DOI: 10.1111/jrh.70004

ORIGINAL ARTICLE

THE JOURNAL OF RURAL HEALTH

Exploring access to critical health services for older adults in rural America from 1990 to 2020

Elizabeth A. Bambury BS[1] | Alexis A. Merdjanoff PhD[2] | Joshua T. Fergen PhD[3] | J. Tom Mueller PhD[1]

[1]Department of Population Health, University of Kansas Medical Center, Kansas City, Kansas, USA

[2]Department of Social and Behavioral Sciences, New York University School of Global Public Health, New York, New York, USA

[3]Memory Keepers Medical Discovery Team, University of Minnesota Medical School Duluth Campus, Duluth, Minnesota, USA

Correspondence
Elizabeth A. Bambury, Department of Population Health, University of Kansas Medical Center, Kansas City, KS, USA.
Email: ebambury@kumc.edu

Funding information
National Institute on Aging, Grant/Award Number: R24AG065159

Abstract

Purpose: Rural America has experienced a rapid loss of hospitals since the turn of the century, making access to high-quality health care the top rural health priority. Coinciding with this hospital decline is the growth of a rural population age 65 years or older. The health needs of older adults can require specialty care to support healthy aging. To date, minimal research has been conducted on trends in aging-related health care services in rural areas beyond hospital closures.

Methods: This study uses a 30-year lookback of data from the Area Health Resource Files to describe the trends in local access to hospitals and critical health services important for conditions experienced by older adults in rural America. Results are presented across measures of rurality and population age.

Findings: Local aging-related access to services such as chemotherapy, oncology, emergency department, geriatric, and home health agencies have been stagnant or declining over time in rural areas. Concerningly, the most remote communities with the highest percent of older adults have the lowest service access.

Conclusion: These findings shed light on the growing need for policies to support healthy aging among the increasingly older rural population.

KEYWORDS
rural health care access, health care service trends, older adult health care, healthy aging, rural America

INTRODUCTION

In rural America, access to high-quality health care services has been noted as the top health priority for the coming decade.[1] It is well documented that rural areas have been losing hospitals at an accelerating rate since the turn of the century.[2] From January 2005 to July 2024, 192 out of an initial 2075 rural hospitals have completely closed or converted to a "Rural Emergency Hospital" to provide only emergency and critical outpatient services.[3,4] The exact causes of these closures are variable, but studies have found a higher likelihood of closures in states that did not expand Medicaid, hospitals with precarious finances, and hospitals where the broader rural community experienced declining economic conditions.[5] This troubling decline occurs alongside a growing rural population age 65 years or older.[6] Estimates from the Urban Institute suggest that the percentage of the population above age 65 years in rural America will be as high as 26% by 2040, up from 21% in 2020.[7] Older adults have unique health risks because of the decreased physical and mental capabilities that come with the biological and life

