

Housing Quality by Disability, Race, Ethnicity, and Rural-Urban Location: Findings from the American Community Survey

Alexis Swendener, PhD

Madeleine Pick, MPH

Megan Lahr, MPH

Hawking Yam, MS

Carrie Henning-Smith, PhD, MPH, MSW

Key Findings

- A higher proportion of rural residents have incomplete kitchen or incomplete plumbing facilities compared to urban residents, resulting in over 368,000 rural and 1.5 million urban residents living in substandard housing.
- Within location type, we identified differences in housing quality by disability, race, and ethnicity.
- In both rural and urban areas, a higher proportion of adults with a disability have incomplete plumbing and incomplete kitchen facilities compared to adults without a disability.
- Rural residents, both those with and without a disability, have higher proportions with incomplete plumbing than either urban residents with a disability or without a disability overall, and rural people with a disability have the highest proportion with substandard plumbing.
- Overall, rural American Indian or Alaska Native communities have the highest proportion with incomplete kitchen facilities (3.53%) and incomplete plumbing (5.13%), much higher than their urban counterparts or other racial and ethnic groups.

Purpose

Housing quality is associated with health and well-being; however, little research examines these factors by location. In this policy brief, we examine rates of two key housing quality indicators (having incomplete plumbing and incomplete kitchen facilities) by rural-urban location, as well as at the intersections of racial/ethnic identity and disability status.

Background

Housing is well-documented as an important social determinant of health, and inadequate housing quality can lead to negative health outcomes.^{1,2} Two important elements of housing quality are whether a home is equipped with complete plumbing and kitchen facilities. For example, if a housing unit lacks either complete plumbing facilities (hot and cold running water and a bathtub or shower) or complete kitchen facilities (stove, refrigerator, and sink with a faucet), the U.S. Department of Housing and Urban Development (HUD) considers the unit to be substandard housing.³

Increases in quality sanitation and plumbing are regarded as key to improving health and lowering mortality rates from infectious diseases over time.⁴ Lacking running water is a serious health issue as it impacts individuals' ability to maintain proper body hygiene, handwashing, and oral health to prevent infectious disease, and lacking a bathtub or shower further limits options for maintaining body hygiene.^{5,6} In addition, having incomplete kitchen facilities impacts food quality and restricts options for maintaining a healthy diet. Lacking access to a refrigerator and stove limits the types of food an individual can cook and restricts the ability to properly store and prepare fresh, healthy foods.⁷⁻⁹ Smaller appliances such as microwaves and hot plates can be alternative options for some, but these are limited in the type and amount of food they can prepare.

Disparities in housing quality vary by sociodemographic groups, which are shaped by structural inequalities. Racially minoritized households are more likely to live in poorer quality housing in general compared to their white counterparts.^{2,10} Individuals with disabilities face additional challeng-

es finding quality housing, including meeting accessibility needs as well as increased financial burdens.¹¹

Although housing has been clearly linked to health and health equity, there is less research demonstrating how housing quality varies by rural or urban location and across different demographic groups within those location types. Differences in housing quality among various demographics of rural and urban adults is one way that we can better understand population-level health inequities, especially among marginalized populations.

Approach

In this study, we used data from the 2015-2019 American Community Survey (ACS) Public Use Microdata Sample (PUMS), accessed through IPUMS USA at the University of Minnesota.¹² With our focus on housing quality, we limited the data to adults living in households (N=11,962,082) and excluded adults living in group quarters. We defined urban and rural populations based on whether the majority of each Public Use Microdata Area's (PUMA) population resides in a 2013 metropolitan area, and assigned corresponding rural or urban status to all individuals in the PUMA.¹³

Disability status was measured using survey respondents' reports of having any of the following disabilities in the ACS: hearing difficulty, vision difficulty, cognitive difficulty, ambulatory difficulty, self-care/activities of daily living difficulty, or independent living difficulty.¹⁴ Racial/ethnic identity was measured as Hispanic/Latino and the following non-Hispanic groups: white, Black, American Indian or Alaskan Native, Asian American or Pacific Islander, Other racial identity, or Two or more racial identities.

Incomplete plumbing facilities was measured in the ACS as missing either or both of the following: hot and cold running water or a bathtub or shower, which must be located within the housing unit. Data on both of these plumbing facilities are also available individually and were analyzed separately as well.

