



How Geography Shapes Health: Zooming in on Local Patterns

Alyssa R. Jackson, MEd,¹ Divya M. Mathew, MPH,¹ Adam J. Boiman, MS, MPH,¹ Elizabeth R. Phelps,¹ Morgan L. Fleming, MPH,¹ Kristen D. Holtz, PhD¹

Authors' Affiliation:

1. KDH Research & Communication

Background

Geography, in a public health context, refers to the physical places where people live, work, and interact. Geography influences health through exposure to environmental conditions and access to goods and services.¹ Indeed, location influences the ease with which people can obtain resources like healthy food and preventive care, economic opportunities to afford these resources, and social norms that influence health-related behaviors. Communities differ widely in access to quality health care, safe housing, transportation, employment, and other essential supports, all of which contribute to patterns of health and disease. As a result, individuals living in different neighborhoods or regions may experience markedly different health risks and outcomes—even within the same city or state.

Examining health through a geographical lens allows these differences to be identified, measured, and addressed. Geographic patterns in health data can reveal how social and economic conditions cluster within communities, highlighting areas where historical, structural, or cultural barriers may limit opportunities for good health. Understanding geographic patterns is essential for designing effective public health interventions and ensuring initiatives are tailored to the context in which people live, work, and play.

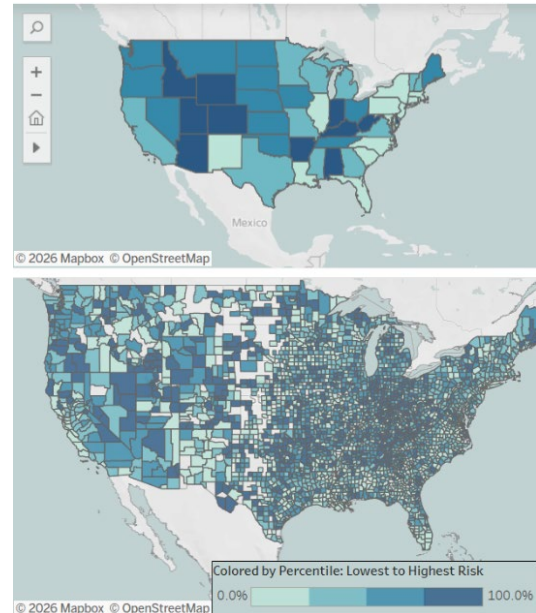
Geography as a Determinant of Health

Social determinants of health (SDOH) are the nonmedical conditions — in which people are born, grow, live, work, and age — that influence health outcomes.² SDOH include factors such as income, education, housing, neighborhood conditions, and access to grocery stores and health care.³ Together, SDOH shape health risks, opportunities, and inequities across populations and are generally not distributed evenly across places; rather, they are shaped by geographical context. Where people live often has a greater influence on health than genetics,³ because geography affects the availability of health-

promoting resources—such as health care services, affordable healthy foods, safe housing, and transportation—as well as exposure to environmental risks and prevailing social norms that shape behaviors.

Figure 1. Importance of geographic scale when examining health outcomes.³⁷

State-level and county-level maps of severe depression rates illustrate how aggregated state data can mask substantial variation within states. County-level analysis provides a more detailed view of local health patterns and helps identify communities where underlying social and environmental conditions may contribute to disparities. For example, although Arizona appears to have one of the highest overall risks at the state level, county-level data reveal that elevated risk is concentrated in specific areas, which drives the state average up.



Thus, assessing health within the context of geographical location is critical for understanding population health patterns. National-level data can identify broad health trends but may obscure where health burdens are concentrated or why certain outcomes differ across areas. Even state-level analyses can mask key variations, as states encompass diverse rural and urban communities with differing resources, occupations, environments, and lived experiences. More granular analyses—such as those at the city, county, or census-tract level—allow for a clearer understanding of localized health patterns and the underlying factors driving disparities.⁴⁻⁶

From States to Neighborhoods: Understanding Geographic Health Disparities

Rural and Urban Health Disparities

One fundamental way in which geography influences health is captured in the distinction between rural and urban communities. By definition, urban and rural settings differ in population density and infrastructure; differences in economic opportunities, service availability, and environmental exposures follow in turn. Together, these factors contribute to measurable differences in health outcomes, access to care, and SDOH. While broad rural–urban comparisons provide useful context, substantial variation can exist within states, regions, and even individual cities, highlighting the need for increasingly granular analyses to fully understand geographic health disparities.