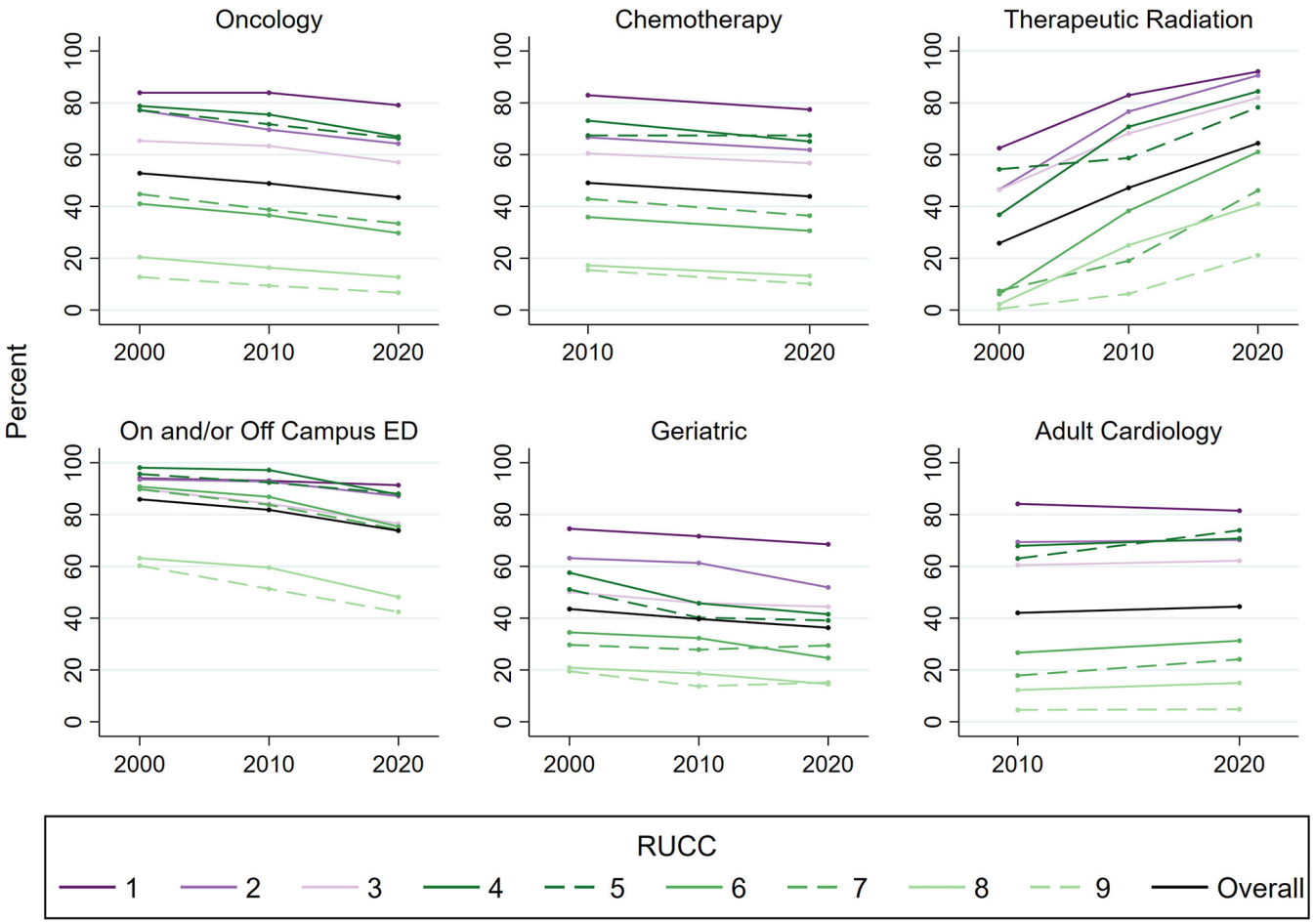

FIGURE 1 Percent of counties with local access to a hospital service, by RUCC and year, 2000–2020.

Notes: Local access is defined as having at least one hospital service within county or neighboring county. Solid lines represent urban or metro-adjacent RUCC. Dashed lines represent rural and remote RUCC. RUCC, Rural–Urban Continuum Codes.

transitions associated with aging. These health risks, such as chronic disease, injury, and development of Alzheimer's disease and related dementias (ADRD), can require specialty care to support healthy aging. The health care exit in an increasingly older rural America has profound implications for population health and the health care system overall if older adults no longer have access to aging-related health services.

Most research has focused on examining trends and impacts of rural hospital closures, and these studies show that when a closure occurs, access to certain services are eliminated from those communities. In particular, availability of older adult services worsens after hospital closures, including access to cancer screening and treatment,[8,9] emergency departments (EDs),[9–11] dialysis,[9] and supply of health care providers overall and across specialties.[10] Less is known on the change in access irrespective of rural hospital closures, however a recent report has documented that a staggering 382 rural hospitals have stopped providing chemotherapy services between 2014 and 2022.[12] Additionally, Germack et al.[13] found that surgeon supply reduces before a closure, representing the symbiotic relationship between physician workforce and the hospital's ability to remain open. There is also mixed evidence as to whether an increase of federally qualified health centers and rural health centers following a closure increases access to care,[14] or keeps it the same.[15]

In general, this changing health care access landscape has been shown to negatively impact patient outcomes for rural residents. Following a hospital closure, patients experience greater travel distances and/or travel time to care,[9,10] as well as worse emergency transport time and emergency service availability.[10,16–18] Rocque et al.[19] found that when cancer patients travel farther to cancer care facilities, they have higher costs and hospitalization rates across all phases of care. Most studies on mortality found an increase in the rates or estimated risk of overall and in-patient mortality after a hospital closure,[15,20–23] while some show no effect on overall mortality[24,25] or a decrease in in-patient mortality.[26]

Few studies look at the specific impact on older adults, but those that do found negative consequences of poor health care access. A recent study has found that when a nursing home closure occurs in a rural ZIP code, distance to nursing homes, home health agencies, and hospitals with swing beds all increase.[27] A case study of one community where a local hospital closed revealed that older community members faced difficulties navigating the health care system

and transportation to health services, which led these members to avoid seeking care.[28] Another study found that worsening access to ambulance rides created a lost sense of safety in communities, which can impact the ability to achieve optimal health while aging.[29]

To-date, little is understood on the trends in access to aging-adult services in rural areas due to limited research, inconsistent measures of aging-related services, and changing definitions of rurality.[30] This paper documents the decline over the last three decades in rural hospitals and critical health services important for conditions experienced by older adults including cancer, heart disease, stroke, unintentional injury, and ADRD. To illustrate these growing trends of spatial inequality, we present not only differences between rural and urban areas, but also within rural America by comparing remote counties to those adjacent to metro areas. These findings highlight the growing need for policies to support healthy aging among the increasingly older population in rural America.

METHODS

Data

We used data from Area Health Resource Files (AHRF) to construct a county-year level dataset for all 50 states and the District of Columbia for the years 1990, 2000, 2010, and 2020.[31] While the variables in each wave vary, the AHRF compiles health-related information from more than 50 databases and other sources into a county-level dataset with some variables dating back to 1978. Due to this inconsistency in waves and the large increase in variables beginning in 1990, we focus on the period from 1990 to 2020. We report in 10-year intervals because the hospital service variables, which are further described in detail below, are available only on a decennial basis. For this analysis, we used health facilities AHRF data originally pulled from the American Hospital Association (AHA) Survey Database and Centers for Medicare and Medicaid (CMS) Provider of Services. The general health care access variables originated from the AHA Survey data, and included the number of hospitals, full-time doctors or dentists, and full-time registered nurses. The variables representing hospital services important to older adults also originated from the AHA Survey data, and indicated the presence of hospitals with oncology, chemotherapy, therapeutic radiation, on and/or off campus ED, geriatric, and adult cardiology. The Certified Medicare Provider (CMP) variables originated from the CMS Provider of Services data. For these variables, we used nursing facilities, home health agencies, rural health clinics, and hospices.