Incomplete kitchen facilities was measured in the ACS as missing one or more of the following: a stove or range, a refrigerator, and a sink with a faucet. All had to be located within the housing structure, and

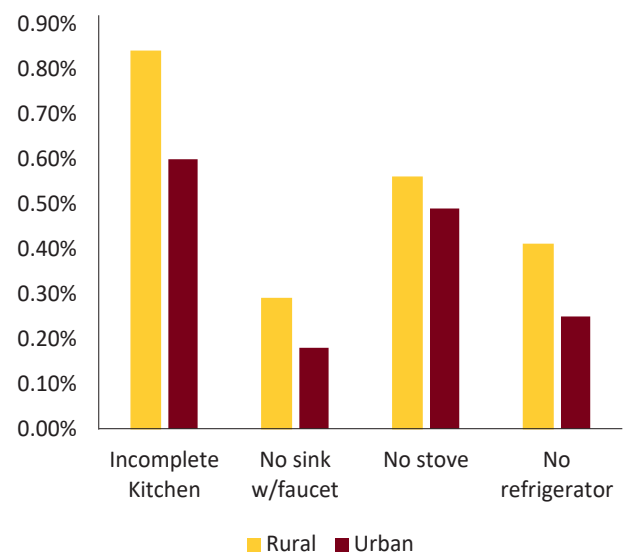
portable cooking equipment did not qualify as a stove/range. Each of the three kitchen facilities are also available individually and were analyzed separately.

We used chi-square tests to determine statistically significant differences between rural and urban adults overall, as well as differences between rural and urban adults by disability status and racial/ethnic group. We also compared proportions within rural populations and urban populations to compare housing characteristics across and within various intersections of rural-urban location, disability status, and racial/ethnic identity. We used Stata 17 for all analyses and employed survey weights to generate nationally representative estimates.

Results

Overall, statistically significantly higher proportions of rural residents live in housing with an incomplete kitchen (0.84% or over 284,000 residents) compared to urban residents (0.60% or over 1,265,000 residents, $p < .001$), as seen in Figure 1.

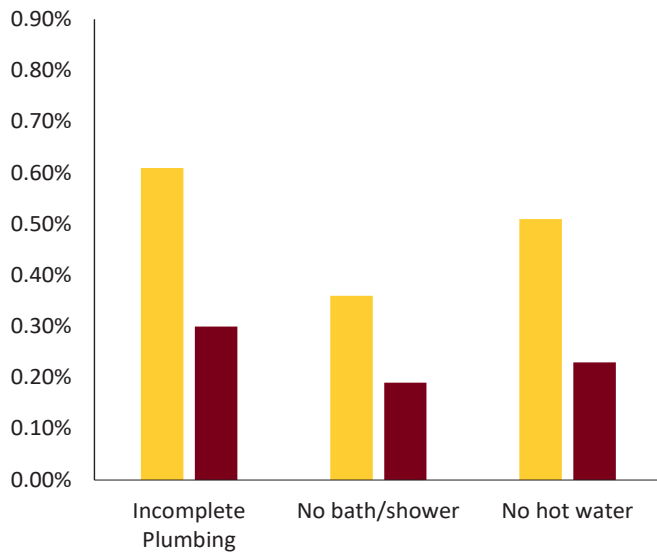
Figure 1. Incomplete Kitchen by Rural-Urban Location



Rural residents also have double the proportion of adults living in housing with incomplete plumbing (0.61% or over 207,000 residents) compared to their urban counterparts (0.30% or over 636,000 residents, $p < .001$), shown in Figure 2. As a result, rural adults also have higher proportions with both incomplete

kitchen facilities and incomplete plumbing (0.37%) compared to their urban counterparts (0.17%, $p < .001$). This equates to almost 124,000 rural adults and over 357,000 urban adults living with both substandard plumbing and substandard kitchens in their homes.

Figure 2. Incomplete Plumbing by Rural-Urban Location



There are some key differences in characteristics of rural residents compared to urban residents as well, shown in Table 1. The proportion of rural residents reporting any disability was significantly higher at approximately 20%, compared to just over 14% of urban residents ($p < .001$). Proportions of rural and urban residents by racial/ethnic identity vary as well. Overall, urban communities have higher proportions of residents who identify as a racial or ethnic minority, with the exception of American Indian or Alaska Native residents, which have a higher proportion of residents in rural areas.

