HIV screening behaviors; however, rural lesbians reported more risk factors for contracting HIV.⁵ Similarly, among rural men who have sex with men, risk factors for contracting HIV are often more prevalent than among their urban counterparts.^{6,7}

Given these geographic disparities, many organizations are paying increased attention to HIV in rural areas. Among other priorities, the “Ending the HIV Epidemic in the U.S.” initiative has identified seven states where HIV in rural areas is of particular concern.⁸ Additionally, specific HIV-related funding for rural areas is available from multiple government agencies.⁹⁻¹¹ However, each of the over 15 definitions of “rural” used can differ dramatically from each other, meaning that many rural communities eligible for some of these grants are not eligible for others.¹² While this problem is well-known in the field of rural health, it is not clear what the impact of applying different definitions of rurality specifically to HIV prevention, testing, and treatment funding for rural areas in the commonwealth of Pennsylvania is, particularly for gender and sexual minorities, who are disproportionately affected by HIV. Therefore, the purpose of this brief report is to identify how the application of five different definitions of rurality affect eligibility for HIV funding at the county level in the commonwealth of Pennsylvania for gender and sexual minorities.

Methods

Data Collection

For this analysis, secondary data from five different publicly-available definitions of rurality were merged with data from the 2022 Pennsylvania LGBTQ Health Needs Assessment (2022 HNA).¹³⁻¹⁸

2022 Pennsylvania LGBTQ Health Needs Assessment (2022 HNA)

The biennial Pennsylvania LGBTQ Health Needs Assessment is conducted through a partnership between the Pennsylvania Department of Health, the Bradbury-Sullivan LGBT Community Center, and the Research & Evaluation Group at Public Health Management Corporation.¹³ For the 2022 HNA, data collection was completed between January and March of 2022. Respondent recruitment entailed a purposive, convenience, snowball sampling scheme, facilitated by partnerships with queer and trans community-based organizations in both English and Spanish. The deidentified 2022 HNA dataset was provided to the first author for analysis.

Definitions of Rurality



The smallest available unit of geography in the deidentified 2022 HNA dataset was the county of respondent residence. Therefore, five county-level definitions of rurality were merged with 2022 HNA data. These definitions are described in more detail below; a summary can also be found in Table 1.

Office of Management and Budget (OMB)

This definition of rurality is national in scope, and published by the White House's Office of Management and Budget (OMB).¹⁴ The OMB defines rurality by both population and adjacency to a metropolitan area. Underlying data that informs the OMB definition includes the 2020 Census. The dichotomization of rurality is determined by assigning counties with a micropolitan area or neither a micropolitan nor metropolitan area as "rural" and those with a metropolitan area as "urban".

Federal Office of Rural Health Policy (FORHP)

This definition of rurality is national in scope, and published by the Health Resources and Services Administration's Federal Office of Rural Health Policy (FORHP).¹⁵ FORHP defines rurality by both population and adjacency to a metropolitan area. Underlying data that inform the FORHP definition include the 2010 Census, as well as the 2013 version of the OMB definition of rurality. FORHP defines counties eligible for rural-specific funding similarly to the OMB; however, counties designated by OMB as "urban" that are an "outlying county with no urbanized area population" are also considered eligible for rural-specific funding by the FORHP definition.

Urban Influences Codes (UIC)

This definition of rurality is national in scope, and is published by the United States Department of Agriculture Economic Research Service (USDA ERS).¹⁶ UICs define rurality by both population and adjacency to a metropolitan area. Underlying data that inform UICs include the 2010 Census and the 2006-2010 American Community Survey, as well as the 2013 version of the OMB definition of rurality. UICs range from 1 ("in large metro area of 1+ million residents") to 12 ("noncore not adjacent to metro or micro area and does not contain a town of at least 2,500 residents"). The commonly-used dichotomization of rurality for UICs is to group counties with codes 3-12 as "rural" and counties with codes 1-2 as "urban".

Rural-Urban Continuum Codes (RUCC)

This definition of rurality is national in scope, and published by USDA ERS.¹⁷ RUCCs define rurality by both population and adjacency to a metropolitan area. Underlying data that inform RUCCs include the 2020 Census and the 2016-2020 American Community Survey, as well as the 2023 version of the OMB definition of rurality. RUCCs range from 1 ("counties in metro areas of 1 million population or more") to 9 ("urban population of fewer than 5,000, not adjacent to a metro area"). The commonly-used dichotomization of rurality for RUCCs is to group counties with codes 4-9 as "rural" and counties with codes 1-3 as "urban".

