



The Geography of Disability and Food Insecurity

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Numerous studies have documented higher rates of food insecurity among households that have at least one person with a disability than for households in which no one has a disability.¹ High expenses for health care and adaptive equipment, for example, may force people with disabilities to make trade-offs between buying food and paying for their other needs.² Despite a wealth of research into factors related to food insecurity and research on how disability is associated with economic outcomes, our knowledge of the relationship between disability and food insecurity remains limited. Largely missing from existing studies is how access to food influences the relationship between disability and food insecurity. In this brief and its accompanying paper,³ we seek to fill this gap in the literature by using geographic data on food establishments combined with other relevant demographic and economic information. Unlike in previous studies, these data allow us to measure *access* to food by measuring the availability and accessibility of food and related establishments,⁴ which enables us to more accurately account for the association between disability and food insecurity.

We find that counties with high rates of people with disabilities also have limited availability and accessibility of food establishments (respectively defined as the number of food establishments per 1,000 residents and the number of food establishments per square mile). Digging deeper, we find that these same counties also have a larger share of food establishments that are likelier to provide unhealthy food options, including smaller grocery stores, convenience stores, limited-service restaurants, pharmacies, and gas stations. We find a strong positive relationship between these types of

food establishments and disability rates. Importantly, the data show a strong relationship between disability and food insecurity, even after accounting for access to food.

Access to Food Establishments in Areas with Lower and High Disability Rates

Throughout this brief, we divide the more than 3,000 counties in the United States into two groups based on the number of people who have a disability in each county: “high” disability counties are those in which disability rates are in the top 25 percent of the overall distribution, and “lower” disability counties are those with rates in the bottom 75 percent of the distribution. By comparing these two groups of counties—roughly 750 counties in the former and 2,250 in the latter—we hope to gain a better perspective on differences in access to food, which can be seen in the results presented in table 1.

TABLE 1

County-Level Food Statistics in 2019, by Areas with Low and High Rates of Disability

	Lower-disability counties	High-disability counties
Share of population that is food insecure	12.00%	16.60%
Mean cost per meal	\$3.22	\$3.08
Number of food establishments per 1,000 residents		
Grocery	0.31	0.38
< 50 employees	0.27	0.34
50+ employees	0.05	0.04
Grocery (other)	0.15	0.11
Convenience store	0.32	0.38
Warehouse club	0.00	0.00
Restaurant (full service)	1.05	0.93
Restaurant (limited service)	0.71	0.65
Restaurant (other)	0.18	0.12
Department store	0.01	0.01
Pharmacy	0.02	0.02
Gas station	0.19	0.25
Total food establishments	2.94	2.84

TABLE 1, CONTINUED

	Lower-disability counties	High-disability counties
Number of food establishments per square mile		
Grocery	0.11	0.02
< 50 employees	0.09	0.02
50+ employees	0.02	0.00
Grocery (other)	0.06	0.01
Convenience store	0.07	0.02
Warehouse club	0.00	0.00
Restaurant (full service)	0.53	0.05
Restaurant (limited service)	0.31	0.05
Restaurant (other)	0.11	0.01
Department store	0.00	0.00
Pharmacy	0.01	0.00
Gas station	0.02	0.01
Total food establishments	1.22	0.16

Source: Authors' calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, "The Relationship between Disability Insurance Receipt and Food Insecurity" (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

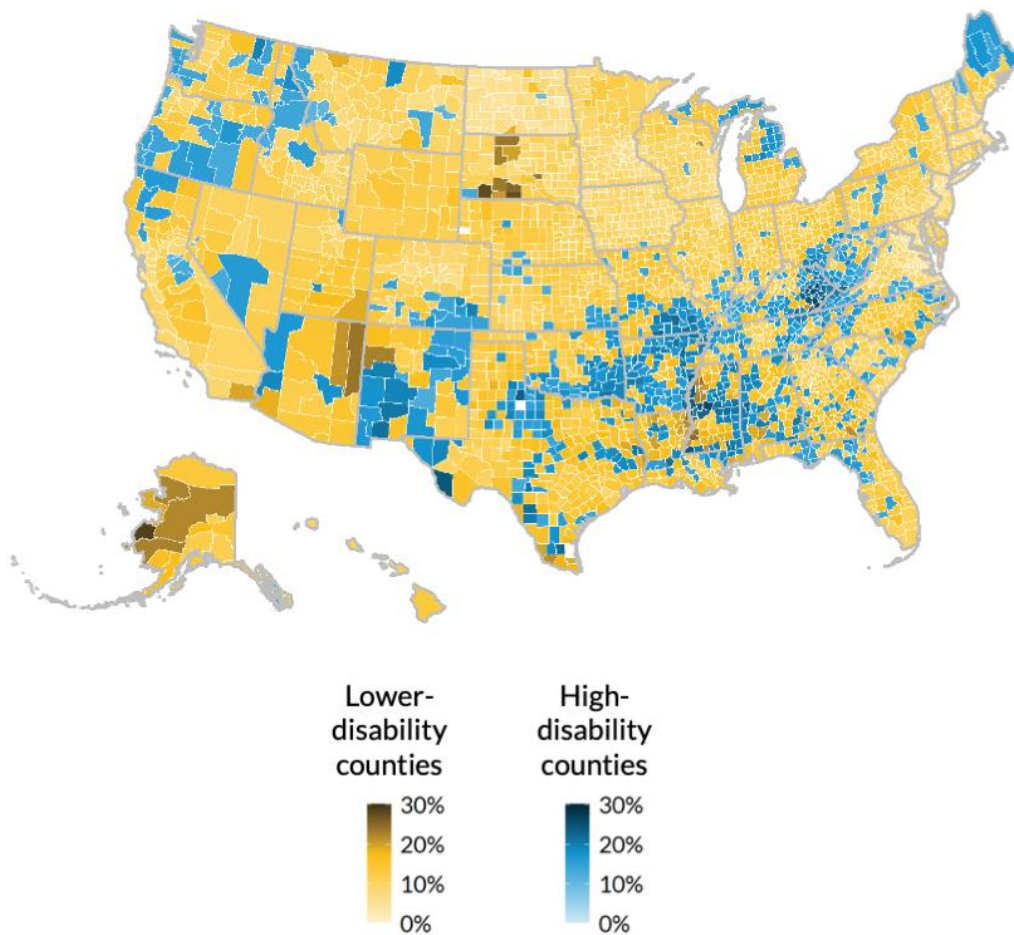
Note: High-disability counties are defined as having a share of people with disabilities at or above the 75th percentile of the nation; lower-disability counties are defined as having a share of people with disabilities below the 75th percentile.