Figure 3 shows that much higher proportions of people with a disability have an incomplete kitchen compared to people without a disability, regardless of location. A higher proportion of urban adults with disabilities have incomplete kitchen facilities (1.65% or over 492,000 residents) compared to their rural counterparts (1.56% or over 105,000 residents, $p < .05$). But among adults without a disability, rural residents have a higher proportion with an incomplete

Table 1. Race/Ethnicity and Disability Status by Rural-Urban Location

	Rural	Urban
Has any disability	19.98%	14.27%
<i>Race and Ethnicity</i>		
Hispanic/Latino	6.93%	17.48%
<i>Not Hispanic/Latino</i>		
White non-Hispanic	81.63%	60.98%
Black non-Hispanic	7.04%	12.44%
Asian American or Pacific Islander	0.99%	6.65%
American Indian or Alaska Native	1.91%	0.42%
Other race	0.06%	0.23%
2+ races	1.44%	1.80%

ACS 2015-2019 5-Year Sample, IPUMS USA.

$N = 11,962,082$. All differences significant at $p < 0.001$

kitchen (0.66% or over 178,000 residents) compared to urban residents (0.43% or over 773,000 residents, $p < .001$).

In terms of individual kitchen components, we find that the higher proportions of adults with disabilities with an incomplete kitchen is largely attributable to lacking a stove, with 1.28% of rural adults with disabilities and 1.48% of urban adults with disabilities having no stove ($p < .001$). This equates to over 86,000 rural and over 443,000 urban adults with disabilities lacking a stove in their homes. In addition, the proportion of rural adults without a disability who have no sink with a faucet in their kitchen is comparable to the proportion of urban adults with a disability who have no sink (0.27% and 0.26%, $p = .34$). Examining the presence of a refrigerator, we find higher proportions of rural adults without a refrigerator, among both those with a disability and those without. Among adults with disabilities, 0.61% of rural residents (or over 41,000) and 0.55% of urban adults (or over 165,000) had no refrigerator in their home ($p < .05$).

Figure 3. Incomplete Kitchen by Rural-Urban Location and Disability Status

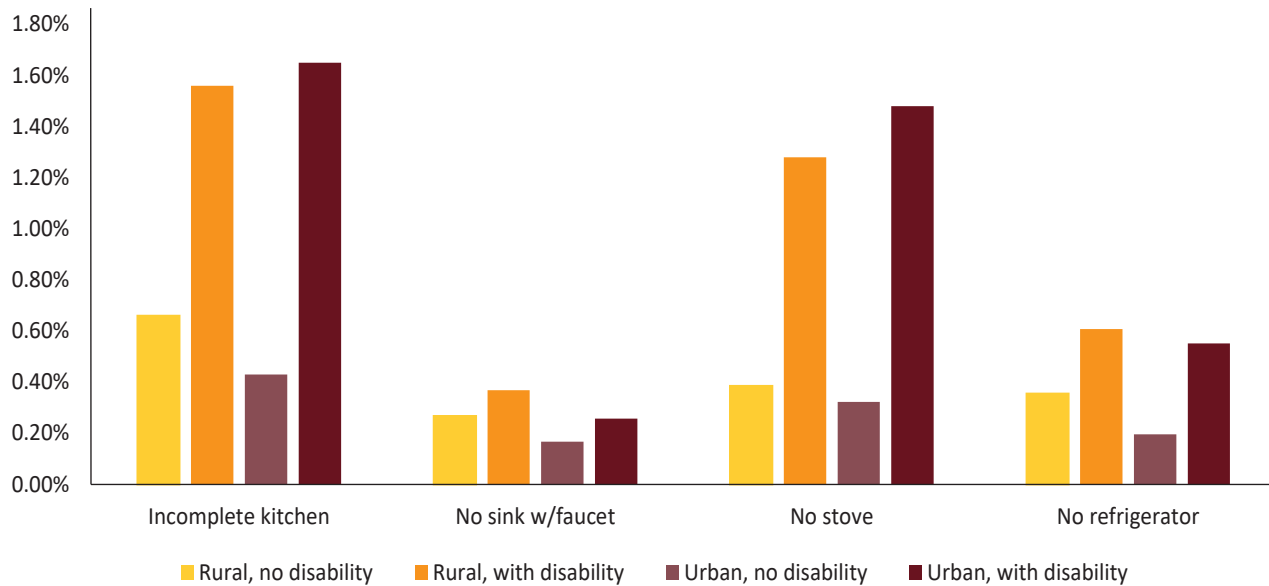
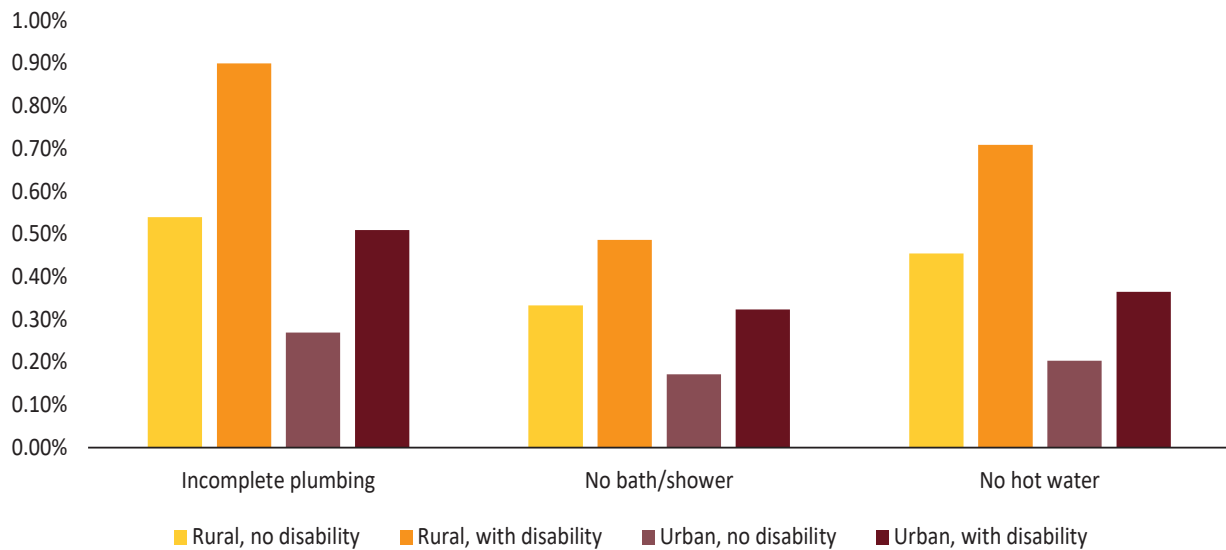