For our measurement of rurality, we used the 2013 USDA Economic Research Service Rural-Urban Continuum Codes (RUCC).[32] For county-level population estimates by year and age, we used census population data from the National Historic Geographic Information System for the four study years.[33] To account for the small number of counties that experienced boundary changes across our study period,[34] we collapsed these counties into larger time-consistent geographic units (see Appendix Table 1).[35]

Variables

To explore changes in access to important health care services for older adults, we created dichotomous variables to flag if a county contained a service or was adjacent to a county containing a service by year, which we refer to as "local access." In doing so, we draw from Penchansky and Thomas' '5 A's of Access' and refer to 'local access' in terms of the *availability* and *accessibility* of care, and do not focus on the other A's of affordability, accommodation, and acceptability.[36] These dimensions consider type of facility/provider within a county, and whether a neighboring county contains a type of facility/provider. To create our measures of local access, we used a row-standardized first-order Queen's contiguity spatial weights matrix to create a spatially lagged version of each variable using the spmatrix Stata package.[37] We then collapsed the variables into dichotomous measures of whether the county or neighboring county contained the service or not.

For general health care access, we used the presence of hospitals, full-time doctors or dentists, and full-time registered nurses. In the case of hospital services important to older adults, we used the presence of hospitals with oncology, chemotherapy, therapeutic radiation, on and/or off campus ED, geriatric, and adult cardiology. CMP services were assessed using the presence of nursing facilities, home health agencies, rural health clinics, and hospices.

The RUCC variable was used throughout the analyses to categorize metropolitan (i.e., metro) and nonmetropolitan (i.e., nonmetro) counties, and the metro-adjacency of nonmetro counties. The RUCC classifications were created by the USDA Economic Research Service using population and worker commuting criteria from the 2010 Census and 2006–2010 American Community Survey. Grounded in the Office of Management and Budget metropolitan area classifications, the RUCC is a nine-category measure of rurality where 1 is the most urban and 9 is the most rural. In this paper, RUCCs 1–3 represent metro counties, and RUCCs 4–9 represent nonmetro. In the spirit of the RUCC classifications, we refer to metro and nonmetro areas as urban and rural, respectively. Going forward, metro-adjacent rural counties (RUCCs 4,6,8) will be referenced as "adjacent" and not metro-adjacent rural counties (RUCCs 5,7,9) will be referenced as "remote." We chose to apply the 2013 RUCC to the entire study period rather than incorporating prior RUCC classifications to allow for consistent comparison of the same groups of counties over time. Due to the fact that the rural counties scoring the best on most indicators of health and well-being have been the most likely to be reclassified as urban,[38,39] if we did not hold rurality constant we would risk selecting on a shrinking set of counties with worse health outcomes over time. Additional detail on the RUCC definitions and distributions can be found in Appendix Tables 2 and 3.

We created a categorical three-tiered measure of percent 65 or older to categorize rural counties based on the percent of their population's age 65 years or older. This allowed us to explore if counties with the highest percentage of their population being age 65 years or older had different levels of local access compared to counties with lower percentages of older people. We chose tertiles due to their

ability to categorize counties by age while still facilitating straightforward visuals and discussion. We first examined the distribution of percent 65 or older for all rural counties in 2020 and then used tertile cutoffs to assign each county a value of low, medium, or high. The population percent cutoffs for the categories can be found in Appendix Table 4.

Analysis

Following the creation of our indicators of local health care access, rurality, and population age, we then conducted a series of descriptive analyses of trends in access over time across the rural–urban continuum. To examine service access change over time, we generated visualizations of the percent of counties with at least one service within or adjacent to the county by RUCC and year. To examine how these trends varied across rural population age profiles, we then assessed the same trends by population age tertiles via data visualization. Unlike the prior analyses, for the age analysis we collapsed the rural RUCC counties into metro-adjacent and remote. Results are reported as overall trends and as percentage point changes over time. In order to assess statistically significant trends, we conducted linear regression analyses of the year indicator variable on each type of health care service for each county grouping. The model coefficients, *F*-values, and levels of statistical significance are included in Appendix Tables 6–11. All data cleaning and analyses were conducted using Stata 16.

RESULTS

Of the 3092 counties in the 50 U.S. states and DC, 1955 (63%) were classified as rural. These rural counties contained 14% of the total population and 17% of the population 65 or older in 2020. Between 1990 and 2020, the percent of the population 65 or older increased across the entire rural-urban continuum. However, in all decades we observed a clear rural–urban gradient in age structure, such that the most rural counties have the greatest percent of population 65 or older in every decade (Appendix Table 5).