Generally, urban and rural environments present different health advantages and challenges. Higher population density in urban areas often means greater access to health care services, public transportation, and other resources that support health, but it can also increase exposure to air pollution, crowding, and the spread of infectious diseases.⁷ In contrast, rural communities often benefit from a small population and environmental stressors but frequently face limited access to health care providers, longer travel distances to services, and fewer economic and health-supporting resources.⁸

Even within cities, differences exist: densely populated neighborhoods often have more hospitals, clinics, and pharmacies than suburban or peripheral areas, illustrating that city-wide averages can mask pockets of lower access and higher risk. In fact, the U.S. Department of Agriculture reports that rural areas have approximately 5.1 primary care physicians per 10,000 residents compared with about 8.0 per 10,000 in urban areas, along with similarly lower availability of dentists and advanced practice providers.⁹ These disparities in health care access are linked to higher rates of chronic diseases—including cardiovascular disease, diabetes, and respiratory conditions—in many rural communities.¹⁰⁻¹³ Rural areas also

experience disproportionately higher rates of tobacco use and drug overdose mortality,^{13–15} while urban residents may face elevated risks for certain mental health conditions and environmental exposures such as air pollution.^{16–18} Zooming in from state-level to regional, county, and city-level analyses helps reveal which specific communities are most affected, rather than relying on averages that obscure local patterns.

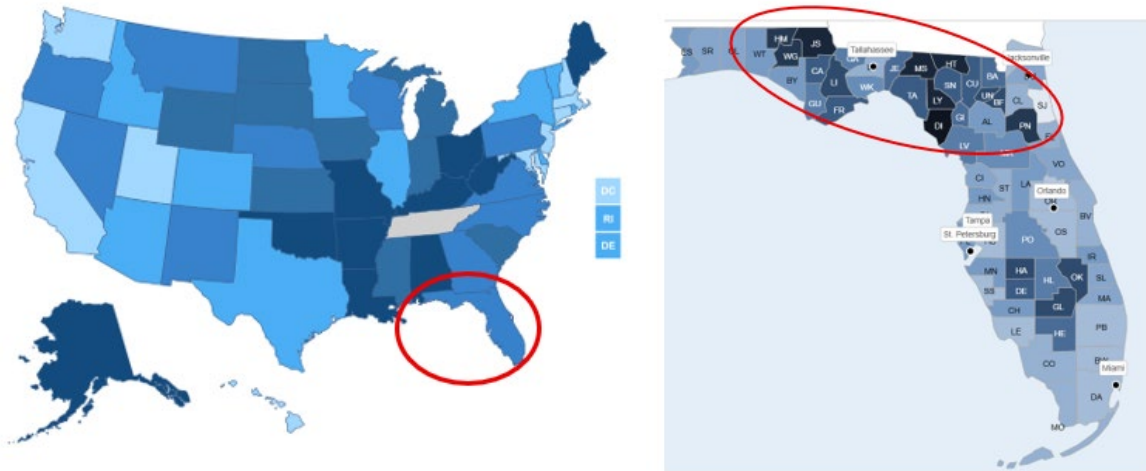


Figure 2. Geographic clustering of smoking prevalence within a single state.^{35,36}

Comparison of adult smoking prevalence at the state level (left) and county level within Florida (right). County-level data reveal a distinct concentration of higher smoking rates in northern Florida, illustrating how health behaviors can cluster geographically and why more localized analyses are important for identifying communities experiencing greater health burdens.

