



Published in final edited form as:

*J Rural Health*. 2024 September ; 40(4): 745–751. doi:10.1111/jrh.12840.

## How Rural is *All of Us*? Comparing Characteristics of Rural Participants in the NIH *All of Us* Research Program to Other National Data Sources

Janessa M. Graves, PhD MPH<sup>1,2</sup>, Shawna R. Beese, PhD RN<sup>2,3</sup>, Demetrius A. Abshire, PhD RN<sup>4</sup>, Kevin J. Bennett, PhD MS<sup>5</sup>

<sup>1</sup>WWAMI Rural Health Research Center, Department of Family Medicine, School of Medicine, University of Washington, Seattle WA

<sup>2</sup>College of Nursing, Washington State University, Spokane WA

<sup>3</sup>College of Agricultural, Human, and Natural Resource Sciences, Extension, Washington State University, Pullman, WA

<sup>4</sup>College of Nursing, University of South Carolina, Columbia, SC

<sup>5</sup>Translational and Clinical Science, University of South Carolina School of Medicine- Columbia, Columbia, SC

### Abstract

**Purpose:** The National Institute of Health's *All of Us* Research Program represents a national effort to develop a database to advance health research, especially among individuals historically underrepresented in research, including rural populations. The purpose of this study was to describe the rural populations identified in the *All of Us* Research Program using the only rurality indicator currently available in the dataset.

**Methods:** Currently, the the *All of Us* Research Program provides a proxy measure of rurality that identifies participants who self-reported delaying care due to far travel distances associated with living in rural areas. Using the *All of Us* Controlled Tier Dataset v6, we compared sociodemographic and health characteristics of *All of Us* rural participants identified via this proxy to rural US residents from nationally representative data sources using chi-squared tests.

**Results:** 3.1% of 160,880 *All of Us* participants were rural, compared to 15–20% of US residents based on commonly accepted rural definitions. Proportionally more rural *All of Us* participants reported fair or poor health status, history of cancer, and history of heart disease ( $p < 0.01$ ).

---

**Corresponding Author:** Janessa M. Graves, PhD MPH, WWAMI Rural Health Research Center, Department of Family Medicine, School of Medicine, University of Washington, Box 354982, Seattle, WA 98195-4982, janessa@uw.edu.

**Author Contributions:** Drs. Graves and Beese had full access to the study data and take responsibility for the accuracy of the analysis. Concept and design: All authors. Acquisition and analysis: Graves, Beese. Interpretation of data: All authors. Drafting of the manuscript: All authors. Critical revision of the manuscript for important intellectual content: All authors. Statistical analysis: Graves, Beese. Obtained funding: Graves, Beese. Supervision: Graves.

**Additional Contributions:** The All of Us Research Program would not be possible without the partnership of its participants.

**Conflict of Interest Disclosures:** None reported.

**Conclusions:** The *All of Us* measure may capture a subset of underserved participants who live in rural areas and experience healthcare access barriers due to distance. Researchers who use this proxy measure to characterize rurality should interpret their findings with caution due to differences in population and health characteristics using the *All of Us* definition or rural compared to other commonly used rural definitions.

### Keywords

rural; database; All of Us

## INTRODUCTION

The National Institute of Health's (NIH) *All of Us* Research Program represents a national effort to develop and maintain a longitudinal research database of health, lifestyle, environmental, and genetic information from at least one million people in the United States (US).<sup>1, 2</sup> As a primary objective, the *All of Us* Research Program aims to create one of the most diverse databases ever developed to advance health research. To achieve this, participants from a wide range of backgrounds and communities are recruited and enrolled.<sup>1</sup> To date, over 80% of *All of Us* participants represent communities historically underrepresented in medical research, and more than half identify with a racial or ethnic minority group.<sup>3</sup>

The *All of Us* Guide for Diversity and Inclusion outlines 10 diversity categories that identify US populations underrepresented in biomedical research: race and ethnicity; access to care; age; annual household income; disability; educational attainment; gender identity; sex assigned at birth; sexual orientation; and geography.<sup>1</sup> Individuals who reside in rural and non-metropolitan areas (hereafter "rural") are underrepresented in biomedical research despite evidence of being no less willing to participate compared to urban residents.<sup>4</sup> Consequently, rural health has been identified as a scientific gap with respect to NIH funding.<sup>5</sup> The underrepresentation of rural residents in biomedical research is attributable to factors such as opportunity, awareness, and trust,<sup>6–8</sup> as well as time, financial, and distance constraints related to rural residents' having to travel far to research sites.<sup>8–12</sup>