General health care services

To examine local access to general health care services, we assessed the share of counties who had a hospital, full-time doctor or dentist, and/or full-time registered nurse either within the county or neighboring county. For our three general health care outcomes, we narratively describe findings and provide data visualizations in the Appendix. We found counties with the greatest degree of urban settlement (RUCCs 1–5) had persistently high and steady local access to hospitals, whereas access to hospitals among the most rural counties started at lower levels and only decreased over time. RUCCs 8 and 9 experienced a 5–6 percentage point decrease in access to a hospital over time. In 2020, just three in four counties in RUCCs 8 or 9 had access to a hospital, versus almost all counties in RUCCs 1–5 (Appendix Figure 1).

Unlike local hospital access, between 2000 and 2020, all RUCC levels experienced increases in local access to full-time doctors or dentists. That said, rural areas started with lowest access, and RUCCs 6–9 still have not reached the level of access achieved by more urban areas (Appendix Figure 1). These more-rural RUCCs experienced the strongest statistically significant change in access from 2000 to 2020 (Appendix Table 6). Perhaps unsurprisingly, all counties across the entire rural–urban continuum have had consistently high access to a full-time registered nurse (Appendix Figure 1).

To examine how local access to general health care varies by population age within rural counties, we studied access to these three services by tertile of percent 65 or older. Access to hospitals decreased as the percentage of 65 or older increased, as well as when counties were classified as remote. Only 80.6% of rural and remote counties in the highest tertile of percent 65 or older had access to a hospital. This is a 5.1 percentage point drop from 85.7% in 1990, the largest change of all categories. Inversely, metro-adjacent rural counties for the same population age tertile experienced an increase in access by 3.4 percentage points (Appendix Figure 2). These opposite trends demonstrate the vulnerabilities in access found among older adults in remote rural counties.

Unlike local hospital access, there has been a noticeable increase in local access to full-time doctors or dentists across rural counties of all age profiles. While there remain lower levels in access to full-time doctors or dentists in more remote and older areas, the variation in access is only 4.1 percentage points across all categories (Appendix Figure 2). Similar to our earlier finding, access to full-time nurses was nearly universal.

Hospital services for older adults

We found that local access to hospital services important for older adults was lower for rural areas and decreased as rurality increased. That said, rural RUCCs 4 and 5, the rural areas with the largest population settlements, demonstrated access levels similar to those of urban RUCCs 1–3 (Figure 1). We saw that, over time, counties across the rural–urban continuum had declining or unchanged access to oncology, chemotherapy, on and/or off campus ED, and geriatric services, despite a growing older population in need of these services. Access has always been and remained lowest for the most rural areas. All levels of RUCC aside from RUCCs 1 and 5 showed a significantly strong decline in local access to oncology and ED services between 2000 and 2020 (Appendix Table 8). One service that experienced growth across all RUCCs is therapeutic radiation—which is reflective of an overall expansion of therapeutic radiation nationwide during the study period. However, even though all RUCC groups saw statistically significant increases from 2000 levels (Appendix Table 8), in 2020 the most rural counties still had access levels 70.9 percentage points lower than the most urban. Adult cardiology was the only service that showed an increase among rural counties, with RUCC 5 experiencing a 14.1 percentage point increase