Consistent with other studies, we find that the average food insecurity rate is higher (by 4.6 percentage points) in counties with high rates of disability than in counties with lower rates of disability. We also find that counties with high rates of disability have lower average food costs but more limited access to food sources than do counties with lower rates of disability.⁵

Mirroring existing research,⁶ high-disability counties (shown in shades of blue in figure 1)—and their associated high rates of food insecurity—tend to be clustered in the southeastern part of the United States and in the Appalachian region in southern West Virginia and eastern Kentucky. We also see that most counties in Maine are considered high-disability counties, as are many counties in Michigan and New Mexico. Counties in yellow are those with lower disability rates. They are scattered throughout the country and include several counties with high rates of food insecurity located along the Arizona-New Mexico border and in South Dakota.

FIGURE 1

Share of the Population That Was Food Insecure in Lower- and High-Disability Counties in 2019



Source: Authors' calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, "The Relationship between Disability Insurance Receipt and Food Insecurity" (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

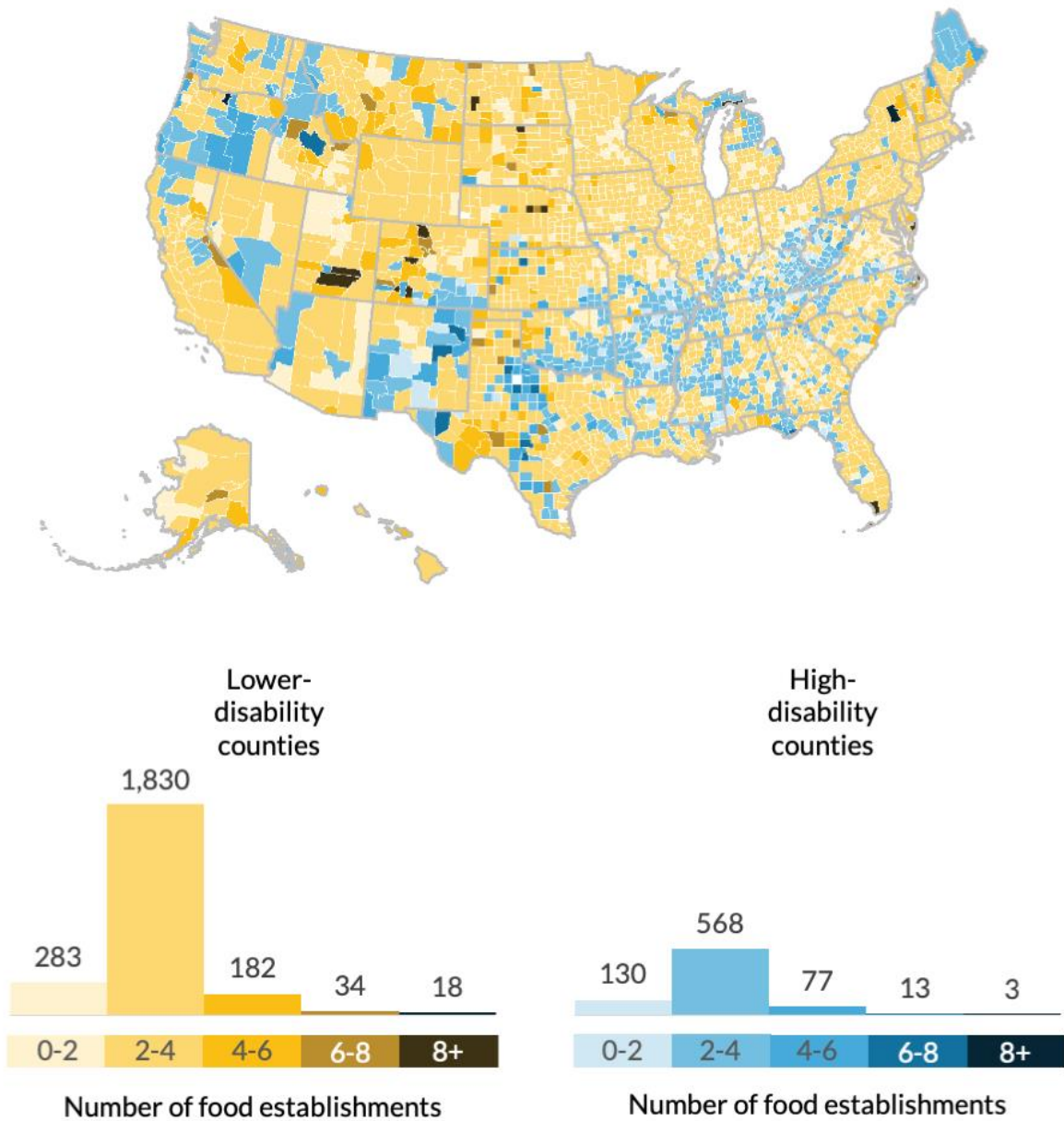
On average, counties with high rates of disability have 2.84 food establishments per 1,000 residents, while counties with lower rates of disability have 2.94 food establishments per 1,000 residents (table 1). Differences in access to food establishments are more pronounced when considering the number per square mile. On average, counties with high rates of disability have only 0.16 food establishments per square mile, and counties with lower rates of disability have 1.22 food establishment per square mile. To put these numbers in perspective, the average US county is about 1,000 square miles, so these numbers translate to 160 establishments in high-disability counties and about 1,220 establishments in lower-disability counties. Thus, high-disability areas have fewer food options to support the size of their population (i.e., lower availability) and their food options are substantially more spread out (i.e., lower accessibility) than in lower-disability areas. This may be especially challenging if people with disabilities additionally have limited mobility and limited transportation options.