To overcome obstacles in engaging with biomedical research among rural and other populations, the *All of Us* Research Program has focused heavily on recruiting participants from populations historically underrepresented in biomedical research.<sup>9, 13, 14</sup> *All of Us* recruitment efforts have incorporated community-engaged strategies to engage geographically and ethnically diverse participants,<sup>9</sup> including use of mobile units, exhibits, and partnerships with community centers, groups, and clinics.<sup>9, 15</sup> In rural communities in particular, recruitment strategies have involved a focus on community partners, health professionals, and social networks.<sup>16</sup> However, target enrollment estimates for *All of Us* participants from rural areas are not readily available.

The *All of Us* Research Program defines geographically diverse communities as those containing "residents of established rural and non-metropolitan ZIP codes, based on the Health Resources and Services Administration (HRSA) Federal Office of Rural Health Policy (FORHP) data files."<sup>17</sup> This approach to classifying rurality relies largely upon

Rural-Urban Commuting Area (RUCA) codes,<sup>18</sup> which identify rural areas based on proximity to urbanization, population density, and daily commuting patterns.<sup>19</sup> Despite using the FORHP definition in recruitment of rural participants, the program does not release a rurality indicator to researchers or another method to classify participant rurality using this definition. Survey data within *All of Us* may serve as a proxy to identify rural participants in this dataset.

The specific focus on rural residents as a priority population for *All of Us*, together with concerted rural recruitment efforts, presents an opportunity for rural health researchers seeking to conduct research using data from the *All of Us* Research Program. Given that nationally representative data sources suffer from small samples of rural participants,<sup>20</sup> the *All of Us* program could serve as an important data source for advancing research that promotes equity in rural health. This is particularly important given the persistent health inequities and disparities rural residents experience such as lower life expectancies, higher burden of multiple chronic health conditions, and a higher prevalence of risk factors such as obesity and physical inactivity.<sup>21–24</sup> Contributors to poor these health outcomes among rural populations include myriad factors, such as lower access to care, socioeconomic status, and health behaviors.<sup>25</sup> Within rural communities, it is important to also consider intersectional identities associated with health disparities. For instance, rural residents who belong to an underrepresented group may experience unique challenges and disparities in accessing healthcare services compared to their urban peers or rural residents who do not share multiple marginalized identities.<sup>26, 27</sup>

The objective of this study was to describe the demographic and health characteristics of rural participants in the NIH *All of Us* Research Program database and compare them to rural US populations identified using common definitions of rurality.

## METHODS

In this cross-sectional comparison study, we sought to identify and compare rural adult (aged >18 years) participants in the *All of Us* Research Program to rural residents sampled from the general US population. The *All of Us* Controlled Tier Dataset (v6) presently does not grant access to any variable (e.g., county, ZIP code) that would allow researchers to characterize a participants' residential location as rural vs. urban. However, *All of Us* participants complete surveys as a component of their participation in the program, and the following question from the Healthcare Access and Utilization Survey was available to identify those residing in rural areas: "Have you delayed getting care for any of the following reasons in the past 12 months? You live in a rural area where distance to the healthcare provider is too far."<sup>28</sup> Response options were "yes," "no," or "don't know." Participants who did not complete the survey or answer this question were excluded, as were participants who responded "don't know."

The proportion of *All of Us* participants identified as rural were compared to the proportion of rural US residents classified using the following common definitions of rurality: Frontier and Remote (FAR) Area Codes,<sup>29</sup> Rural-Urban Continuum Codes (RUCC),<sup>30</sup> Urban Influence Codes (UIC),<sup>31</sup> RUCA codes,<sup>18</sup> and the FORHP definition.<sup>32</sup> Estimates

of the proportion of the US population classified as rural were obtained from Mueller, et al.<sup>33</sup> Additionally, the US Census Bureau rurality definition (based on the 2010 Census), which classifies areas outside of urban clusters or urbanized areas as rural,<sup>34</sup> was utilized. Population estimates for the Census Bureau measure were obtained from the American Community Survey (ACS) Demographic and Housing Estimates 5-Year Estimates Data Profiles from 2021.<sup>35</sup> Demographic characteristics reported by rural *All of Us* participants were compared to US rural residents using the US Census definitions of rurality.<sup>36</sup>