Center for Rural Pennsylvania (CRP)

This definition of rurality is statewide in scope, and published by the Center for Rural Pennsylvania (CRP).¹⁸ CRP defines rurality by population density. Underlying data that inform the CRP definition includes the 2020 Census. The CRP definition dichotomizes rurality by assigning counties with a population density less than the state-level average of 291 people per square mile as "rural" and counties with a population density greater than the state-level average as "urban".



Table 1. Summary of Five County-Level Definitions of Rurality.			
Measure	Scope	Year Published	County-Level Rural/Urban Dichotomous Classification
OMB ¹⁴	National	2023	Rural counties: Micropolitan or Neither designation Urban counties: Metropolitan designation
FORHP ¹⁵	National	2021	Counties eligible for rural funding: Micropolitan or Neither designation; Metropolitan designation as an outlying county with no urbanized area population Ineligible counties: Metropolitan designation, are not an outlying county with no urbanized area population
UIC ¹⁶	National	2013	Nonmetropolitan counties: codes 3-12 Metropolitan counties: codes 1-2
RUCC ¹⁷	National	2024	Nonmetro counties: codes 4-9 Metro counties: codes 1-3
CRP ¹⁸	State	2022	Rural counties: <291 people per square mile Urban counties: >291 people per square mile

Data Analysis

After merging these datasets at the county level, descriptive statistics and multi-group tests for equality of proportions were calculated and conducted in R (v4.3.3, “Angel Food Cake”).¹⁹

Results

Analytic Sample

In total, the 2022 HNA contained 4,228 respondents. Of these, 4,205 reported their county of residence. 3,516 respondents reported both their county of residence and their HIV testing history. 983 of these respondents reported never having been testing for HIV in their lifetime. 179 of these respondents reported currently living with HIV.

Results by Definition of Rurality

Of the 67 counties in the commonwealth of Pennsylvania, between 45% (UIC; n=30) and 72% (CRP; n=48) were categorized as rural counties, depending on which definition of rurality was applied (Figure 1). This difference between the five definitions of rurality was significant at the $\alpha=0.05$ level ($X^2=12.9$, $df=4$, $p=0.012$).



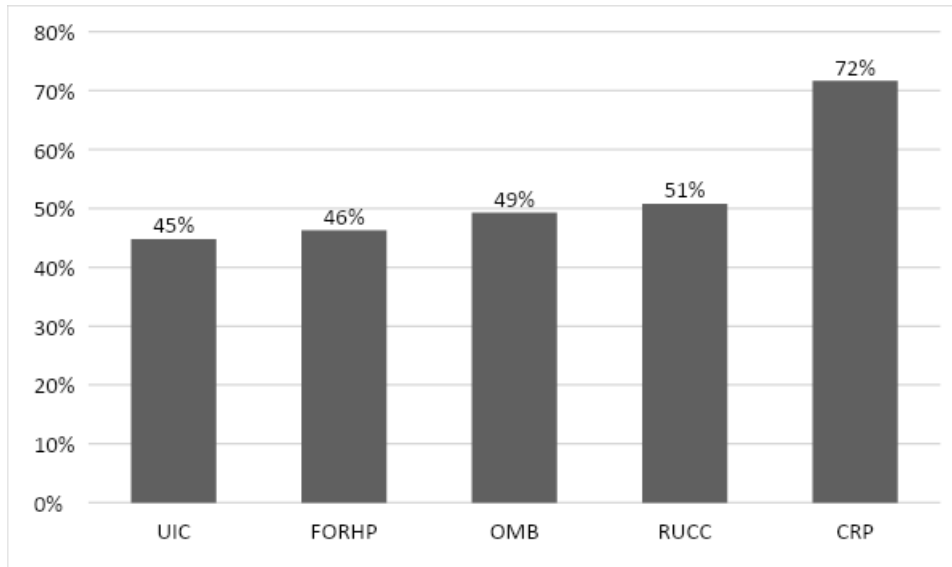


Figure 1. Percentage of counties classified as “rural” by definition of rurality.