Geographic patterns in the number of food establishments for high- and lower-disability counties largely reflect those for food insecurity. Compared with lower-disability counties, high-disability counties have fewer food establishments overall—791 versus 2,347—but a larger share of counties with few food establishments per 1,000 people (figure 2). Counties with between zero and two food establishments per 1,000 residents account for 16 percent (or 130) of counties with high disability rates but only 12 percent (or 283) of those with low disability rates. In contrast, counties with between two and four food establishments per 1,000 residents account for 72 percent (or 568) of counties with high disability rates and 78 percent (or 1,830) of those with low disability rates.

We observe unsurprising patterns in the distribution of food establishments on a per square mile basis. As shown in figure 3, population-dense areas of the country—such as the metropolitan areas of large cities like Chicago, Houston, Los Angeles, Miami, New York City, and San Francisco—have higher densities of food establishments than more rural areas of the country.

FIGURE 2

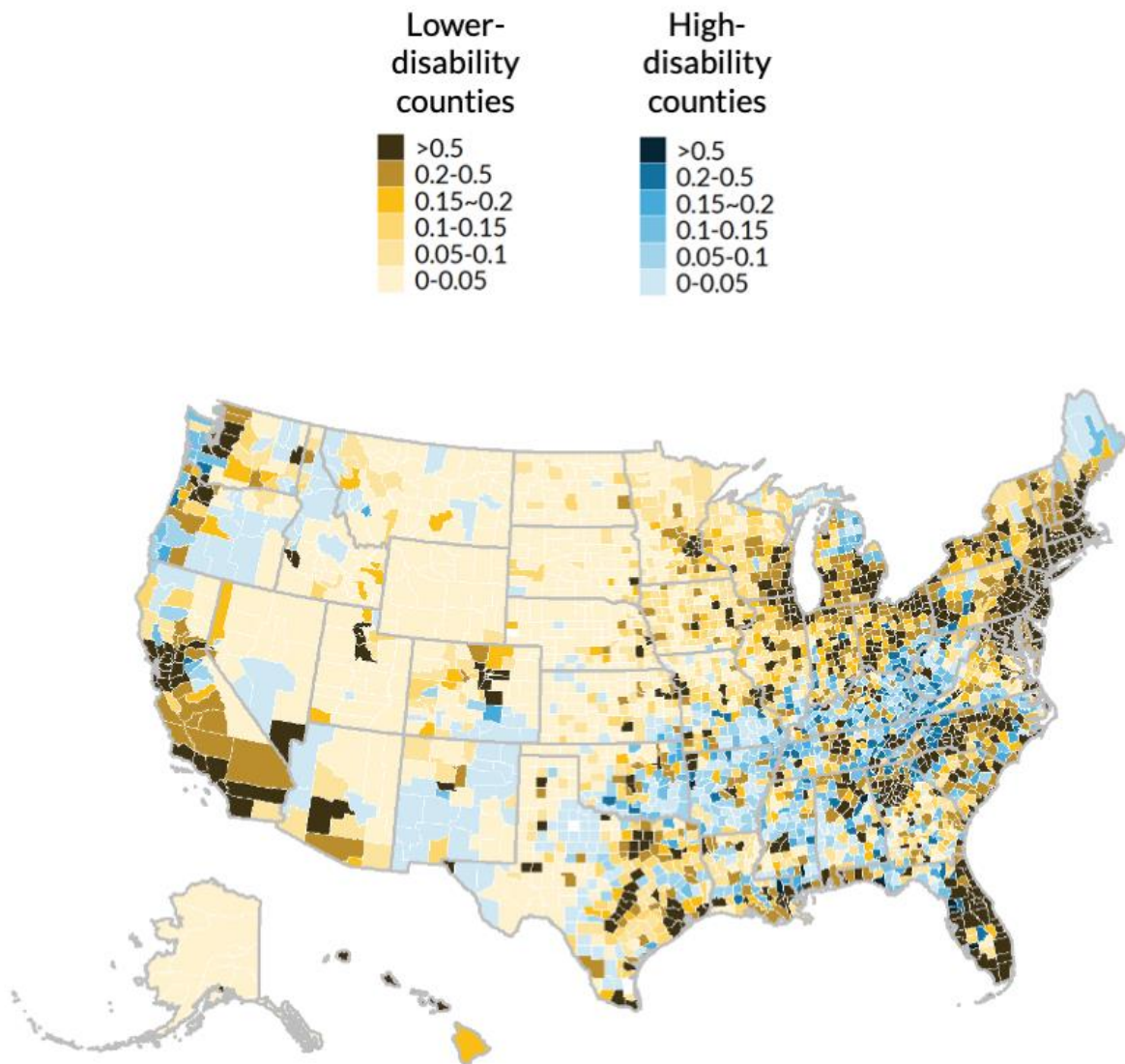
Number of Food Establishments per 1,000 People in Lower- and High-Disability Counties in 2019