Demographic characteristics of rural participants obtained using the *All of Us* Researcher Workbench cohort builder included race (white, black/African American, Asian, or more than one race), ethnicity (not Hispanic, Hispanic), and sex (female, male). Self-reported health status and health history included the following measures classified dichotomously (yes, no): fair or poor health status, history of cancer, and history of heart disease. Two self-reported measures healthcare access were also obtained: delay or non-receipt of dental care due to cost (yes, no) or delay or non-receipt of medical care due to cost (yes, no). These data were obtained from the Basics Survey (demographics) and Overall Health Survey (health status) completed upon enrollment in *All of Us*, and the Personal Medical History Survey (cancer, heart disease history) and Healthcare Access and Utilization Survey (healthcare access) completed 90 days after enrollment.<sup>37</sup> Health status, health history, and healthcare access measures reported by rural *All of Us* participants were compared to health status data obtained from the 2019 National Health Interview Survey (NHIS) for non-metropolitan populations for all measures.

Proportions of rural *All of Us* participants across each category of demographic characteristics, health status, or healthcare access were compared to US rural populations using chi-squared tests in Stata/MP v15.0. The level for statistical significance was set at  $\alpha=0.05$ . The Washington State University Office of Research Assurances determined that the project does not meet the criteria for human subjects research and is exempt from the need for institutional review board review.

## RESULTS

Among the 160,880 participants who answered the survey question utilized as a proxy for rurality, 4,940 participants answered “yes”, amounting to 3.1% rural participants in the *All of Us* Research Program.<sup>28</sup> This proportion is similar to the 4.0% of US residents identified as rural using FAR area codes (Figure 1). However, the *All of Us* rural proportion is much smaller than the rural US population proportion for other definitions of rurality (range: 15.0–19.4%).

The demographic characteristics of *All of Us* rural participants differed significantly from national estimates of rural populations (Table 1;  $p<0.01$  for all comparisons). Among *All of Us* rural participants, 13.9% identified as Black/African American, which is twice as many identified in the US population using the 2021 ACS definition of rurality. Similarly, twice as many *All of Us* rural participants identified as Hispanic than rural US populations. The *All of Us* rural participants were 70.2% female, compared to 49.2% of the rural US population (Table 1).

The prevalence of health conditions and challenges in accessing healthcare services varied significantly between *All of Us* rural participants and national estimates of rural populations (Table 2;  $p < 0.01$  for all comparisons). The proportions of *All of Us* rural participants reporting fair or poor health status, or history of cancer were significantly higher than national prevalence estimates, and proportionally more rural *All of Us* participants reported a history of heart disease (11.0%) compared to the US rural population (6.7%). The proportion of people facing a delay or non-receipt of healthcare (dental or medical) due to cost was significantly lower among *All of Us* rural participants compared to US rural populations reporting to the NHIS (Table 2).

## DISCUSSION

To date, the only approach to classifying rurality among *All of Us* participants is via a self-reported survey question that defines rurality as participants' geographic residence where the distance to the healthcare provider is too far and contributes to delay in getting medical care. This question only captures participants who delayed care due to geographic distance and does not sufficiently identify rural residents who traveled far for healthcare without access delay or rural residents who accessed healthcare nearby. While the NIH *All of Us* Research Program is not intended to be nationally representative, differences in characteristics of rural residents using this proxy measure in the *All of Us* data compared to common rurality classification schemes shed little light as to an accurate representation of rural in the database. Researchers who use *All of Us* to study rural health should consider the validity of this proxy for rurality relative to their specific inquiry, and note the limitations in their dissemination of findings.