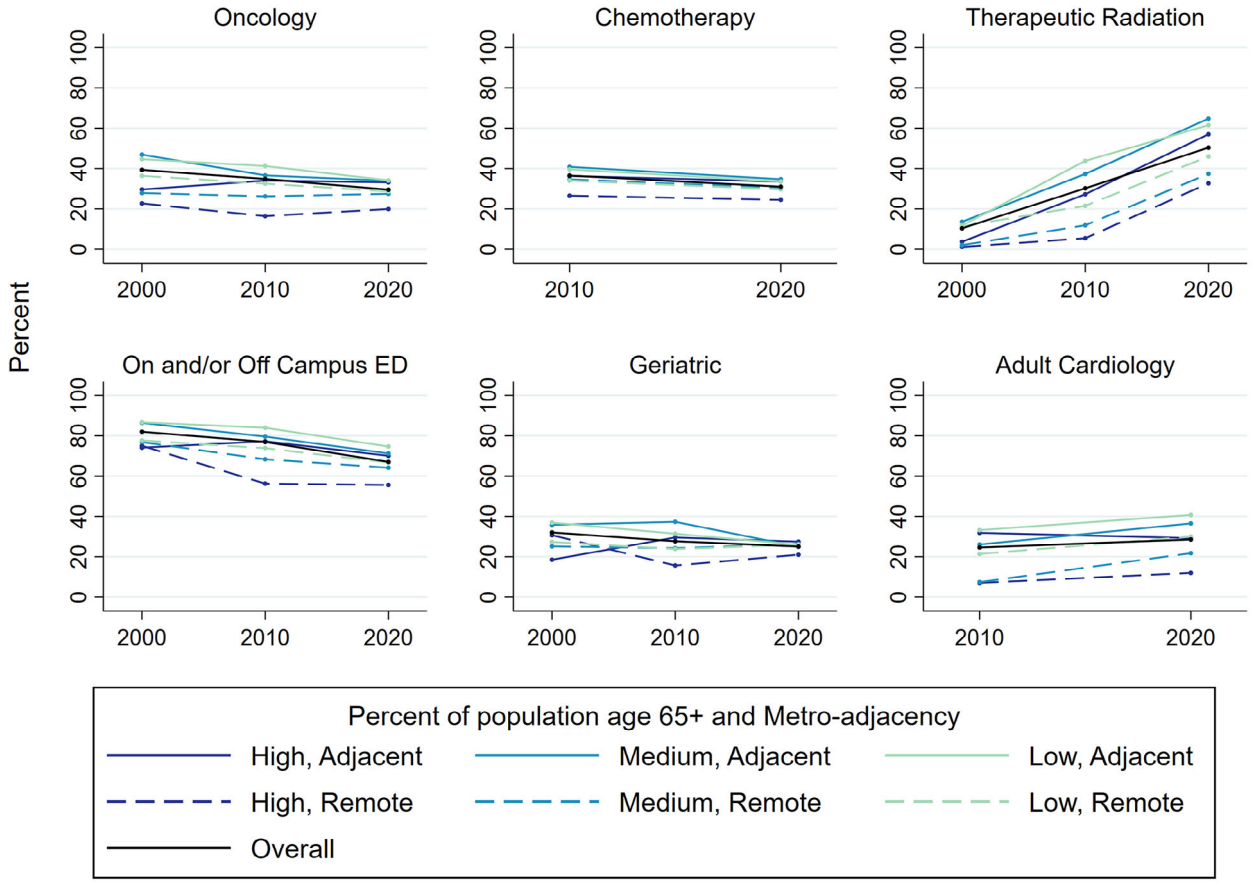

FIGURE 2 Percent of rural counties with local access to a hospital service, by percent population age 65+, year, and metro-adjacency, 2000–2020.

Note: Local access is defined as having at least one hospital service within county or neighboring county.

while urban counties experienced a decline or stagnation. However, the overall access gap in adult cardiology remains wide, with a difference of 91.3 percentage points between RUCC 1 and RUCC 9.

The most remote counties had the lowest local access to hospital services, and access generally decreased as percent 65 or older increased, which is similar to our findings for general hospital access. The gap between the least-old metro-adjacent group compared to the most-old remote group grew 18.2 percentage points for therapeutic radiation between 2000 and 2020, which demonstrates how the oldest and most remote areas did not experience the same growth in access to therapeutic radiation (Figure 2). Additionally, while rural areas in the medium and low tertiles of population over 65 experienced significant increases in local access to cardiology services, those with the highest percent of population over 65 did not (Appendix Table 9).

CMP services for older adults

Between 2000 and 2020, local access to a CMP nursing facility dropped steadily so that by 2020, all RUCC had access levels smaller than 20%. Access to home health agencies remained higher in the urban and highest population rural RUCCs, but declined for RUCCs 6–9. In fact, the difference in access between RUCCs 1 and 9 rose by 25.8 percentage points, demonstrating the growing disparities in access between urban and rural areas for home health services. All RUCCs showed a 4.8–14.1 percentage point increase in access to rural health clinics, the only service where rural RUCCs have the highest access. Lastly, we saw an increase in hospice care access as well, but levels of access for RUCCs 6–9 were far lower than in urban counties (Figure 3) and only rural RUCCs 7 and 9 did not experience a statistically significant increase in access (Appendix Table 10).

The trend of poorest local access for the oldest and remote areas was again shown for home health agency and hospice access. Nursing facilities and rural clinic access were similar across all categories (Figure 4), but only the areas with the highest percent of their population over 65 did not experience significant increases in access to rural health clinics (Appendix Table 11).

DISCUSSION

This study sheds light on the decline in access to general health care, hospital, and CMP services important for the aging rural American

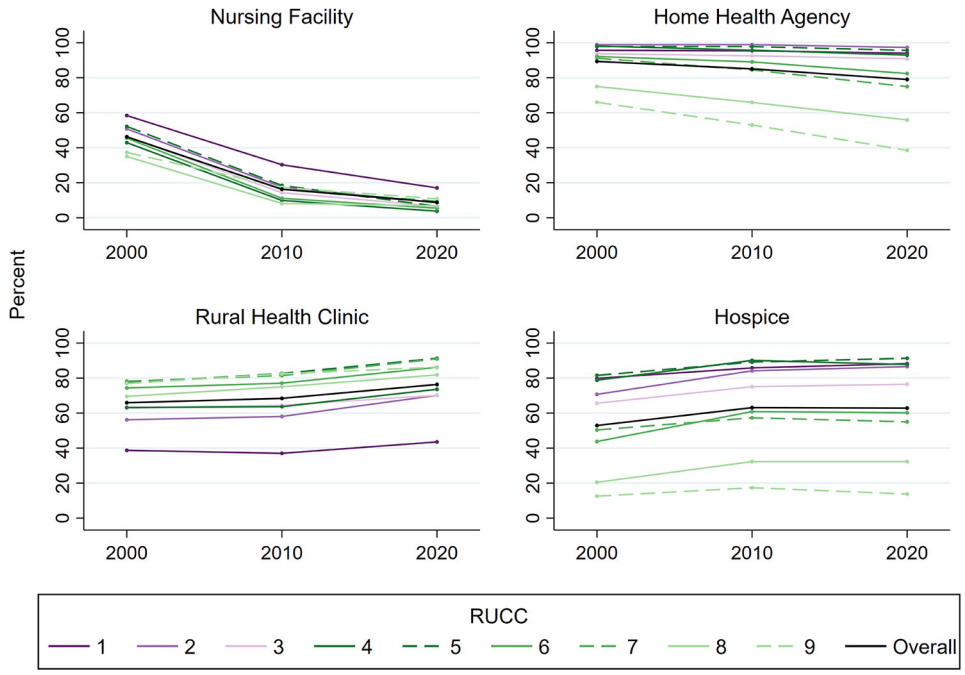

FIGURE 3 Percent of counties with local access to a CMP service, by RUCC and year, 2000–2020.