Figure 4 shows large disparities in the proportions of rural and urban adults with incomplete plumbing by disability status. Regardless of location, a larger proportion of adults with a disability have incomplete plumbing compared to adults without a disability, with 0.90% of rural and 0.51% of urban adults with disabilities ($p < .001$) having incomplete plumbing compared to 0.54% of rural and 0.27% of urban adults without a disability. This equates to almost 61,000 rural and over 153,000 urban adults with disabilities with substandard plumbing in their homes. The rural disparity overall is so high that rural residents

without a disability had larger proportions living with incomplete plumbing compared to urban adults with a disability (0.54% vs 0.51%, $p < .001$). In addition, similar proportions of rural adults without a disability and urban adults with a disability had no bath or shower (0.33% and 0.32%, $p = .40$). The rural disparity in having no hot water is large as well, with both rural adults with and without a disability having higher proportions with no hot water than either of the urban groups overall, with rural people with a disability having the highest proportion without hot water at 0.71% or almost 48,000 residents.

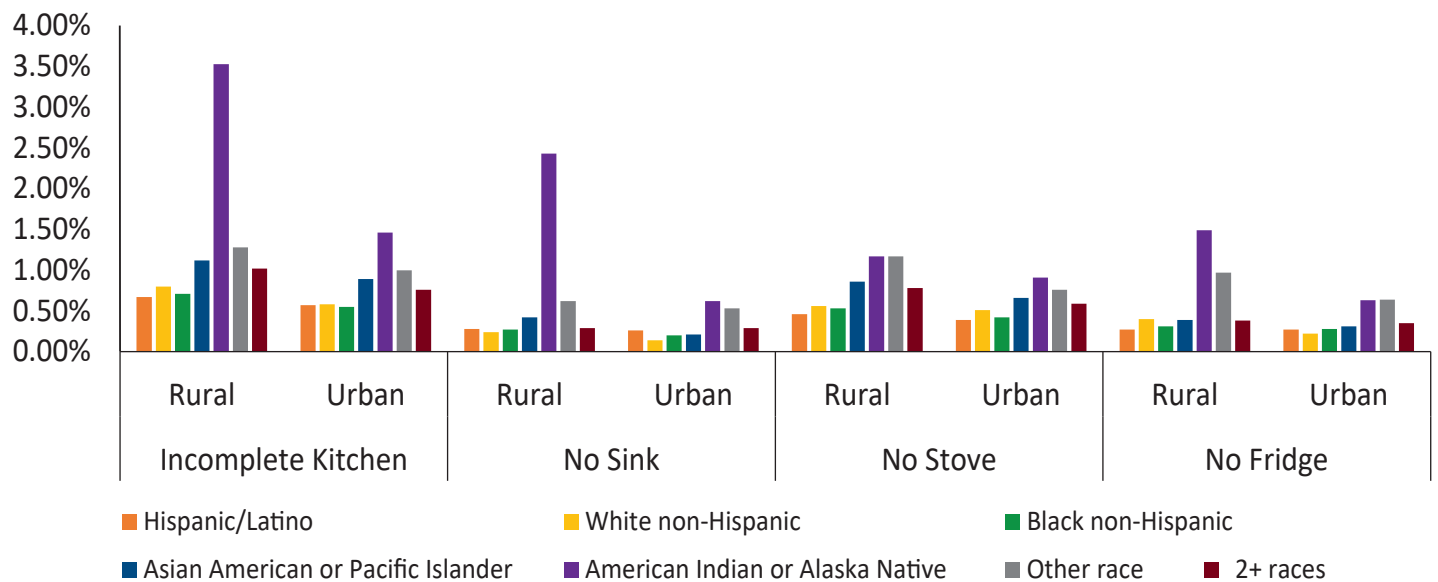
Figure 4. Incomplete Plumbing by Rural-Urban Location and Disability Status