Only 3.1% of *All of Us* participants indicated they resided in a rural area where distance to the healthcare provider was too far. Because this database lacks an objective geographic measure (e.g., ZIP code) or rurality classification (e.g., RUCA codes), it is not possible to determine what proportion of *All of Us* participants actually resided in rural areas and perceived they resided too far from care. Although distance to care is particularly a barrier for residents of small rural areas, many residents of urban, suburban, and large rural areas also perceive distance to care as a healthcare access barrier albeit at smaller proportions compared to residents of small rural areas.<sup>38</sup> A participant's tolerance of distance traveled for healthcare may also vary by provider type (i.e., primary care vs. specialist care), and type of healthcare provider was not specified in the *All of Us* survey question. It should be noted, however, that rural residents may be more accepting than urban residents to drive long distances for healthcare,<sup>39</sup> likely as an artifact of being accustomed to having fewer healthcare options in their direct vicinity. It is possible, therefore, that the measure currently used within *All of Us* may be subject to low sensitivity, such that it falsely classifies truly rural residents as non-rural because they are generally less likely to self-identify as residing too far from healthcare.

Although we cannot accurately determine if a respondent lives in a rural area using this proxy measure in the *All of Us* data, evidence suggests that the perception of living in a rural area has implications for understanding rural-urban health disparities. Relatively recent evidence shows there is low agreement ( $\kappa = 0.33$ ) between RUCA codes and perceived

rurality, and this discordance raises important questions about the concept of rurality and the various factors that affect health outcomes.<sup>40</sup> Similar research conducted among pharmacists in North Carolina has shown that fewer than half of pharmacists who perceive working in a rural workplace are in a RUCA-designated rural area.<sup>41</sup> This discordance between perceived rurality and rurality based on commonly used measures has been attributed to perceptions people have about their environments and available resources.<sup>40, 41</sup> This explanation is plausible in light of our findings, as perceived rurality was based on distance to receiving healthcare. Should geographic measures, such as county or ZIP code, remain unavailable to *All of Us* researchers, inclusion of recently developed measures of rural perception or identity<sup>42</sup> will advance rural health research within the *All of Us* ecosystem. In addition, *All of Us* should also consider revising the current question used to determine rurality to avoid conflating delay in receiving healthcare with rurality. Given the existing constraints in defining rurality within the NIH *All of Us* dataset, this study is first to conduct any analyses focused on the characteristics of rural participants and lays the groundwork for future research to refine how *All of Us* ensures that rural populations are represented in health research.

Rural participants identified via the proxy measure within the NIH *All of Us* Research Program differed significantly from rural US residents identified using common rurality definitions. One limitation to note is that the national estimates for rural populations by race or ethnicity were based on all ages, not only adults aged 18 years and over. We do not, however, believe the adult estimates would differ markedly from the estimates reported for all ages in this study. Additionally, certain rurality classification schemes may under- or over-estimate rural populations,<sup>43</sup> as shown in Figure 1, with rural residents comprising from 4.0% to 19.4% of the US population. This is important to note, given the comparisons of *All of Us* rural participant characteristics to national rural populations reported in this manuscript.

The unique focus of *All of Us* on recruiting underserved and historically underrepresented populations likely plays a role in this study's findings. Based on the current proxy measure of rurality available within *All of Us*, rural participants in *All of Us* are specifically identified as those who face barriers to healthcare access due to distance from a provider. This definition may drive the finding that rural participants in *All of Us* appear to have poorer health status and experience diminished access to care compared the rural US population described from other data sources. Yet, this study also revealed that less than one third of the identified *All of Us* rural participants were male, despite the fact that rural men, especially those of color, experience disparities in healthcare access and health outcomes.<sup>44</sup> Future *All of Us* efforts recruitment efforts should focus on connecting with rural men, especially rural men from diverse populations, to increase awareness and engagement in the future. The *All of Us* database is nonetheless valuable in its diversity, especially that it captures a diverse population of rural participants. Future rural health research efforts using *All of Us* should account for the uniquely diverse population therein.



## CONCLUSIONS

The only measure that can be used to determine rurality in the NIH *All of Us* database does not appear to adequately identify rural residents in the US. One reason for this is that the rurality measure only identifies residents whose healthcare access has been impacted by their residence. This measure should not be used to identify rural residents; although, it may be a helpful indicator of rural underserved participants. In order to conduct rural health research within *All of Us*, geographic indicators that align with common and widely accepted methods of defining rural should be integrated within their platform. Researchers who rely on the current *All of Us* measure for determining rurality should interpret their findings with caution due to the differences in population and health characteristics between the current measure compared to other measures.