Notes: Local access is defined as having at least one CMP service within county or neighboring county. Solid lines represent urban or metro-adjacent RUCC. Dashed lines represent rural and remote RUCC. RUCC, Rural–Urban Continuum Codes; CMP, Certified Medicare Provider.

population and is aligned with previously published trends in rural hospital closures over time.[2,3]

These findings unveil a concerning trend of low and lowering local access to important hospital services for older adults, namely oncology, chemotherapy, ED, geriatric, and cardiology (Figure 1), as well as nursing facility, home health agency, and hospice CMP services (Figure 2). This not only reveals the broad extent of poor access to these services across rural America, but it also shows that those in the oldest and most remote areas have the lowest access. Even when local service access improved over time in rural areas, as in the case of therapeutic radiation, the gap between the most rural and urban areas has grown, indicating increasing spatial inequality.

Concerningly, home health access has declined only in rural areas, and the oldest and most remote areas show the greatest loss in access. This echoes findings in a recent study by Davila et al.,[40] which found that older rural-residing Veterans received considerably fewer home health visits compared to their urban counterparts, which likely reflects inaccess to these services in rural America. Home health agencies allow older adults to age in place by conveniently bringing health care services into the home without the need to travel to a health facility. While it is possible that this decline is being replaced by a different form of in-home or assisted living care not available in these data, this trend is troubling for the future of those aging in rural America. Given that the rural population is projected to continue aging, this spatial mismatch between services and areas of greatest need imposes considerable difficulties on not only the older adult population in the United States, but also the health care system overall.

These results demonstrate that remote, rural communities with the highest percent of older adults are in most need of solutions to support local access to health services. Recently, much attention has been placed on supporting older adults as they age, as well as supporting rural communities in the wake of hospital closures. In 2023, the National Rural Health Association received grant funding from the John A. Hartford Foundation to create the National Rural Age-Friendly Initiative to create strategies that promote age-friendly care in rural communities.[41] The Older Americans Act has also been reauthorized through FY 2024 to continue to support community social services for older adults, and could potentially be modified to address older rural residents living in the most low-access areas. Additionally, the Biden-Harris Administration took steps to keep more rural hospitals open.[42] That said, one of the main approaches to keeping rural hospitals open is by transitioning them into Rural Emergency Hospitals, a new Medicare provider type which can only offer ED services, observational care, and limited outpatient services. This means that many of the ongoing policies designed to keep rural hospitals open are still likely to result in a decline in essential services for older adults.[43]

There are several study limitations to note. First, the AHA survey data are self-reported by hospitals with no validation whether the hospitals do indeed offer the services. Second, some trends were limited to a 10-year study window due to variables not being included in earlier versions of the AHRF. Third, while these services appear to be available within a county, it is not an indication of if older adults are being offered or using these services. Fourth, this analysis is limited to services included in the AHRF datafiles, which potentially misses other services important to healthy aging in rural communities. Fifth, rural

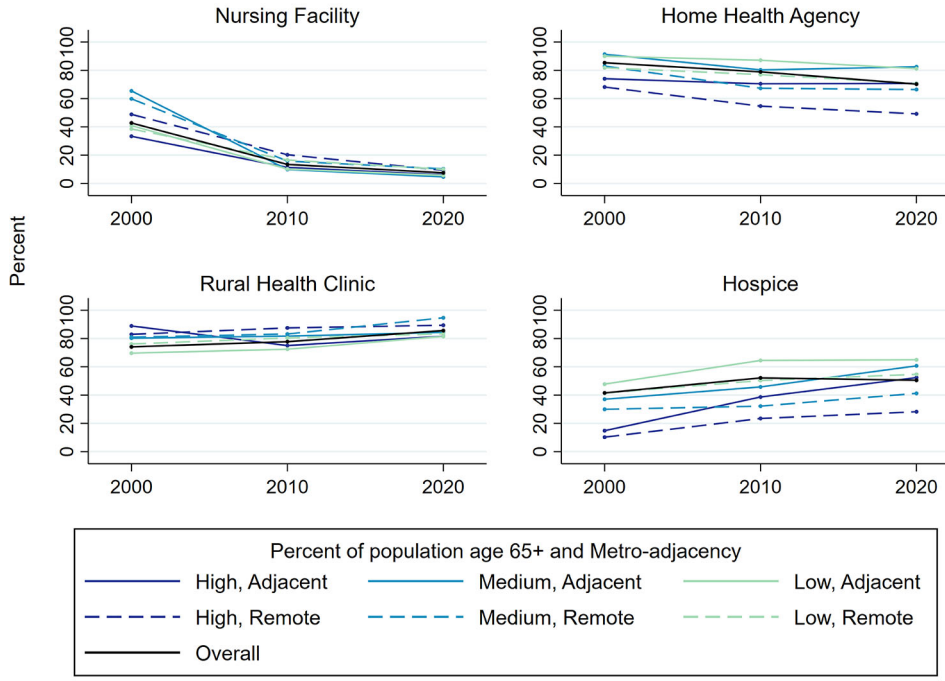

FIGURE 4 Percent of rural counties with local access to a CMP service, by percent population age 65+, year, and metro-adjacency, 2000-2020.
Note: Local access is defined as having at least one CMP service within county or neighboring county. CMP, Certified Medicare Provider.