Source: Authors' calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, "The Relationship between Disability Insurance Receipt and Food Insecurity" (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

FIGURE 3

Number of Food Establishments per Square Mile in Lower- and High-Disability Counties in 2019



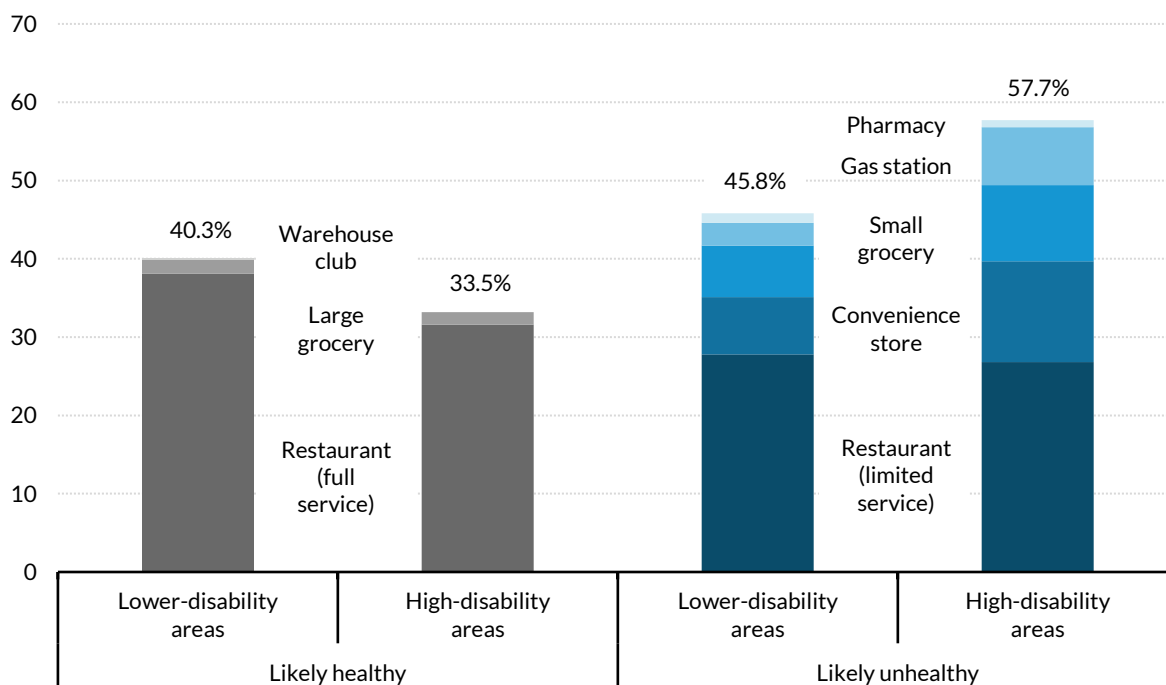
Source: Authors' calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, "The Relationship between Disability Insurance Receipt and Food Insecurity" (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

In addition to having more limited access to food establishments, counties with high rates of disability have a different mix of food establishments than other counties. In these counties, food establishments are more likely to be smaller grocery stores, convenience stores, and gas stations than larger grocery stores and full-service restaurants (table 1).⁷

When we categorize food establishments by whether they are likely to serve healthy or unhealthy food, we find stark differences in the mix of food establishment types between lower- and high-

disability counties (figure 4). We classify “likely healthy” food establishments as larger grocery stores, warehouse clubs, full-service restaurants, and department stores, and “likely unhealthy” food establishments as smaller grocery stores, convenience stores, limited-service restaurants, pharmacies, and gas stations. Our definition of “likely healthy” and “likely unhealthy” food establishments follows conventional wisdom and is based on the assumption that certain categories of food outlets have limited availability of fruits, vegetables, lean proteins, and dairy and a greater abundance of snack foods and sugar-sweetened beverages. Among all food establishments, the percentage that are likely unhealthy is 57.7 percent in counties with a high percentage of residents with disabilities, compared with 45.8 percent in counties with a lower percentage of residents with disabilities.⁸ Not only do high-disability counties have fewer overall food establishments than lower-disability counties, but they also have a higher share of food establishments that we expect to serve less healthy food.