## Funding/Support:

This study was supported by through grant funding from the National Institutes of Health (NIH) received by the American Association of Colleges of Nursing (AACN). The *All of Us* Research Program is supported by the National Institutes of Health, Office of the Director: Regional Medical Centers: 1 OT2 OD026549; 1 OT2 OD026554; 1 OT2 OD026557; 1 OT2 OD026556; 1 OT2 OD026550; 1 OT2 OD 026552; 1 OT2 OD026553; 1 OT2 OD026548; 1 OT2 OD026551; 1 OT2 OD026555; IAA #: AOD 16037; Federally Qualified Health Centers: HHSN 263201600085U; Data and Research Center: 5 U2C OD023196; Biobank: 1 U24 OD023121; The Participant Center: U24 OD023176; Participant Technology Systems Center: 1 U24 OD023163; Communications and Engagement: 3 OT2 OD023205; 3 OT2 OD023206; and Community Partners: 1 OT2 OD025277; 3 OT2 OD025315; 1 OT2 OD025337; 1 OT2 OD025276. Demetrius A. Abshire is funded by the National Institute on Minority Health and Health Disparities of the National Institutes of Health (K23MD013899). The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

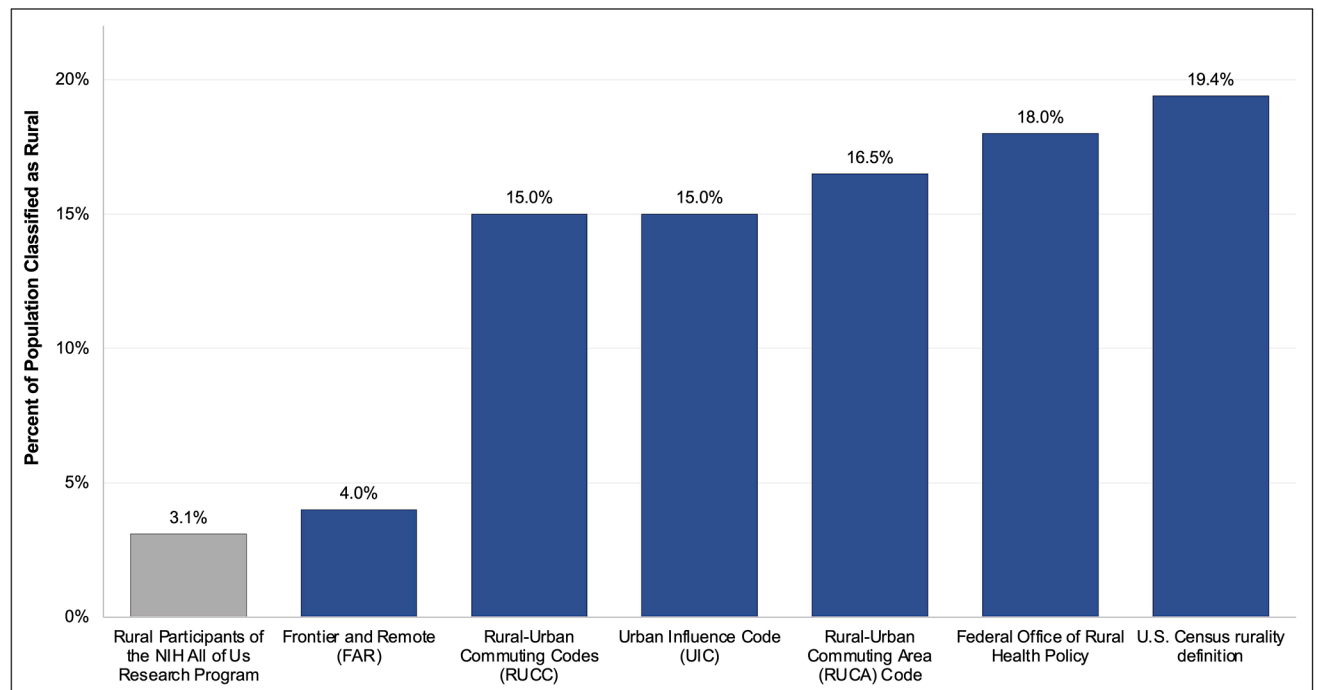
## REFERENCES

- Mapes BM, Foster CS, Kusnoor SV, et al. Diversity and inclusion for the *All of Us* Research Program: A scoping review. *PloS One*. 2020;15(7):e0234962. [PubMed: 32609747]
- Denny JC, Rutter JL, Goldstein DB, et al. The “All of Us” Research Program. *N Engl J Med*. Aug 15 2019;381(7):668–676. [PubMed: 31412182]
- National Institutes of Health, All of Us Research Hub. Data Snapshots. May 30, 2023; <https://researchallofus.org/data-tools/data-snapshots/>. Accessed May 31, 2023.
- Kim SH, Tanner A, Friedman DB, Foster C, Bergeron CD. Barriers to clinical trial participation: A comparison of rural and urban communities in South Carolina. *J Community Health*. Jun 2014;39(3):562–571. [PubMed: 24310703]
- Brown AGM, Shi S, Adas S, et al. A decade of nutrition and health disparities research at NIH, 2010–2019. *Am J Prev Med*. Aug 2022;63(2):e49–e57. [PubMed: 35469699]
- Barrett NJ, Rodriguez EM, Iachan R, et al. Factors associated with biomedical research participation within community-based samples across 3 National Cancer Institute–designated cancer centers. *Cancer*. 2020;126(5):1077–1089. [PubMed: 31909824]
- Davis TC, Arnold CL, Mills G, Miele L. A qualitative study exploring barriers and facilitators of enrolling underrepresented populations in clinical trials and biobanking. *Front Cell Dev Biol*. 2019-April-30 2019;7.
- Ford JG, Howerton MW, Lai GY, et al. Barriers to recruiting underrepresented populations to cancer clinical trials: A systematic review. *Cancer*. 2008;112(2):228–242. [PubMed: 18008363]
- Mancera BM, Sy A, Williams CD, Hargreaves MK. Utilizing a social-ecological health promotion framework to engage diverse populations for recruitment in the *All of Us* Research Program. *J Community Engagement Scholarship*. 2021;13(2).

10. Heller C, Balls-Berry JE, Nery JD, et al. Strategies addressing barriers to clinical trial enrollment of underrepresented populations: A systematic review. *Contemp Clin Trials*. 2014;39(2):169–182. [PubMed: 25131812]
11. Friedman DB, Foster C, Bergeron CD, Tanner A, Kim SH. A qualitative study of recruitment barriers, motivators, and community-based strategies for increasing clinical trials participation among rural and urban populations. *Am J Health Promot*. 2015;29(5):332–338. [PubMed: 24670073]
12. Hanley DF Jr., Bernard GR, Wilkins CH, et al. Decentralized clinical trials in the trial innovation network: Value, strategies, and lessons learned. *J Clin Transl Sci*. 2023;7(1):e170. [PubMed: 37654775]