areas differ by region in geographic, economic, demographic, cultural, and infrastructural ways that may influence access to care. While we did not observe any noticeable differences in results when stratified by region (results not reported), future research may consider examining this. Finally, although we believe that the county and surrounding counties are an appropriate scale for understanding health care service access, counties generally increase in size from east to west across the United States. Thus, findings should be interpreted with consideration of this variability in size. Future studies should access restricted versions of these data to analyze health care access by either smaller geographic units, the use of driving time calculations, or other more precise approaches.

In this study, we identified consistently limited and gradual loss of local access to health services for older rural adults in the United States, particularly for those living in the most rural, remote, and old areas of the country. Although these trends are clear, more research is needed to understand the impact this has on population health outcomes for older adults and their caregivers. As we prepare to support an increasingly older population across the United States, the development of policies to address this sustained inaccessibility of care in rural areas is essential to ensure all Americans can age well.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

FUNDING INFORMAITON

This paper was principally supported by a seed grant from The Interdisciplinary Network on Rural Population Health and Aging via an R24 network grant funded by the National Institute on Aging (R24AG065159).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in The National Archives Catalog at https://catalog.archives.gov/. These data were derived from the following resources available in the public domain:—Area Resource Files (ARF), 1978-2020, https://catalog.archives.gov/id/571544

ORCID

Elizabeth A. Bambury BS https://orcid.org/0000-0003-3958-3728
J. Tom Mueller PhD https://orcid.org/0000-0001-6223-4505

REFERENCES

1. Callaghan T, Kassabian M, Johnson N, et al. Rural healthy people 2030: new decade, new challenges. *Prev Med Rep*. 2023;33(102176):1-6.
2. Kaufman BG, Thomas SR, Randolph RK, et al. The rising rate of rural hospital closures. *J Rural Health*. 2016;32(1):35-43.
3. UNC Cecil G. Sheps Center for Health Services Research. Rural hopsital closures: 191 rural hospital closures and conversions since January 2005. Accessed July 31, 2024. https://www.shepscenter.unc.edu/programs-projects/rural-health/rural-hospital-closures/
4. American Hospital Association. Chart 2.1: Number of community hospitals, 2005–2021. 2021. https://www.ahadata.com/hospitaltrendwatch/hospitalorganizationaltrends/numberofcommunityhospitals
5. Chatterjee P. Causes and consequences of rural hospital closures. *J Hosp Med*. 2022;17(11):938-939.
6. Smith AS, Trevelyan E. *The Older Population in Rural America: 2012–2016*. U.S. Census Bureau; 2019.