We find differences in having an incomplete kitchen between rural and urban residents within several racial/ethnic groups, as seen in Figure 5. Rural residents who identify as non-Hispanic white, non-Hispanic Black, American Indian or Alaska Native, and with Two or more racial groups had a higher proportion with an incomplete kitchen compared to their urban counterparts ($p < .001$, except Two or more races $p < .01$). Among all racial/ethnic groups, rural American Indian or Alaska Native adults had the highest proportion with an incomplete kitchen (3.53%), followed by three groups with statistically similar proportions: rural

Asian American or Pacific Islander, urban American Indian or Alaska Native, and rural Other race adults (all less than 1.46%). Examining individual kitchen components, we find that rural American Indian or Alaska Native adults had the highest proportions with no sink with a faucet (2.43%) and no refrigerator (1.49%), and rural American Indian or Alaska Native and rural Other race adults shared similarly high proportions without a stove/range at 1.17%. Overall, these stark disparities equate to over 22,500 rural American Indian or Alaska Native adults living with substandard kitchen facilities.

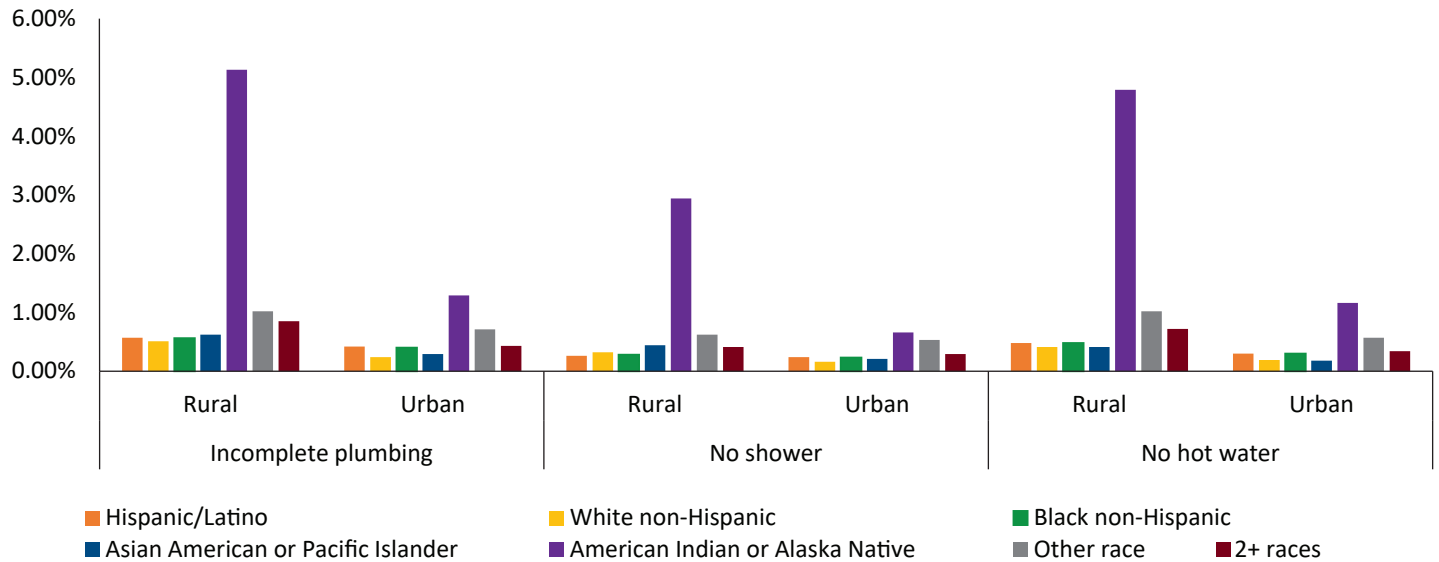
Figure 5. Incomplete Kitchen by Rural-Urban Location and Race/Ethnicity