Built Environment

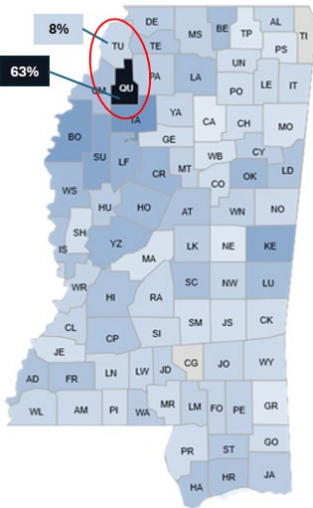
Differences in the built environment further shape health opportunities and risks across geographic settings. The built environment includes the physical structures and spaces in which people live, work, and move—such as housing, streets, sidewalks, businesses, and recreational spaces—and influences opportunities for physical activity, access to healthy foods, and exposure to environmental hazards.¹⁹ Urban areas often provide greater proximity to amenities and services but may expose residents to higher levels of traffic-related air pollution and ozone.¹⁸ Rural areas, by contrast, tend to have more open space but often lack sidewalks, recreational facilities, and reliable transportation options, which can limit opportunities for physical activity and access to care.²⁰ Infrastructure differences can also influence environmental exposures; for example, ozone pollution occurs more frequently in large urban counties, while rural communities may face greater challenges related to drinking water quality and aging infrastructure.¹⁸ Looking at these features at finer geographic levels—county, neighborhood, or census tract—helps identify communities with limited access to healthy water, recreation, or safe infrastructure. For example, some suburban neighborhoods within large cities may have fewer clinics and longer travel times to hospitals than nearby urban cores, creating localized health disparities despite overall city-wide resources.^{21,22}

Culture

Geographic context also shapes culture and social norms that influence health behaviors and care-seeking patterns. In smaller rural communities, where people often know one another, concerns about judgment or gossip may discourage individuals from seeking care for stigmatized conditions such as mental health or substance use disorders.^{23–26} Instead, individuals may rely more heavily on informal support networks such as family or faith communities.²⁷ In contrast, urban environments often provide greater anonymity and a wider range of services, which may reduce barriers to seeking certain types of care despite challenges such as fragmented health systems. At the same time, greater cultural diversity



in urban areas may introduce barriers related to language differences, discrimination, or limited social support networks, which can contribute to isolation and mental health challenges.^{28,29}



Taken together, geographic context shapes cultural norms, social networks, environmental exposures, and access to resources, all of which influence health behaviors and outcomes. To be optimally impactful, public health interventions should be tailored and delivered in the communities most in need. By progressively “zooming in” from states to regions, counties, and neighborhoods, public health professionals can pinpoint areas for intervention, such as urban peripheral neighborhoods with limited clinic access or rural communities with few preventive care resources. This approach ensures interventions are targeted where they are most likely to have impact. As shown in Figures 2 and 3, examining health outcomes at more localized geographic levels can reveal clusters of risk that may remain hidden when data are aggregated at the state level.

Figure 3. Access to Healthy Food in Mississippi: State vs. County-Level Patterns.³⁸

At the state level, 11% of Mississippians have limited access to healthy food, higher than the national average of 6%. **However, a county-level view reveals stark local differences: one county has 63% of residents with limited access, while a neighboring county is only 8%.** This stark contrast illustrates why looking beyond state averages is essential—granular geographic analysis uncovers high-risk communities that might otherwise be overlooked and supports more targeted public health interventions.

Geographic Methods and Data Sources to Strengthen Public Health Research

A range of methods can be used to examine health through a geographic lens, including geographic information systems (GIS), community- and neighborhood-level data, and mixed-method study designs. GIS supports spatial analysis and data visualization by allowing researchers to identify patterns, clusters, and disparities that may be obscured in aggregate data.³⁰

Quantitative geographic methods have been widely used to examine the spatial distribution of infectious and chronic diseases, relationships between the food environment and obesity, walkability and green space access, and availability of health care services.^{30–34} Qualitative methods have also been central to geographic health research, providing deeper insight into how people experience their environments. Both quantitative and qualitative approaches are particularly valuable for examining health inequities among underserved populations, including women, low-income communities, and groups typically concentrated in specific areas such as Alaska Native/American Indian families.³⁰

Mixed-method study designs further strengthen geographic research by integrating quantitative spatial analyses with qualitative data to capture both patterns and lived experiences. For example, a mixed-method study assessing food environments across low-, middle-, and high-income neighborhoods in a Mexican city combined quantitative measures of food outlet density, proximity, pricing, and quality with qualitative interviews to gather culturally-relevant perspectives on food access.³⁰ Together, these approaches provide a more complete understanding of how environments influence health behaviors and outcomes.