FIGURE 4
Distribution of Food Establishments in 2019, by Areas with Lower and High Rates of Disability



Source: Authors’ calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, “The Relationship between Disability Insurance Receipt and Food Insecurity” (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

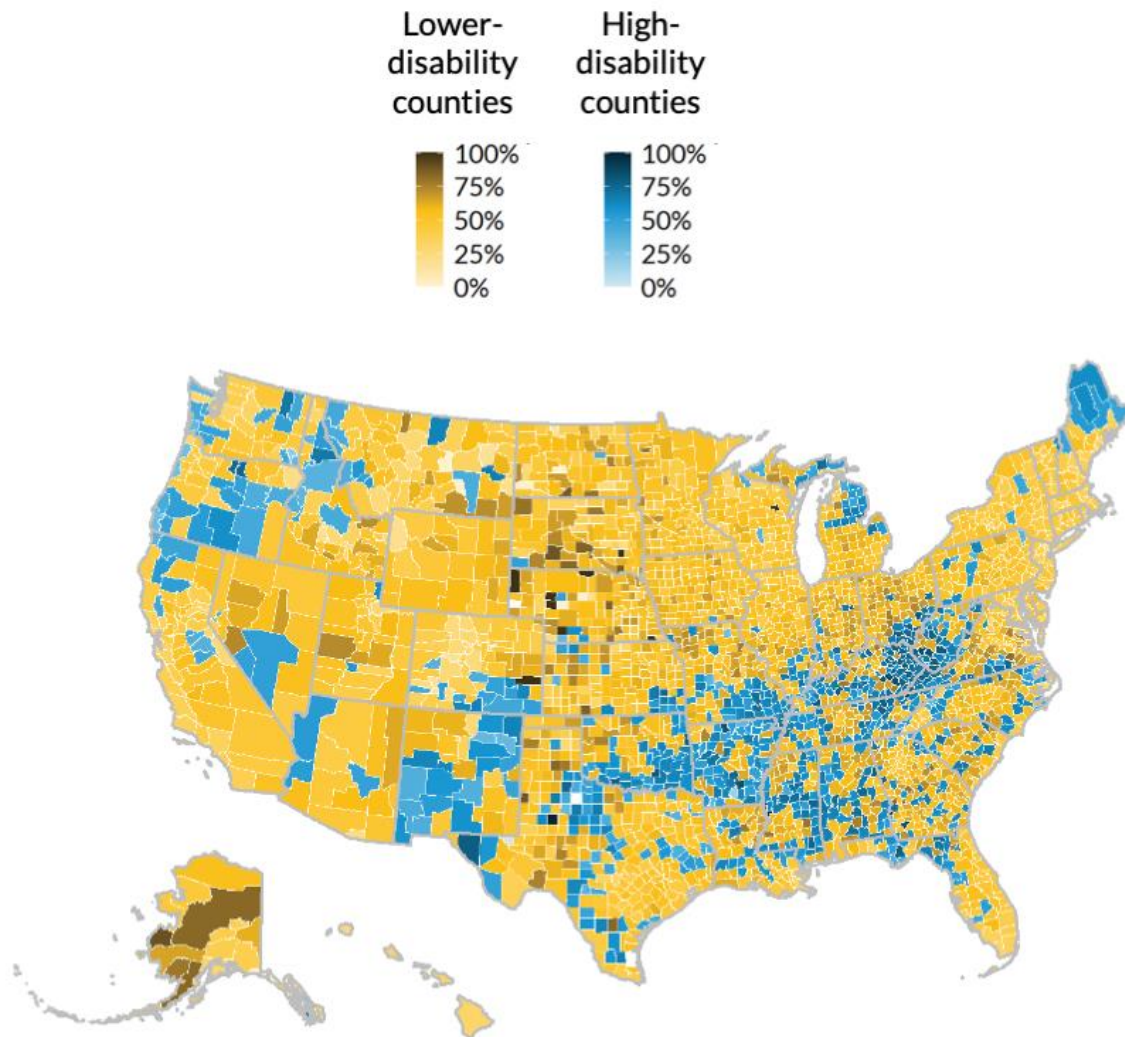
Note: High-disability counties are defined as having a share of people with disabilities at or above the 75th percentile of the nation; lower-disability counties are defined as having a share of people with disabilities below the 75th percentile.

Aggregate numbers mask some important geographic patterns in these different types of food establishments. In figure 5, we see an especially high density of likely unhealthy food establishments in high-disability counties (the darkest blue colors), particularly in the Appalachian region of the country as

well as in parts of Arkansas, Mississippi, and Alabama. We also see high concentrations of unhealthy establishments in lower-disability counties scattered across the country, which are especially pronounced in pockets of Ohio and Alaska and run vertically through the center of the country from North Dakota through Texas.

FIGURE 5

Percentage of Likely Unhealthy Food Establishments in Lower- and High-Disability Counties in 2019



Source: Authors' calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, "The Relationship between Disability Insurance Receipt and Food Insecurity" (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

Notes: Food establishments that are considered "likely unhealthy" include smaller grocery stores (fewer than 50 employees), convenience stores, limited-service restaurants, pharmacies, and gas stations. Food establishments that are considered "likely healthy" include larger grocery stores (50 or more employees), warehouse clubs, and full-service restaurants.