7. Pendall R, Goodman L, Zhu J, Gold A. People and homes are aging quickly in our rural communities. *Urban Wire*. 2016. https://www.urban.org/urban-wire/people-and-homes-are-aging-quickly-our-rural-communities
8. Zahnd WE, Hung P, Shi SK, et al. Availability of hospital-based cancer services before and after rural hospital closure, 2008–2017. *J Rural Health*. 2023;39(2):416-425.
9. Thomas SR, Kaufman BG, Randolph RK, Thompson K, Perry JR, Pink GH. *A Comparison of Closed Rural Hospitals and Perceived Impact*. North Carolina Rural Health Research Program; 2015. https://www.shepscenter.unc.edu/programs-projects/rural-health/
10. Wishner J, Soulleveld P, Rudowitz R, Paradise J, Antonisse L. *A Look at Rural Hospital Closures and Implications for Access to Care: Three Case Studies*. Kaiser Family Foundation; 2016. www.kff.org
11. Venkatesh AK, Janke A, Rothenberg C, Chan E, Becher RD. National trends in emergency department closures, mergers, and utilization, 2005–2015. *PLoS One*. 2021;16(5):e0251729.
12. Topchik M, Brown T, Pinette M, Balfour B, Wiesse A. *Unrelenting Pressure Pushes Rural Safety Net Crisis into Uncharted Territory*. chartis.com: The Chartis Group; 2024.
13. Germack HD, Kandrack R, Martsolf GR. When rural hospitals close, the physician workforce goes. *Health Aff*. 2019;38(12):2086-2094.
14. Miller KEM, Miller KL, Knocke K, Pink GH, Holmes GM, Kaufman BG. Access to outpatient services in rural communities changes after hospital closure. *Health Serv Res*. 2021;56(5):788-801.
15. Bell N, Hung P, Merrell MA, Crouch E, Eberth JM. Changes in access to community health services among rural areas affected and unaffected by hospital closures between 2006 and 2018: a comparative interrupted time series study. *J Rural Health*. 2023;39(1):291-301.
16. Chaudhary S, Davis A, Troske K, Troske S. *Hospital Closures and Short-Run Change in Ambulance Call Times*. Rural & Underserved Health Research Center Publications, University of Kentucky; 2019.
17. Troske S, Davis A. *Do hospital closures affect patient time in an ambulance?* Rural & Underserved Health Research Center Publications, University of Kentucky; 2019.
18. Miller KEM, James HJ, Holmes GM, Van Houtven CH. The effect of rural hospital closures on emergency medical service response and transport times. *Health Serv Res*. 2020;55(2):288-300.
19. Rocque GB, Williams CP, Miller HD, et al. Impact of travel time on health care costs and resource use by phase of care for older patients with cancer. *J Clin Oncol*. 2019;37(22):1935-1945.
20. Berry B. *When the Rural Hospital Closes: An Analysis of Acute Health Impacts Following Closure of Rural Hospitals in Appalachia*. Chancellor's Honors Program Projects; 2023. https://trace.tennessee.edu/utk_chanhonoproj/2551
21. Carroll C. Impeding access or promoting efficiency? Effects of rural hospital closure on the cost and quality of care. *NBER Working Paper*. National Bureau of Economic Research; 2019. www.nber.org
22. Gujral K, Basu A. Impact of rural and urban hospital closures on inpatient mortality. *NBER Working Paper*. National Bureau of Economic Research; 2019. www.nber.org
23. Song LD, Saghafian S. The spillover effects of hospital closures on the efficiency and quality of other hospitals. *John F. Kennedy School of Government Faculty Research Working Paper Series*. John F. Kennedy School of Government Faculty; 2021.
24. Joynt KE, Chatterjee P, Orav EJ, Jha AK. Hospital closures had no measurable impact on local hospitalization rates or mortality rates, 2003–2011. *Health Aff*. 2015;34(5):1-7.
25. Niu J, Saeed MK, Winkelmayer WC, Erickson KF. Patient health outcomes following dialysis facility closures in the United States. *J Am Soc Nephrol*. 2021;32(10):2613-2621.
26. Merrell MA. The Association of Rural Hospital Closures with In-hospital and 30-day Post hospital Discharge from Emergency Care Sensitive Conditions. *Doctoral dissertation*. Norman J. Arnold School of Public Health, University of South Carolina; 2019. www.scholarcommons.sc.edu
27. Sharma H, Bin Abdul Baten R, Ullrich F, MacKinney AC, Mueller KJ. Nursing home closures and access to post-acute care and long-term care services in rural areas. *J Rural Health*. 2024;40(3):1-8.
28. Countouris M, Gilmore S, Yonas M. Exploring the impact of a community hospital closure on older adults: a focus group study. *Health Place*. 2014;26:143-148.
29. MacKinney AC, Dudley D, Schoephoerster G. Aging well in rural america—the role and status of healthcare. *Generations*. 2019;43(2):46-54.
30. Mills CA, Yeager VA, Unroe KT, Holmes A, Blackburn J. The impact of rural general hospital closures on communities—a systematic review of the literature. *J Rural Health*. 2024;40(2):1-11.
31. Professions HRSABoH. *Area Health Resource Files*. National Archives Catalog. U.S. Department of Health and Human Services; 1978–2020.
32. U.S. Department of Agriculture ERS. 2013 Rural–Urban Continuum Codes. U.S. Department of Agriculture ERS; 2020.
33. Manson S, Schroeder J, Riper DV, Kugler T, Ruggles S. *IPUMS National Historic Geographic Information System*. IPUMS; 2022.
34. U.S. Census Bureau. Substantial Changes to Counties and County Equivalent Entities: 1970–Present. https://www.census.gov/programs-surveys/geography/technical-documentation/county-changes.html
35. ArcGIS Pro [computer program]. Version 3.1.3. Redlands, CA: Environmental Systems Research Institute; 2023.
36. Penchansky R, Thomas JW. The concept of access: definition and relationship to consumer satisfaction. *Med Care*. 1981;19(2):127-140.
37. spmatrix *[computer program]*. Stata Press; 2021.
38. Johnson KM, Lichter DT. Metropolitan reclassification and the urbanization of rural america. *Demography*. 2020;57(5):1929-1950.
39. Brooks MM, Mueller JT, Thiede BC. County reclassifications and rural–urban mortality disparities in the United States (1970–2018). *Am J Public Health*. 2020;110(12):1814-1816.
40. Davila H, Mayfield B, Mengeling MA, et al. Home health utilization in the Veterans Health Administration: are there rural and urban differences?. *J Rural Health*. 2025;41(1):e12865.
41. Lutz A. New NRHA Initiative Focuses on Age-friendly Care. *Rural Health Voices*. NHRA; 2023.
42. HHS Press Office. *The Biden-Harris Administration is Taking Actions to Improve the Health of Rural Communities and Help Rural Health Care Providers Stay Open*. HHS Press Office; 2023.
43. Rural Emergency Hospitals. *Hospitals*. https://www.cms.gov/medicare/health-safety-standards/guidance-for-laws-regulations/hospitals/rural-emergency-hospitals

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Bambury EA, Merdjanoff AA, Fergen JT, Mueller JT. Exploring access to critical health services for older adults in rural America from 1990 to 2020. *J Rural Health*. 2025;41:e70004. https://doi.org/10.1111/jrh.70004