Conclusion

By revealing where health risks are concentrated and how they intersect with the local environment, geographic analyses support the tailoring of public health strategies, targeted messaging, and efficient



allocation of resources. They are especially valuable for monitoring and responding to public health emergencies or localized outbreaks, where timely, location-based information is critical for effective intervention.³⁰

Overall, geographic approaches add substantial value to public health research and practice. They provide a more nuanced and insightful picture of health problems and barriers, facilitate engagement with the most appropriate stakeholders and populations, and increase the likelihood that programs, messaging, and resources will reach the audiences most affected.³⁰ By grounding public health decisions in location-based evidence, geographic analyses enhance both the relevance and impact of public health efforts.

References

1. Dummer, T. J. B. (2008). Health geography: supporting public health policy and planning. *CMAJ*, 178(9), 1177–1180. <https://doi.org/10.1503/cmaj.071783>
2. *Social Determinants of Health - Healthy People 2030*. (n.d.). Office of Disease Prevention and Health Promotion. Retrieved February 5, 2026, from <https://odphp.health.gov/healthypeople/priority-areas/social-determinants-health>
3. U.S. Department of Health and Human Services, & Office of Disease Prevention and Health Promotion. (n.d.). *Social Determinants of Health*. Healthy People 2030. Retrieved February 3, 2026, from <https://odphp.health.gov/healthypeople/priority-areas/social-determinants-health>
4. Greenlund, K. J., Lu, H., Wang, Y., Matthews, K. A., LeClercq, J. M., Lee, B., & Carlson, S. A. (2023). PLACES: Local Data for Better Health. *Preventing Chronic Disease*, 19. <https://doi.org/10.5888/pcd19.210459>
5. Porter, D. (2020, December 1). *Neighborhood Level Health Estimates Give Deeper Insight Into Community Health*. <https://www.policymap.com/blog/neighborhood-level-health-estimates-give-deeper-insight-into-community-health>
6. Institute for People, P. and P. (n.d.). *Data Granularity*. Retrieved February 3, 2026, from <https://www.communitycommons.org/entities/69c480a4-7e94-463e-b37d-97f9545254e9>
7. Yuce, H., Stauss, H., & Persad, A. (2024). Use of Population Weighted Density Index for Coronavirus Spread in the United States. *Journal of Health Economics and Outcomes Research*, 11(2), 1–8. <https://doi.org/10.36469/001c.117784>
8. Dobis, E. A., & McGranahan, D. (2021, February 1). *Rural Residents Appear to be More Vulnerable to Serious Infection or Death From Coronavirus COVID-19 | Economic Research Service*. Amber Waves: Economic Research Service. <https://www.ers.usda.gov/amber-waves/2021/february/rural-residents-appear-to-be-more-vulnerable-to-serious-infection-or-death-from-coronavirus-covid-19>
9. Pender, J., Kuhns, M., Yu, C., Larson, J., & Huck, S. (n.d.). *Linkages Between Rural Community Capitals and Healthcare Provision: A Survey of Small Rural Towns in Three U.S. Regions*. Retrieved February 3, 2026, from www.ers.usda.gov
10. Centers for Disease Control and Prevention (CDC). (2024, December 19). *Preventing Chronic Diseases and Promoting Health in Rural Communities*. Advancing Health Equity in Chronic Disease. <https://www.cdc.gov/health-equity-chronic-disease/health-equity-rural-communities/index.html>
11. Steiger, K., Herrin, J., Swarna, K. S., Davis, E. M., & McCoy, R. G. (2024). Disparities in Acute