When analyzing the results of the 2022 HNA, the percentage of respondents living in rural counties ranged from 4.6% (UIC; n=195) to 16.8% (CRP; n=706) among the 4,205 respondents that reported their county of residence. This difference between the five definitions of rurality was significant at the $\alpha=0.05$ level ($X^2=628.0$, $df=4$, $p<0.001$; Table 2).

Among the 983 respondents who reported never having been tested for HIV in their lifetime, the percentage of those living in rural counties ranged from 6.5% (UIC; n=64) to 18.5% (CRP; n=182). This difference between the five definitions of rurality was significant at the $\alpha=0.05$ level ($X^2=110.1$, $df=4$, $p<0.001$; Table 2).

Among the 179 respondents who reported currently living with HIV, the percentage of those living in rural counties ranged from 1.7% to 15.6%. This difference between the five definitions of rurality was significant at the $\alpha=0.05$ level ($X^2=52.1$, $df=4$, $p<0.001$; Table 2).

Definition	Percentage of Counties Designated Rural n (%) N=67	Percentage of Respondents in Rural Counties n (%) N=4,205	Percentage of Respondents Never Tested for HIV in Rural Counties n (%) N=983	Percentage of Respondents Living with HIV in Rural Counties n (%) N=179
UIC	30 (45)	195 (4.6)	64 (6.5)	3 (1.7)
FORHP	31 (46)	206 (4.9)	67 (6.8)	4 (2.2)
OMB	33 (49)	252 (6.0)	83 (8.4)	5 (2.8)
RUCC	34 (51)	252 (6.0)	85 (8.6)	5 (2.8)
CRP	48 (72)	706 (16.8)	182 (18.5)	28 (15.6)
Significance Testing	$X^2=12.9$, $df=4$, $p=0.012$	$X^2=628.0$, $df=4$, $p<0.001$	$X^2=110.1$, $df=4$, $p<0.001$	$X^2=52.1$, $df=4$, $p<0.001$



Discussion

At each of the four levels of analysis, the definition of rurality used at the county level significantly impacted which counties – and their residents – would be eligible for rural-specific funding. The CRP definition of rurality in particular is drastically more inclusive than the four definitions that are national in scope. This is due to the fact that the population density of each county is only measured against the commonwealth average of 291 people per square mile, rather than the national average of 94 people per square mile.²⁰ Indeed, as of the 2020 Census, Pennsylvania was 11th-densest of the 50 states, as well as Washington, D.C. and Puerto Rico.²⁰ Since the CRP definition is so much more inclusive, Pennsylvania counties otherwise not considered eligible for federal rural funding opportunities for HIV prevention, testing, and treatment may benefit from partnering with eligible colleges and universities in order to apply for funding from the Center for Rural Pennsylvania in order to improve services in their counties.²¹

It is important to note that county-level definitions do not always match the sentiments of the people living in them, perhaps since they cover larger, more heterogenous areas than smaller census tract- or census block-level definitions. For example, in Pennsylvania, Lancaster County residents generally feel that they live in a rural area.²² However, it is classified as an urban county in all five dichotomized definitions used in this analysis, owing to the urban centers within.¹⁴⁻¹⁸ This situation is common throughout the United States, and is at least partially rectified in FORHP's census tract-level definition, which uses the "Goldsmith Modification" in order to designate some rural populations in larger metropolitan areas as eligible for rural-specific funding.²³

Additionally, the landscapes of rural definitions are constantly changing as data are updated. One explanation for the differences between the other four definitions of rurality that are national in scope is whether their underlying data source is the 2010 or 2020 Census. The national definitions with the highest percentage of rural counties and respondents, the OMB and RUCC, both use 2020 Census data.^{14,17} However, the current UIC and FORHP definitions use 2010 Census data, and will not be updated until late 2024 at the earliest.^{15,16} While Census data are crucial in developing these definitions of rurality, other data are also considered. For example, the FORHP definition may soon include the recently-released Road Ruggedness Scale (RRS) in its definition of rurality, given the impact of road terrain on health access in the United States.²⁴

Limitations

This analysis is subject to several limitations. First, this analysis relies on survey data, which is cross-sectional and may not accurately represent the distribution of queer and trans Pennsylvanians throughout the state given the sampling scheme used. Second, analysis is limited to only one state. Third, this analysis assumes survey respondents seek or obtain care in the same county they live in, which is not always correct. Fourth, this analysis only looks at queer and trans Pennsylvanians; this is not the only population at risk for HIV. Fifth, this analysis only considers county-level definitions of rurality based on the data available; these patterns may not hold for smaller geographic units such as census tract or census block. Finally, this analysis dichotomizes rurality at the county level, which may obscure trends found in more granular definitions.