Within almost all racial/ethnic groups (except Other race), we see a significantly higher proportion of rural residents without complete plumbing facilities compared to their urban counterparts ($p < .001$ except Asian American or Pacific Islander residents $p < .01$), as shown in Figure 6. Overall, American Indian or Alaska Native adults have the largest proportion of adults with incomplete plumbing facilities. We find 5.13% of rural American Indian or Alaska Native adults and 1.29% of urban American Indian or Alaska Native adults have

incomplete plumbing facilities, with rural Other race identified adults having a statistically similar proportion to the latter at just over 1%. Figure 6 also shows the proportion of individual incomplete plumbing facilities, and we find 2.94% of rural American Indian or Alaska Native adults live in a home without a shower or bath and 4.79% live with no piped hot and cold water. This results in over 33,000 rural American Indian or Alaska Native residents across the US without access to basic plumbing in their homes.

Figure 6. Incomplete Plumbing by Rural-Urban Location and Race/Ethnicity



Discussion and Implications

Housing quality is associated with individual health and well-being, but much less is known about how housing quality differs among rural and urban residents or in combination with other demographics, such as race/ethnicity and disability status. This policy brief addresses these gaps, and we find complex variations in who is living in housing with substandard plumbing or kitchen facilities by different intersections of race, ethnicity, disability status, and rural-urban location. We recognize that a large majority of the U.S. population has complete plumbing and kitchen facilities but call attention in this brief to the many people that still live in substandard housing facilities that are known to impact health. For example, we find that over 1.5 million urban residents and over 368,000 rural residents live in housing with incomplete kitchen facilities, incomplete plumbing, or both. Notably, these findings reflect a lack of several important aspects of kitchen and plumbing necessities, but do not include access to toilets. The measure of toilets was removed from the ACS in 2016 over concern about public disapproval of asking about them.¹⁵ Still, overall, significantly higher proportions of rural residents live

in housing with an incomplete kitchen and plumbing facilities compared to urban residents, with important differences by disability status, race, and ethnicity.

We find higher proportions of adults with a disability have an incomplete kitchen or incomplete plumbing compared to adults without a disability, regardless of location. Many individuals with disabilities have limited incomes, which may make it difficult to afford high-quality housing.¹¹ Among adults with disabilities, a higher proportion of urban adults have incomplete kitchen facilities compared to their rural counterparts, and a stove/range is the most likely missing component in the kitchens. But among adults without a disability, rural residents have a higher proportion with an incomplete kitchen compared to urban residents. Rural residents exhibit a greater discrepancy in substandard plumbing compared to urban residents, particularly among rural adults with disabilities. Housing policies need to reflect the needs of quality housing among rural residents as well as reflect both quality and accessibility needs for residents with disabilities in all locations.¹¹

In addition, we find that rural residents across most racial and ethnic groups have higher proportions of incomplete plumbing and kitchen facilities compared

to their urban counterparts. We find especially pronounced disparities among rural American Indian or Alaska Native adults living in substandard housing, including some differences in the individual components that make up having a fully functional kitchen. Specifically, a startlingly high proportion of rural American Indian or Alaska Native residents reported having no kitchen sink, followed by those reporting having no refrigerator, with a lower percentage (though still higher than other racial and ethnic groups) reporting having no stove. For all other groups examined in this brief (including rural-urban residents overall and those with and without disabilities), however, the most common missing kitchen component was a stove/range. These differences suggest there may be unique barriers or considerations for American Indian or Alaska Native residents that require closer examination and focus on specific kitchen appliances. According to the 2020 Census, about 40% of American Indian or Alaska Native residents live in rural areas.¹⁶ Our findings reflect the ongoing issues for American Indian or Alaska Native adults facing substandard housing, slower growth in housing stock, and lower vacancy rates in certain rural areas of the country, which can contribute to the lack of available, affordable, and quality housing.¹⁷