- and Chronic Complications of Diabetes Along the U.S. Rural-Urban Continuum. *Diabetes Care*, 47(5), 818–825. <https://doi.org/10.2337/dc23-1552>
12. Khavjou, O., Tayebali, Z., Cho, P., Myers, K., & Zhang, P. (2025). Rural–Urban Disparities in State–Level Diabetes Prevalence Among US Adults, 2021. *Preventing Chronic Disease*, 22. <https://doi.org/10.5888/pcd22.240199>
 13. Goeres, L. M., Gille, A., Furuno, J. P., Erten-Lyons, D., Hartung, D. M., Calvert, J. F., Ahmed, S. M., & Lee, D. S. H. (2015). Rural-Urban Differences in Chronic Disease and Drug Utilization in Older Oregonians. *The Journal of Rural Health: Official Journal of the American Rural Health Association and the National Rural Health Care Association*, 32(3), 269. <https://doi.org/10.1111/jrh.12153>
 14. Centers For Disease Control and Prevention (CDC). (2024, May 16). *Drug Overdose in Rural America as a Public Health Issue*. Rural Health. <https://www.cdc.gov/rural-health/php/public-health-strategy/public-health-considerations-for-drug-overdose-in-rural-america.html>
 15. Rural Health Information Hub. (2025, August 15). *Substance Use and Misuse in Rural Areas*. <https://www.ruralhealthinfo.org/topics/substance-use>
 16. Galea, S., Uddin, M., & Koenen, K. (2011). The urban environment and mental disorders: Epigenetic links. *Epigenetics*, 6(4), 400. <https://doi.org/10.4161/epi.6.4.14944>
 17. American Psychiatric Association. (2021, February 26). *City Living and Mental Well-being*. <https://www.psychiatry.org/news-room/apa-blogs/city-living-and-mental-well-being>
 18. Strosnider, H., Kennedy, C., Monti, M., & Yip, F. (2023). Rural and Urban Differences in Air Quality, 2008–2012, and Community Drinking Water Quality, 2010–2015 — United States. *MMWR. Surveillance Summaries*, 66(13). <https://doi.org/10.15585/mmwr.ss6613a1>
 19. *Built Environment Assessment Tool and Manual*. (2024, February 7). CDC. <https://www.cdc.gov/physical-activity/php/built-environment-assessment/index.html>
 20. Whitfield, G. P., Carlson, S. A., Ussery, E. N., Watson, K. B., Berrigan, D., & Fulton, J. E. (2019). National-Level Environmental Perceptions and Walking among Urban and Rural Residents: Informing Surveillance of Walkability. *Preventive Medicine*, 123, 101. <https://doi.org/10.1016/j.ypmed.2019.03.019>
 21. Jackson, J. L., & Williams, J. S. (2024). Exploring and Reducing the Impact of Neighborhoods on Health Disparities. *JAMA Network Open*, 7(5), e2410206–e2410206. <https://doi.org/10.1001/jamanetworkopen.2024.10206>
 22. Khan, S. U. (2024). Zip Code Health Disparities: Mapping Cardiovascular Inequities at the Neighborhood Level. *Methodist DeBakey Cardiovascular Journal*, 20(5), 6. <https://doi.org/10.14797/mdcvj.1457>
 23. Anderson, C., & Shirako, A. (2023). The Morality Map: Does living in a smaller community cause greater concern for moral reputation? *Current Research in Ecological and Social Psychology*, 4(2), 100120. <https://doi.org/10.1037/0022-3514.94.2.320>
 24. *Confronting Mental Health Challenges in Rural America | NAMI: National Alliance on Mental Illness*. (n.d.). Retrieved February 5, 2026, from <https://www.nami.org/blog/confronting-mental-health-challenges-in-rural-america/>
 25. Crumb, L., Mingo, T. M., & Crowe, A. (2019). “Get over it and move on”: The impact of mental illness stigma in rural, low-income United States populations. *Mental Health & Prevention*, 13, 143–148. <https://doi.org/10.1016/j.mhp.2019.01.010>
 26. Coombs, N. C., Campbell, D. G., & Caringi, J. (2022). A qualitative study of rural healthcare providers’ views of social, cultural, and programmatic barriers to healthcare access. *BMC Health Services Research* 2022 22:1, 22(1), 438-. <https://doi.org/10.1186/s12913-022-07829->