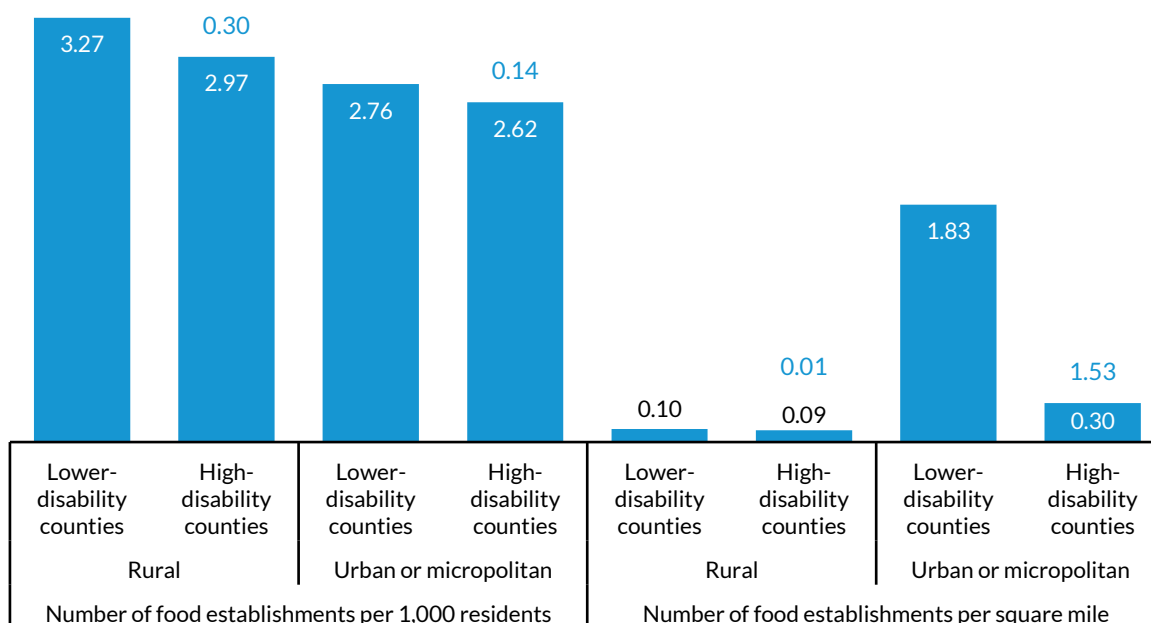
Differences between Rural and Urban Areas

The same patterns for high-disability and lower-disability counties generally hold, even when accounting for differences in urbanization. Overall, food availability and accessibility are more limited in both “rural” (or “non-core” per the National Center for Health Statistics [NCHS] 2013 urban-rural classification scheme) and urban or micropolitan counties (NCHS classification of metropolitan or micropolitan) with higher rates of disability than in those with lower rates of disability. On average, there are 3.27 food establishments per 1,000 residents in lower-disability rural counties compared with 2.97 establishments in high-disability rural counties (figure 6). In urban or micropolitan counties, there are 2.76 establishments in lower-disability counties and 2.62 establishments in high-disability counties. We find the same relationship when comparing the number of food establishments per square mile.

FIGURE 6

County-Level Food Establishment Statistics in 2019, by Areas with Lower and High Rates of Disability and by Urbanization

(Differences shown in blue above the second bar)



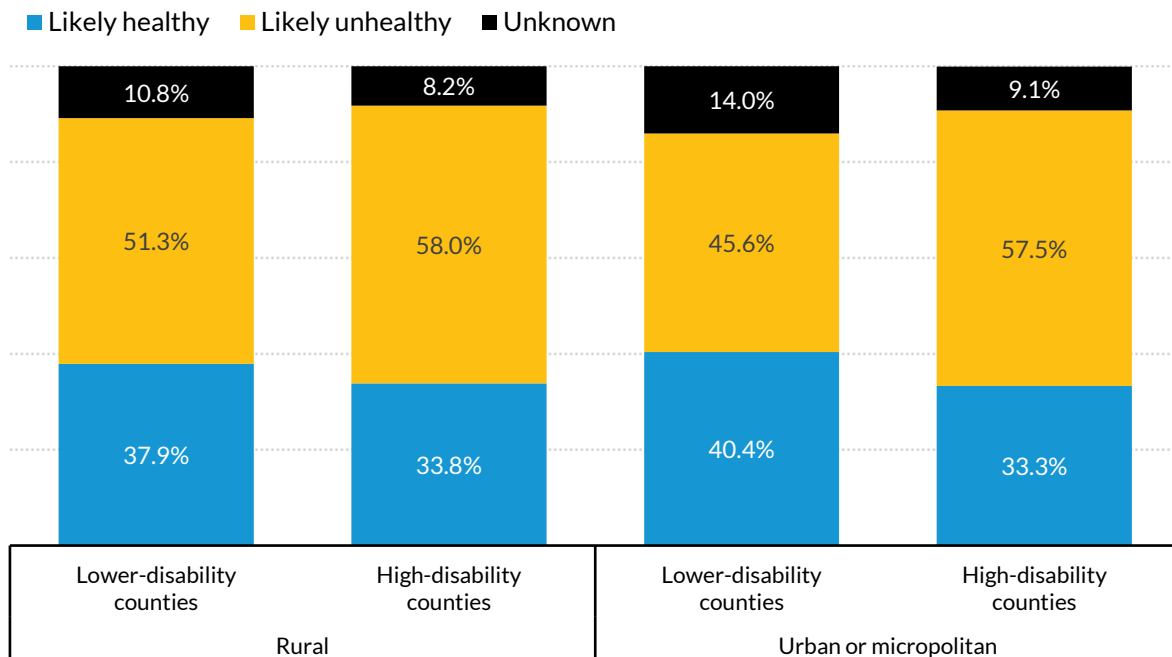
Source: Authors’ calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, “The Relationship between Disability Insurance Receipt and Food Insecurity” (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

Note: High-disability counties are defined as having a share of people with disabilities at or above the 75th percentile of the nation; lower disability counties are defined as having a share of people with disabilities below the 75th percentile.

