



## RESEARCH BRIEF #48

July 20, 2021

### Flood Risk is Higher in Rural and Disadvantaged Communities

Danielle Rhubart and Yue Sun

Flooding has become more common and poses risks to the health and well-being of individuals, families, and communities.<sup>1,2</sup> However, not all places face the same risk of flooding.<sup>3,4</sup> Identifying places with flooding risk is essential for targeting resources and developing policies that prevent adverse outcomes when flooding occurs. Therefore, we examined how flood risk varies across places based on their demographic and social characteristics.

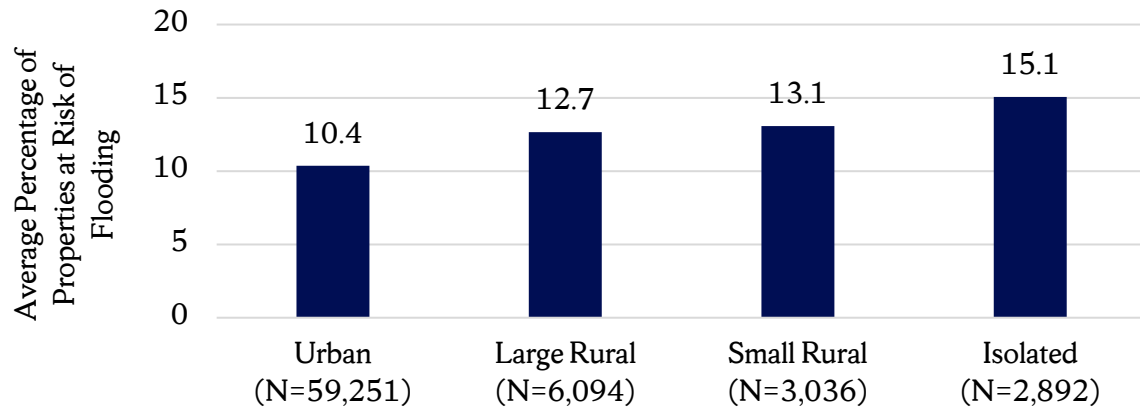
We merged flood risk data with data on rural-urban status, socioeconomic composition, and demographic composition for all census tracts (neighborhoods) in the lower 48 states of the U.S. We then examined if the share of properties at risk of flooding varied across different types of communities.

#### KEY FINDINGS

- Rural census tracts have larger relative shares of properties at risk of flooding.
- Most rural flooding is clustered in Appalachia and the Northwest.
- Tracts with larger shares of older adults and socioeconomically vulnerable populations have larger relative shares of properties at risk of flooding.

### Flood Risk is Higher in Rural Neighborhoods

Rural census tracts have larger percentages of properties at risk of flooding compared to urban tracts (see Figure 1). Compared to an average of 10.4% of properties at risk of flooding in urban census tracts, the average percentage of properties at risk increases to 12.7% in large rural tracts, 13.1% in small rural tracts, and 15.1% in isolated rural tracts. Most rural tracts with high flood risk are clustered in Appalachia and the Northwest. That isolated tracts have the largest share of properties at risk is concerning given that it can be more challenging to coordinate services in these areas, and flood mitigation efforts can be more costly due to dispersed populations.<sup>5</sup>

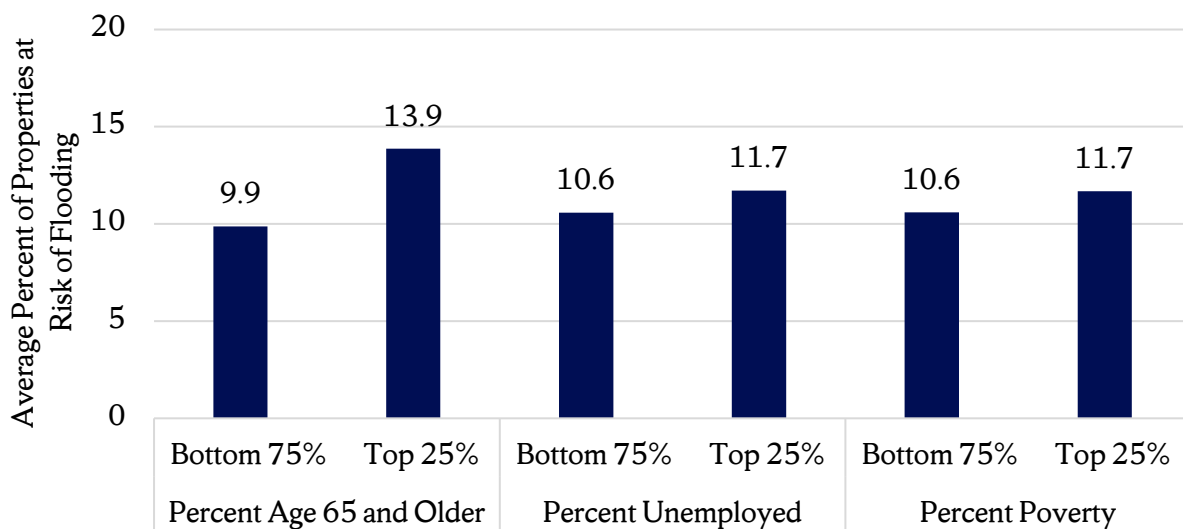


**Figure 1. Flood Risk is Higher in Rural Census Tracts**

Data Source: First Street Foundation Flood Risk Data for 2020, version 1.0 N=71,273 tracts.