13. Cronin RM, Jerome RN, Mapes B, et al. Development of the initial surveys for the *All of Us* Research Program. *Epidemiology*. Jul 2019;30(4):597–608. [PubMed: 31045611]
14. Cuellar NG, Aquino E, Barreto SC, et al. increasing awareness of the *All of Us* Research Program in Latino communities. *Hispanic Health Care Intl*. 2018;16(4):168–173.
15. National Institutes of Health *All of Us* Research Program. The All of Us Journey Brings More Research Program Features to All of You. <https://allofus.nih.gov/news-events/announcements/all-us-journey-brings-more-research-program-features-all-you>. Accessed May 22, 2023.
16. National Rural Health Association. All of Us Research Program aims to enroll 1 million participants. 09/21/2018. Accessed March 4, 2024.
17. NIH All of Us Research Hub. How does All of Us assess diversity? What communities does All of Us consider “underrepresented in biomedical research?”. <https://www.researchallofus.org/faq/how-does-all-of-us-assess-diversity-what-communities-does-all-of-us-consider-underrepresented-in-biomedical-research/>. Accessed February 4, 2024.
18. United States Department of Agriculture, Economic Research Service. Rural-Urban Commuting Area Codes. <https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/>. Accessed February 2, 2023.
19. Health Resources and Services Administration (HRSA). Defining Rural Population. <https://www.hrsa.gov/rural-health/about-us/what-is-rural>. Accessed February 10, 2024.
20. Zahnd WE, Askelson N, Vanderpool RC, et al. Challenges of using nationally representative, population-based surveys to assess rural cancer disparities. *Prev Med*. 2019;129:105812.
21. Hales CM, Fryar CD, Carroll MD, Freedman DS, Aoki Y, Ogden CL. Differences in obesity prevalence by demographic characteristics and urbanization level among adults in the United States, 2013–2016. *JAMA*. 2018;319(23):2419–2429. [PubMed: 29922829]
22. Whitfield GP, Carlson SA, Ussery EN, Fulton JE, Galuska DA, Petersen R. Trends in meeting physical activity guidelines among urban and rural dwelling adults - United States, 2008–2017. *MMWR Morb Mortal Wkly Rep*. 2019;68(23):513–518. [PubMed: 31194722]
23. Boersma P, Black LI, Ward BW. Prevalence of multiple chronic conditions among US adults, 2018. *Prev Chronic Dis*. 2020;17:E106. [PubMed: 32945769]
24. Abrams LR, Myrskylä M, Mehta NK. The growing rural-urban divide in US life expectancy: contribution of cardiovascular disease and other major causes of death. *Int J Epidemiol*. 2022;50(6):1970–1978. [PubMed: 34999859]
25. Rural Health Information Hub (RHIhub). Rural Health Disparities. 12/1/2023; <https://www.ruralhealthinfo.org/topics/rural-health-disparities>. Accessed March 2, 2024.
26. Joudeh L, Harris OO, Johnstone E, Heavner-Sullivan S, Propst SK. “Little Red Flags”: Barriers to accessing health care as a sexual or gender minority individual in the rural southern United States-A qualitative intersectional approach. *J Assoc Nurses AIDS Care*. 2021;32(4):467–480. [PubMed: 33935190]
27. Afifi RA, Parker EA, Dino G, Hall DM, Ulin B. Reimagining rural: Shifting paradigms about health and well-being in the rural United States. *Annu Rev Public Health*. 2022;43:135–154. [PubMed: 34910581]
28. NIH All of Us Research Hub. Health Care Access & Utilization Survey, Rural. <https://databrowser.researchallofus.org/survey/health-care-access-and-utilization/rural>. Accessed September 19, 2022.