These findings have important implications for public policy. Continued and further investment in home modification and repair programs may assist homeowners to address some of these immediate needs, with particular attention to ensuring rural residents are aware of these programs and have access to them. One such program is the U.S. Department of Agriculture's (USDA) Section 504 Home Repair program, which offers loans and grants to rural homeowners for the purpose of repairs and upgrades.¹⁸ This program is somewhat limited, however, in that applicants must own and occupy the house and have "very low income" as defined by their county. Additionally, though this brief did not specifically examine differences between homeowners and renters, renters may have limited access to home repair financial assistance and may have other barriers to completing home repairs as they often need to do so through a landlord and/or management company. In rural communities, there are also likely fewer vendors to choose from compared to urban

areas, which limits scheduling options and financial competition.¹⁹

Another relevant program is the USDA's Housing Preservation Grants given to organizations to focus on home rehabilitation for low income rural residents.²⁰ Although funds can be used for repairing key safety and sanitation aspects of a home including water/waste disposal systems and accessibility features, this program is limited to specific expenses, and notably does not cover new appliances.²¹ Many states and local areas have their own home modification and repair programs as well, in addition to a patchwork of funds available through non-profit organizations. However, learning about and navigating these various programs may be additional barriers to fully reaching residents who could most benefit from them.

Rural housing policy should be tailored to the needs of systematically marginalized groups, many of whom are at greater risk of living in substandard housing. For example, structural racism and historically racist housing policies are factors that continue to impact housing access and quality among people of color and Indigenous people.² In particular, policymakers may need to consider additional investments in infrastructure and housing resources to address root causes that hinder development in the most remote rural areas, including Tribal lands.²² For example, improvements have been made in housing quality for American Indian and Alaska Native residents via HUD's Indian Housing Block Grant program, but the program is underfunded.^{17,23} Other investments in infrastructure in Tribal communities, such as those found in the Bipartisan Infrastructure Law, may lead to further improvements.²⁴

Conclusion

Housing quality impacts health outcomes. This policy brief details the link between incomplete home kitchen and plumbing facilities and health by disability status, race, ethnicity, and rurality. Our findings highlight that urgent attention is needed to address substandard housing in rural areas, particularly for rural American Indian or Alaska Native residents. In addition, policies to improve housing quality should be directed especially toward those with disabilities,

regardless of location. Improving housing quality is an important way to address the social determinants of health and promote health equity.

References

1. Taylor L. Housing and Health: An Overview of the Literature. *Health Aff Brief*. Published online 2018. <https://www.healthaffairs.org/doi/10.1377/hpb20180313.396577/full/>
2. Swope CB, Hernández D. Housing as a determinant of health equity: A conceptual model. *Soc Sci Med*. 2019;243:112571. doi:10.1016/j.socscimed.2019.112571
3. US Department of Housing and Urban Development. Code of Federal Regulations, Federal preference: Substandard housing. Published 2000. <https://www.govinfo.gov/content/pkg/CFR-2000-title24-vol1/xml/CFR-2000-title24-vol1-sec5-425.xml>
4. D'Alessandro D, Appolloni L. Housing and health: an overview. *Ann Ig*. 2020;32(5 Suppl 1):17-26.
5. Centers for Disease Control and Prevention. Personal Hygiene. Water, Sanitation, and Environmentally Related Hygiene (WASH): Personal Hygiene. Published December 1, 2022. <https://www.cdc.gov/hygiene/personal-hygiene/index.html>
6. Centers for Disease Control and Prevention. Oral Health Basics. Basics of Oral Health. Published February 9, 2023. <https://www.cdc.gov/oralhealth/basics/index.html>
7. Wolfson JA, Bleich SN. Is cooking at home associated with better diet quality or weight-loss intention? *Public Health Nutr*. 2015;18(8):1397-1406. doi:10.1017/S1368980014001943
8. Lachat C, Nago E, Verstraeten R, Roberfroid D, Van Camp J, Kolsteren P. Eating out of home and its association with dietary intake: a systematic review of the evidence. *Obes Rev*. 2012;13(4):329-346. doi:10.1111/j.1467-789X.2011.00953.x
9. Centers for Disease Control and Prevention. Four Simple Steps to Food Safety: Clean, Separate, Cook, Chill. Published August 5, 2022. <https://www.cdc.gov/foodsafety/keep-food-safe.html>
10. Joint Center for Housing Studies of Harvard University. The State of the Nation's Housing 2022. Published online 2022. <https://www.jchs.harvard.edu/state-nations-housing-2022>
11. Burns SP, Mendonca R, Pickens ND, Smith RO. America's housing affordability crisis: Perpetuating disparities among people with disability. *Disabil Soc*. 2021;36:10.1080/09687599.2021.1960276. doi:10.1080/09687599.2021.1960276
12. Ruggles, Steven, Flood, Sarah, Goeken, Ronald, Schouweiler, Megan, Sobek, Matthew. IPUMS USA: Version 12.0. Published online 2022. doi:10.18128/D010.V12.0
13. Schroeder J, Henning-Smith C, Tuttle M. *Demographics and Disability Status of Adults Living Alone in Rural Areas*. University of Minnesota Rural Health Research Center Policy Brief; 2021. <https://rhc.umn.edu/publication/demographics-and-disability-status-of-adults-living-alone-in-rural-areas/>
14. Henning-Smith C. Where do community-dwelling older adults with disabilities live? Distribution of disability in the United States of America by household composition and housing type. *Ageing Soc*. 2017;37(6):1227-1248. doi:10.1017/S0144686X16000210
15. Raglin DA. Plumbing and Kitchen Facilities in Housing Units. American Community Survey Office, United States Census Bureau; 2015. https://www.census.gov/library/working-papers/2015/acs/2015_Raglin_01.html
16. Office of Minority Health, United States Department of Health and Human Services. Profile: American Indian/Alaska Native. Published 2022. <https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=3&lvlid=62>
17. Pindus N, Kingsley GT, Biess J, et al. Housing Needs of American Indians and Alaska Natives in Tribal Areas: A Report From the Assessment of American Indian, Alaska Native, and Native Hawaiian Housing Needs. *Office of Policy Development and Research*, US Department of Housing and Urban Development; 2017:1-200. <https://www.huduser.gov/portal/publications/HNAIHousingNeeds.html>
18. United States Department of Agriculture, Rural Development. Single Family Housing Repair Loans & Grants. Rural Development. Published January 5, 2015. <https://www.rd.usda.gov/programs-services/single-family-housing-programs/single-family-housing-repair-loans-grants>
19. The Council of State Governments. Housing shortages in rural areas are stifling growth, causing states to adopt new targeted incentives. The Council of State Governments. Published August 17, 2022. <https://www.csg.org/2022/08/17/housing-shortages-in-rural-areas-are-stifling-growth-causing-states-to-adopt-new-targeted-incentives/>