- 2
27. Rawal, S., Snead, C. A., Soiro, F. D., Lawrence, J., Rivers, B. M., & Young, H. N. (2025). Facilitators and barriers to implementing the Diabetes Prevention Program in rural church settings: A qualitative study using the Consolidated Framework for Implementation Research. *Journal of Rural Health, 41*(2), e12888. <https://doi.org/10.1111/jrh.12888>
 28. Cacciatore, S., Mao, S., Nuñez, M. V., Massaro, C., Spadafora, L., Bernardi, M., Perone, F., Sabouret, P., Biondi-Zoccai, G., Banach, M., Calvani, R., Tosato, M., Marzetti, E., & Landi, F. (2025). Urban health inequities and healthy longevity: traditional and emerging risk factors across the cities and policy implications. *Aging Clinical and Experimental Research, 37*(1), 143. <https://doi.org/10.1007/s40520-025-03052-1>
 29. Eagle Gate College. (2024, August 2). *The Importance of Cultural Diversity in Healthcare*. <https://www.eaglegatecollege.edu/blog/the-importance-of-cultural-diversity-in-healthcare/>
 30. Vine, M. M., Mulligan, K., Harris, R., & Dean, J. L. (2023). The Impact of Health Geography on Public Health Research, Policy, and Practice in Canada. *International Journal of Environmental Research and Public Health 2023, Vol. 20, 20*(18). <https://doi.org/10.3390/ijerph20186735>
 31. Augustin, J., Andrees, V., Walsh, D., Reintjes, R., & Koller, D. (2023). Spatial Aspects of Health—Developing a Conceptual Framework. *International Journal of Environmental Research and Public Health, 20*(3), 1817. <https://doi.org/10.3390/ijerph20031817>
 32. Pineda, E., Stockton, J., Scholes, S., Lassale, C., & Mindell, J. S. (2024). Food environment and obesity: a systematic review and meta-analysis. *BMJ Nutrition, Prevention & Health, 7*(1), 204. <https://doi.org/10.1136/bmjnph-2023-000663>
 33. Wali, B., Frank, L. D., Chapman, J., & Fox, E. H. (2024). Role of walkability, bike infrastructure, and greenspace in combatting chronic diseases: A heterogeneous ecological analysis in the United States. *Sustainable Cities and Society, 113*, 105550. <https://doi.org/10.1016/j.scs.2024.105550>
 34. Cheng, Y., Bai, Y., Yang, J., Tan, X., Xu, T., & Cheng, R. (2024). Analysis and prediction of infectious diseases based on spatial visualization and machine learning. *Scientific Reports, 14*(1), 28659. <https://doi.org/10.1038/s41598-024-80058-1>
 35. America's Health Rankings. (2024). *Explore Smoking in the United States*. United Health Foundation. <https://www.americashealthrankings.org/explore/measures/Smoking>
 36. County Health Rankings & Roadmaps. (2025). *Florida*. County Health Rankings & Roadmaps. https://www.countyhealthrankings.org/health-data/florida?year=2025&measure=Adult+Smoking*
 37. Mental Health America. (n.d.). *State and County Dashboard*. Mental Health America. Retrieved March 16, 2026, from <https://mhanational.org/data-in-your-community/mha-state-county-data/>
 38. County Health Rankings & Roadmaps. (n.d.). *Mississippi*. Retrieved March 16, 2026, from https://www.countyhealthrankings.org/health-data/mississippi?year=2025&measure=Limited+Access+to+Healthy+Foods*



Acknowledgements

This research was self-funded.

ALYSSA R. JACKSON, MEd is a Research Associate at KDH Research & Communication

DIVYA M. MATHEW, MPH is a Research Assistant at KDH Research & Communication

ADAM J. BOIMAN, MS, MPH is a Research Assistant at KDH Research & Communication

ELIZABETH R. PHELPS is a Research Associate at KDH Research & Communication

MORGAN L. FLEMING, MPH is a Senior Account Manager at KDH Research & Communication

KRISTEN D. HOLTZ, PhD is the Founder and President at KDH Research & Communication



145 15th Street NE
Suite 831
Atlanta, GA 30309

www.kdhrc.com
publicaffairs@kdhrc.com

KDH RESEARCH & COMMUNICATION is a non-partisan, public health, research and communications agency. The goal of the "Informing Public Health" brief series is to disseminate innovative, objective, and timely information to solve public health and other social issues. KDHRc actively contributes to a future when all people can find, understand, and act on information to safeguard the health of themselves, their families, and their communities.

The views expressed here are those of the authors and do not necessarily reflect those of KDH Research & Communication, its board, or funders. Permission is granted for reproduction of this document with attribution to KDH Research & Communication.