29. United States Department of Agriculture, Economic Research Service. Frontier and Remote Area Codes. August 20, 2019; <https://www.ers.usda.gov/data-products/frontier-and-remote-area-codes/>. Accessed May 22, 2023.
30. United States Department of Agriculture, Economic Research Service. Rural-Urban Continuum Codes. <https://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx>. Accessed February 2, 2023.
31. United States Department of Agriculture, Economic Research Service. Urban Influence Codes. <https://www.ers.usda.gov/data-products/urban-influence-codes/>. Accessed February 2, 2023.
32. Health Services and Resources Administration, Federal Office of Rural Health Policy. Defining Rural Population. March 2022; <https://www.hrsa.gov/rural-health/about-us/what-is-rural>. Accessed March 15, 2023.
33. Mueller KJ, Coburn AF, Knudson A, et al. Considerations for defining rural places in health policies and programs: Rural Policy Research Institute; 2020. <https://rupri.public-health.uiowa.edu/publications/policypapers/Considerations%20For%20Defining%20Rural%20Places.pdf>
34. Ratcliffe M, Burd C, Holder K, Fields A. Defining rural at the US Census Bureau. American Community Survey and Geography Brief. 2016;1(8):1–8.
35. United States Census Bureau. Table DP05: ACS Demographic and Housing Estimates. American Community Survey 5-Year Estimates Data Profiles, 2021. [https://data.census.gov/table/ACSDP5Y2021.DP05?q=dp05&g=010XX43US\\_010XXG0US&moe=true](https://data.census.gov/table/ACSDP5Y2021.DP05?q=dp05&g=010XX43US_010XXG0US&moe=true). Accessed February 28, 2024.
36. United States Census Bureau. Urban and Rural. September 2023; <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html>. Accessed February 29, 2024.
37. Ramirez AH, Sulieman L, Schlueter DJ, et al. The *All of Us* Research Program: Data quality, utility, and diversity. Patterns (N Y). Aug 12 2022;3(8):100570. [PubMed: 36033590]
38. Graves JM, Abshire DA, Alejandro AG. System- and individual-level barriers to accessing medical care services across the rural-urban spectrum, Washington State. Health Serv Insights. 2022;15:11786329221104667.
39. Henning-Smith C, Evenson A, Kozhimannil K, Moscovice I. Geographic variation in transportation concerns and adaptations to travel-limiting health conditions in the United States. J Transport Health. 2018/03/01/ 2018;8:137–145.
40. Onega T, Weiss JE, Alford-Teaster J, Goodrich M, Eliassen MS, Kim SJ. Concordance of rural-urban self-identity and zip code-derived rural-urban commuting area (RUCA) designation. J Rural Health. 2020;36(2):274–280. [PubMed: 30913340]
41. Castle ME, Tak CR. Self-reported vs RUCA rural-urban classification among North Carolina pharmacists. Pharm Pract. 2021;19(3):2406.
42. Oser CB, Strickland J, Batty EJ, Pullen E, Staton M. The Rural Identity Scale (RIS): Development and Validation. J Rural Health. 2022;38(1):303–310. [PubMed: 33666278]
43. 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. Med Care. 2021;59(Suppl 5):S413–s419. [PubMed: 34524237]
44. Zahnd WE, Murphy C, Knoll M, et al. The intersection of rural residence and minority race/ethnicity in cancer disparities in the United States. Int J Environ Res Public Health. 2021;18(4).