Recommendations

- **Funders should make their definition of rurality clear to potential applicants.** Rurality as a definition is nebulous and ever-changing, as evidenced by the results above. Funders should be transparent in disclosing and description their definition of rurality so that potential applicants understand their eligibility more easily.
- **Organizations must be cognizant of the various ways their rurality is defined.** Community organizations, local health departments, and others invested in HIV prevention, testing, and treatment in rural areas should be aware of how definitions of rurality differ throughout the United States. This includes knowing what components go into each definition, the geographic unit the definition applies to, and any pending or current updates to the definition. Online resources such as the Rural Health Grants Eligibility Analyzer or the “Am I Rural?” tool allow for easy searching of not just how different rural definitions apply to an address, but also eligibility for certain funding opportunities.^{25,26}
- **More investigation into HIV prevention, testing, and treatment needs of rural queer and trans Pennsylvanians is needed.** The biennial Pennsylvania LGBTQ Health Needs Assessment offers a practical source of data to monitor statewide need for various services, including HIV prevention, testing, and treatment in rural areas. Future inquiry should analyze potential demographic or access differences between rural and urban queer and trans Pennsylvanians to better target resources and opportunities to improve the health and wellbeing of this population.



References

1. Centers for Disease Control and Prevention. Estimated HIV incidence and prevalence in the United States, 2017–2021. *HIV Surveillance Supplemental Report*, 2023 May; 28 (No.3).
<http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>
2. Qiu X, Brousseau NM, Hill EC, Medina I, Swanson KR, Bincsik AK, Earnshaw VA. What shapes People Living With HIV's experiences of HIV stigma in Delaware?: A qualitative exploration of place and social position. *Delaware Journal of Public Health*. 2022 Aug;8(3):14.
<https://www.doi.org/10.32481/djph.2022.08.005>
3. Owens C. HIV pre-exposure prophylaxis awareness, practices, and comfort among urban and rural family medicine physicians. *The Journal of Rural Health*. 2023 Mar;39(2):469-76.
<https://doi.org/10.1111/jrh.12723>
4. Quinn K, Sanders C, Petroll AE. "HIV is not going to kill me, old age is!": the intersection of aging and HIV for older HIV-infected adults in rural communities. *AIDS Education and Prevention*. 2017 Feb;29(1):62-76.
5. Barefoot KN, Warren JC, Smalley KB. Women's health care: the experiences and behaviors of rural and urban lesbians in the USA. *Rural and remote health*. 2017 Mar 1;17(1):1-6.
6. Sarno EL, Bettin E, Jozsa K, Newcomb ME. Sexual health of rural and urban young male couples in the United States: Differences in HIV testing, pre-exposure prophylaxis use, and condom use. *AIDS and Behavior*. 2021 Jan;25:191-202. <https://doi.org/10.1007/s10461-020-02961-8>
7. Owens C, Hurtado M, Moskowitz DA, Mustanski B, Macapagal K. Rural–Urban Differences in HIV Sexual Risk Behaviors and HIV Service Utilization Among Adolescent Sexual Minority Males in the United States. *Archives of Sexual Behavior*. 2024 Mar 25:1-1. <https://doi.org/10.1007/s10508-024-02840-6>
8. Office of Infectious Disease and HIV/AIDS Policy. EHE Overview. U.S. Department of Health and Human Services. December 4, 2023. <https://www.hiv.gov/federal-response/ending-the-hiv-epidemic/overview>
9. Centers for Disease Control and Prevention. Funding Opportunity Announcement: PS-24-0026. January 24, 2023. Accessed April 10, 2024, from <https://www.cdc.gov/hiv/funding/announcements/ps24-0026/index.html>
10. U.S. Department of Health and Human Services, Health Resources and Services Administration. Rural HIV/AIDS Planning Program. n.d. Accessed March 15, 2024, from <https://www.hrsa.gov/grants/find-funding/HRSA-20-105>
11. U.S. Department of Health and Human Services, Administration for Community Living. \$500,000 Rural HIV and Aging Challenge. n.d. Accessed May 1, 2024, from <https://www.challenge.gov/?challenge=half-million-rural-hiv-and-aging-challenge>