20. United States Department of Agriculture, Rural Development. Housing Preservation Grants. Rural Development. Published January 5, 2015. <https://www.rd.usda.gov/programs-services/single-family-housing-programs/housing-preservation-grants>
21. Higgins S. Utah's rural housing gets a boost from USDA grant, but Cox wants more. KUER 90.1. Published December 20, 2022. <https://www.kuer.org/politics-government/2022-12-20/utahs-rural-housing-gets-a-boost-from-usda-grant-but-cox-wants-more>
22. National Low Income Housing Coalition. Housing Needs on Native Tribal Lands.; 2022. <https://nlihc.org/sites/default/files/Native-Housing.pdf>
23. National American Indian Housing Council. National American Indian Housing Council's Briefing Paper: Recommended Fiscal Year 2023 & 2024 Funding Levels for Tribal Housing Programs.; 2022. https://naihc.net/wp-content/uploads/2022/10/NAIHC-Budget-Recommendations-FY23-24_finaltoharepost.pdf
24. The White House. Fact Sheet: Biden-Harris

Administration Releases Tribal Playbook, Announces Massive New Tribal Funding from Bipartisan Infrastructure Law. The White House Briefing Room. Published May 31, 2022. <https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/31/fact-sheet-biden-harris-administration-releases-tribal-playbook-announces-massive-new-tribal-funding-from-bipartisan-infrastructure-law/>

Suggested Citation

Swendener A, Pick M, Lahr M, Yam H, and Henning-Smith C. Housing Quality by Disability, Race, Ethnicity, and Rural-Urban Location: Findings from the American Community Survey. *UMN Rural Health Research Center Policy Brief*. July 2023. <https://rhrc.umn.edu/publication/housing-quality-by-disability-race-ethnicity-and-rural-urban-location-findings-from-the-american-community-survey/>



Rural Health Research & Policy Centers

Funded by the Federal Office of Rural Health Policy
www.ruralhealthresearch.org

Support for this study was provided by the Federal Office of Rural Health Policy, Health Resources and Services Administration, Cooperative Agreement U1CRH03717-13-00. The information, conclusions, and opinions expressed are those of the authors, and no endorsement by FORHP, HRSA, or HHS is intended or should be inferred.

For more information, contact Carrie Henning-Smith (henn0329@umn.edu)

University of Minnesota Rural Health Research Center
Division of Health Policy and Management, School of Public Health,
2221 University Avenue SE, #350 Minneapolis, MN, 55414