**Figure 1.**

Percentage of rural participants in the NIH *All of Us* Research Program compared to rural residents identified using various rurality classification schemes in the United States.<sup>33, 35</sup>

*Note:* Population estimates by rurality classification scheme were obtained from Mueller, et al.,<sup>33</sup> with the exception of the U.S. Census rurality definition, which was obtained from the American Community Survey, 2021 (5-year estimates).<sup>35</sup>

**Table 1.**Demographic characteristics of *All of Us* rural participants and rural US residents.

	<i>All of Us</i> rural participants <sup>a</sup>	2011 ACS rural residents <sup>b</sup>
<b>Race</b>		
White	62.6%	84.9%
Black/African American	13.9%	6.0%
Asian	1.5%	1.3%
More than one race	1.9%	4.3%
<b>Ethnicity</b>		
Not Hispanic	78.1%	92.5%
Hispanic	14.8%	7.5%
<b>Sex</b>		
Female	70.2%	49.2%
Male	24.5%	50.8%

*Abbreviations:* ACS, American Community Survey

<sup>a</sup>Rural *All of Us* participants were identified as those who responded “Yes” to the following question in the Healthcare Access and Utilization Survey: “Have you delayed getting care for any of the following reasons in the past 12 months? You live in a rural area where distance to the healthcare provider is too far.” Estimates of the proportion of rural *All of Us* participants (aged >18 years) (N = 160,880) across categories were obtained from the Basics Survey.

<sup>b</sup>Rural US residents were identified using the US Census definition, which classifies rural as any location outside a Census-defined urban area (based on Census 2010 data).<sup>36, 46</sup> Estimates of rural US residents (N = 64.0 million) obtained from American Community Survey, 2011 5-Year Estimate Subject Table DP05.<sup>35</sup> Adult (aged >18 years) estimates reported by sex; for race and ethnicity, reported estimates reflect all ages.

**Table 2.**

Health status and healthcare access experience among rural *All of Us* participants versus the rural US population.

	<i>All of Us</i> rural participants <sup>a</sup>	US rural population
<b>Health status</b>		
Fair or poor health status <sup>b</sup>	41.9%	14.1%
<b>Health history</b>		
History of cancer <sup>b</sup>	14.5%	7.3%
History of heart disease <sup>b</sup>	11.0%	6.7%
<b>Healthcare access</b>		
Delay or non-receipt of dental care due to cost <sup>b</sup>	20.3%	41.4%
Delay or non-receipt of medical care due to cost <sup>b,c</sup>	14.4%	41.1%

<sup>a</sup>Rural *All of Us* participants were identified as those who responded “Yes” to the following question in the Healthcare Access and Utilization Survey: “Have you delayed getting care for any of the following reasons in the past 12 months? You live in a rural area where distance to the healthcare provider is too far.” Estimates of the proportion of rural *All of Us* participants (aged >18 years) across categories were obtained from the Overall Health Survey (Health Status), Personal Medical History Survey (Cancer, Heart Disease History), and Healthcare Access and Utilization Survey (Healthcare Access).

<sup>b</sup>US rural population estimates (aged >18 years) obtained from the National Health Interview Survey (NHIS), 2019 (rural respondents are those who reside outside of a metropolitan statistical area).<sup>47</sup>

<sup>c</sup>Type of medical care received not specified.