12. Long JC, Delamater PL, Holmes GM. Which definition of rurality should I use?: The relative performance of 8 federal rural definitions in identifying rural-urban disparities. Medical Care. 2021 Oct 1;59:S413-9. <https://doi.org/10.1097/MLR.0000000000001612>
13. Research & Evaluation Group at Public Health Management Corporation and Bradbury-Sullivan LGBT Community Center. 2022 Pennsylvania LGBTQ Health Needs Assessment. 2022. https://assets.nationbuilder.com/bradburysullivancenter/pages/2872/attachments/original/1673023325/2022_PA_LGBTQ_HNA_Report_Final_approved.pdf?1673023325
14. U.S. Census Bureau. Core Based Statistical Areas (CBSAs), Metropolitan Divisions, and Combined Statistical Areas (CSAs). July 2023. Accessed January 24, 2024, from <https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/delineation-files.html>
15. U.S. Department of Health and Human Services, Health Resources and Services Administration. List of Rural Counties and Designated Eligible Census Tracts in Metropolitan Counties. September 2021. Accessed January 19, 2024, from <https://data.hrsa.gov/Content/Documents/tools/rural-health/forhpeligibleareas.pdf>
16. U.S. Department of Agriculture, Economic Research Services. Urban Influence Codes. May 2013. Accessed January 19, 2024, from <https://www.ers.usda.gov/data-products/urban-influence-codes/documentation/>
17. U.S. Department of Agriculture, Economic Research Services. Rural-Urban Continuum Codes. January 2024. Accessed January 23, 2024, from <https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/documentation/>
18. Center for Rural Pennsylvania. Rural-Urban Maps. 2022. Accessed January 19, 2024, from <https://www.rural.pa.gov/data/rural-urban-definitions>
19. R Core Team. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. 2024. <https://www.R-project.org/>
20. U.S. Census Bureau. Historical Population Density Data (1910-2020). April 26, 2021. Accessed May 1, 2024, from <https://www.census.gov/data/tables/time-series/dec/density-data-text.html>
21. Center for Rural Pennsylvania. 2025 Research Grant Program Request for Proposals. March 2024. Accessed April 14, 2024, from <https://www.rural.pa.gov/download.cfm?file=Resources/PDFs/2025%20RFP%20Web.pdf>
22. Lisi T, Thomas A. Is Lancaster County a metropolitan or rural region? Here's what census figures say about the county, its population. LancasterOnline. August 13, 2021. Accessed May 1, 2024, from https://lancasteronline.com/news/local/is-lancaster-county-a-metropolitan-or-rural-region-heres-what-census-figures-say-about-the/article_4849d894-fbbd-11eb-b3dd-7306022f404c.html



23. Goldsmith HF, Puskin DS, Stiles DJ. Improving the operational definition of “rural areas” for federal programs. Rockville, MD: Federal Office of Rural Health Policy. 1993. Accessed May 1, 2024, from <https://www.ruralhealthinfo.org/pdf/improving-the-operational-definition-of-rural-areas.pdf>

24. U.S. Department of Health and Human Services, Health Resources and Services Administration. Proposed Inclusion of Terrain Factors in the Definition of Rural Area for Federal Office of Rural Health Policy Grants. April 26, 2024. Document Number 2024-08931. 89 FR 32451. Accessed April 29, 2024, from https://www.federalregister.gov/documents/2024/04/26/2024-08931/proposed-inclusion-of-terrain-factors-in-the-definition-of-rural-area-for-federal-office-of-rural?utm_campaign=subscription+mailing+list&utm_medium=email&utm_source=federalregister.gov#citation-1-p32452

25. U.S. Department of Health and Human Services, Health Resources and Services Administration. Rural Health Grants Eligibility Analyzer. n.d. Accessed May 1, 2024, from <https://data.hrsa.gov/tools/rural-health>

26. Rural Health Information Hub. Am I Rural? – Tool. n.d. Accessed May 1, 2024, from <https://www.ruralhealthinfo.org/am-i-rural>