As shown in figure 7, we find that counties with a high prevalence of disability have a larger share of food establishments that are likely unhealthy and a smaller share of food establishments that are likely

healthy. However, these differences are significantly more pronounced in urban or micropolitan counties than in rural counties. In urban or micropolitan counties, for example, food establishments that are likely unhealthy account for 57.5 percent of all food establishments in counties with high rates of disability and 45.6 percent of all food establishments in counties with lower rates of disability—a difference of 11.9 percentage points. In rural counties, food establishments that are likely unhealthy account for 58.0 percent of all food establishments in counties with high rates of disability and 51.3 percent of all food establishments in counties with lower rates of disability—a difference of only 6.7 percentage points.

FIGURE 7
Distribution of Food Establishments in 2019, by Areas with Lower and High Rates of Disability and by Urbanization



Source: Authors’ calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, “The Relationship between Disability Insurance Receipt and Food Insecurity” (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

Notes: High-disability counties are defined as having a share of people with disabilities at or above the 75th percentile of the nation; lower disability counties are defined as having a share of people with disabilities below the 75th percentile. See figure 5 for definitions of the “likely healthy” and “likely unhealthy” categories.

What we do not know from these tabulations is *where* people eat food or shop for food. While we can identify the specific addresses of the food establishments in our data, we do not know the home addresses of people with disabilities, so we cannot see exactly where people need to travel to make their food purchases. This information would indicate whether people are crossing county lines to do their food shopping and whether that behavior is more or less likely in rural or urban areas. Again, this is an area ripe for further research—by combining our food establishment data with data on disability

status or receipt of benefits in the Social Security Disability Insurance program (assuming the Social Security Administration has address information of beneficiaries), we could at least get a better sense of *specific* access and availability to food establishments.

Select County Profiles

Our data and the scope of this project did not allow us to do a deep dive into every county in the United States, but for purposes of illustration, we explored a handful of counties in 2019. The four counties we examined range in population size and area, from Los Angeles, California, which is large in both population and area; to Billings, North Dakota, which is small in population; to Hickman, Kentucky, which is small in area; to Providence, Rhode Island, which falls between these counties on these different dimensions. We highlight these counties for select metrics in figure 8 along with all other counties in the country shown in blue circles. We studied these counties to demonstrate the variation in the different components of this analysis and how a more detailed, systematic look at specific areas of the country (requiring, of course, more geographically detailed disability data) could provide greater insight into the challenges people with disabilities face accessing healthy foods.

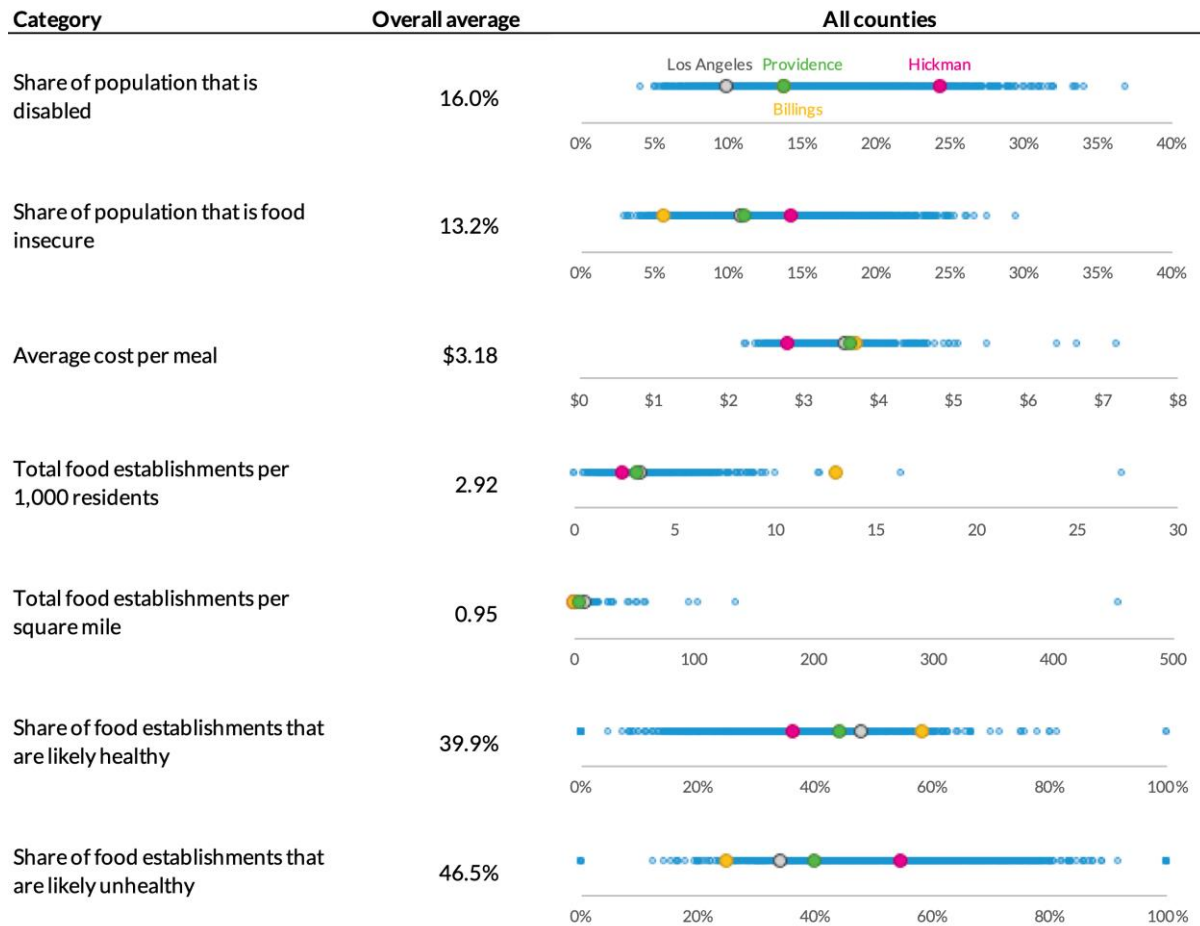
Among the counties profiled, Hickman has the highest percentage of residents with disabilities (24.3 percent). It also has the highest food insecurity rate (14.3 percent) and the lowest average cost per meal (\$2.79). Consistent with our previous findings, it also has a relatively limited number of food establishments—only 2.44 food establishments per 1,000 residents and 0.05 food establishments per square mile. Not only are the availability and accessibility of food establishments limited, but more than half (54.5 percent) likely provide mostly unhealthy food options. That is, of the 11 types of food establishments we identify in our analysis, more than half in Hickman are smaller grocery stores, conveniences stores, limited-service restaurants, and gas stations. Again, we do not know what kind of food these establishments sell; however, because of their size or the nature of their primary business (e.g., selling gasoline), it seems likely that their food selection is fairly limited and primarily convenient—qualities often associated with unhealthy foods.