### Flood-Prone Neighborhoods are More Socioeconomically Disadvantaged

Property flooding risk is also higher in neighborhoods with larger shares of older adults and economically-disadvantaged residents (see Figure 2). Compared to Census tracts with the largest shares of older adults (top 25<sup>th</sup> percentile) have an average of 13.9% of properties at risk of flooding compared to tracts in the bottom 75<sup>th</sup> percentile of older adult population. Census tracts with higher rates of poverty and unemployment also face elevated flood risk compared to tracts with lower rates of poverty and unemployment. These findings held even after controlling for multiple other neighborhood characteristics. Elevated flood risk in more socioeconomically disadvantaged and vulnerable neighborhoods is concerning given that these populations have fewer resources to prevent and recover from flooding<sup>6,7</sup> - thus exacerbating their existing disadvantages. Older adults, in particular, may have difficulty relocating and may be at risk of serious injury or even death due to flooding.



**Figure 2. Tracts with Larger Shares of Older Adults and Vulnerable Populations have Larger Shares of Properties at Risk of Flooding**

Data Source: First Street Foundation data version 1.0 (FSF 2020) and American Community Survey 5-year estimates (2015-2019) (U.S. Census 2020). N=71,273 Census tracts.

## Policies to Reduce the Negative Impacts of Flooding

Rural areas with elevated flood risk should be prioritized for outreach efforts to register residents for subsidies for the National Flood Insurance Program and, in extreme cases, flood buyout easements. In addition, state and local governments should work with and provide support to Area Agencies on Aging to coordinate outreach efforts to communities with larger relative shares of older adults who are facing elevated flood risk. This could include evacuation and resource distribution resources as well as coordinators to help older adults access government subsidies for flood insurance and post-flood recovery resources to rebuild. Similar efforts should be pursued in high poverty communities with large shares of properties at risk. Local governments could partner with and support local service agencies in connecting low-income residents and subsidizing their access to flood insurance, property mitigation and recovery resources, and buy-out programs.

## Data and Methods

We used census tract level data from the First Street Foundation Flood Lab<sup>8</sup> containing the percent of properties with flood risk for 2020, sociodemographic data from the 2015-2019 American Community Survey, and rural-urban status from the 2010 Rural-Urban Commuting Area codes by the Economic Research Service.<sup>9</sup> For Figure 1, Urban: Tracts in metro areas and micropolitan, small town, and isolated tracts with secondary commuter flows of 30-50 percent to an urbanized area; Large rural: Tracts in micropolitan areas with secondary commuter flows of less than 30 percent to an urbanized area; Small rural: Tracts in small town areas and with secondary commuter flows of less than 30 percent to an urbanized area or with secondary flows between 30 and 50 percent to an urban cluster; and Isolated: Tracts in rural areas with no primary commuter flows to an urbanized area or cluster and with secondary commuter flows of less than 30 percent to an urban area. For a full description of the data and methods used, please [see the published article](#).

## References

1. Brody, S., Highfield, W., & Kang, J. (2011). *The causes and consequences of flooding in the United States*. Cambridge: Cambridge University Press.
2. Simpson-Houseley, P., & De Man, A. (1989). Flood experience and posttraumatic trait anxiety in Appalachia. *Psychological Reports*, 64(3), 896-898.
3. Ueland, J., & Warf, B. (2006). Racialized topographies: altitude and race in Southern cities. *Geographical Review*, 96(1), 50-78.
4. Tate, E., A. Rahman, C. Emrich, and C. Sampson (2021). Flood exposure and social vulnerability in the United States. *Natural Hazards*, 106(1), 435-457.
5. Prelog, A. J., & Miller, L. M. (2013). Perceptions of Disaster Risk and Vulnerability in Rural Texas. *Journal of Rural Social Sciences*, 28(3), 1-31.
6. Fothergill, A., & Peek, L. (2004). Poverty and disasters in the United States: A review of recent sociological findings. *Natural Hazards*, 32: 89-110.
7. Tyler, J., Sadiq, A., & Noonan, D. S. (2019). A Review of the Community Flood Risk Management Literature in the USA: Lessons for Improving Community Resilience to Floods. *Natural Hazards*, 96, 1223-1248.
8. First Street Foundation. (2020). First Street Foundation Flood Model Aggregate Data - Version 1.0.0 (CC 4.0 BY-NC-SA). <https://creativecommons.org/licenses/by-nc-sa/4.0/>
9. Economic Research Service. (2019). Rural Urban Commuting Areas. United States Department of Agriculture <https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/documentation/>. Accessed April 21, 2021.

## Acknowledgments

The authors acknowledge support from the National Institute on Aging (NIA) Interdisciplinary

Network on Rural Population Health and Aging (R24AG065159) and the USDA Agricultural Experiment Station Multistate Research Project: W4001, Social, Economic and Environmental Causes and Consequences of Demographic Change in Rural America. The authors also acknowledge the First Street Foundation for providing access to the flood risk data. The authors also extend appreciation to Dr. Shannon Monnat for editing an earlier version of this brief.

### **About the Authors**

**Danielle Rhubart** ([dcr185@psu.edu](mailto:dcr185@psu.edu)) is an Assistant Professor of Biobehavioral Health and Research Associate in the Population Research Institute at The Pennsylvania State University and faculty affiliate of the Lerner Center for Public Health Promotion in the Maxwell School of Citizenship and Public Affairs at Syracuse University (SU). **Yue Sun** ([ysun46@syr.edu](mailto:ysun46@syr.edu)) is a PhD student in the Department of Sociology, a Lerner Graduate Fellow, and an Affiliate of the Policy, Place, and Population Health Lab in the Maxwell School at SU.

The mission of the SU Lerner Center for Public Health Promotion is to improve population and community health through research, education, and outreach focused on the social, spatial, and structural determinants of physical, mental, and behavioral health and health disparities.

426 Eggers Hall | Syracuse | New York | 13244  
[syracuse.edu](http://syracuse.edu) | [lernercenter.syr.edu](http://lernercenter.syr.edu)