In contrast, Billings has a lower-than-average disability rate (13.8 percent). Its food insecurity rate is the lowest of the counties profiled (5.6 percent), and it has the highest average cost per meal (\$3.70). It has the largest supply of food establishments (13.02 per 1,000 residents) but is one of the least food accessible (0.01 food establishments per square mile). Yet only a quarter (25.0 percent) of food establishments in the county are likely unhealthy.

Los Angeles and Providence—the two largest counties we include—sit somewhere in the middle of these other two counties. About 10 percent of people in Los Angeles and 13.8 percent of residents in Providence have a disability. Compared with the country as a whole, both counties have more food establishments per capita (3.26 and 3.15, compared with the national average of 2.92) and per square mile (8.11 and 4.89, compared with the national average of 0.95). And while the share of likely unhealthy food establishments in Providence is on par with the national average (39.8 percent compared with 38.9 percent), it is significantly lower in Los Angeles (30.6 percent).

FIGURE 8

Characteristics of Select US Counties in 2019



Source: Authors’ calculations using merged data. See Barbara A. Butrica, Stipica Mudrazija, and Jonathan Schwabish, “The Relationship between Disability Insurance Receipt and Food Insecurity” (Chestnut Hill, MA: Center for Retirement Research at Boston College, 2020).

Notes: Blue dots represent all other counties in the United States. See figure 5 for definitions of the “likely healthy” and “likely unhealthy” categories.

Discussion

In 2019, there were more than 41 million Americans with disabilities, an estimated 35 million people who were food insecure, and 34 million people living in poverty, demonstrating a clear need to better understand how these factors are linked. In this brief and its accompanying paper (Butrica, Mudrazija, and Schwabish 2021), we more accurately capture the relationship between disability and food insecurity by accounting for *access* to food using two measures and a unique dataset of food establishments that is more up to date than other publicly available data sources. We find that counties with a large share of residents with disabilities are also limited in their availability and accessibility of food establishments. These same counties also have a larger share of food establishments that likely

provide mostly unhealthy food options, based on the assumption that certain categories of food outlets have limited availability of fruits, vegetables, lean proteins, and dairy and a greater abundance of snack foods and sugar-sweetened beverages. Importantly, we find a strong relationship between disability and food insecurity even after considering access to food. In the statistical regression (the results of which are not explored here but are shown in detail in the longer paper), we find that a 1 percentage-point increase in the food insecurity rate is associated with a 0.961 percentage-point (6.1 percent) increase in the disability rate.

There are caveats to this analysis that are worth considering. First, our measures of food access, food insecurity, and food prices are incomplete, as we are unable to look consistently at affordability *and* accessibility of healthy foods. In some cases, such as for larger grocery stores, we assume that they are better able to carry healthier foods but are unable to say much about their affordability with our data. In other cases, such as fast food restaurants, we assume that they carry both less healthy and more affordable foods. Second, any comparisons along the metric of affordability are incomplete—comparing affordability of restaurants to grocery stores, for example, is more complicated than a simple price comparison. Third, there are a slew of unmeasured factors that we have not accounted for in our modeling including, for example, administrative policies in the Social Security Disability Income program or factors that might be difficult to measure systematically such as social networks or access to food banks. Also, by focusing exclusively on counties, we disregard possible cross-county-line patterns in access to food.

Understanding the link between disability and food insecurity has potential implications for multiple public assistance programs, including the Supplemental Nutrition Assistance Program, the National School Lunch and School Breakfast programs, and the Social Security Disability Income and Supplemental Security Income programs, not to mention the multitude of nonprofits, food banks, and other community-based organizations that provide assistance and support to people and families who are food insecure or have disabilities. We view this analysis as an early step toward better understanding this relationship.

Notes

- ¹ For example, Brucker et al. (2015); Brucker (2016); Brucker and Coleman-Jensen (2017); Brucker and Nord (2016); Heflin, Altman, and Rodriguez (2019); She and Livermore (2007).
- ² For example, Huang, Guo, and Kim (2010); She and Livermore (2007); Nord and Kantor (2006); and the scoping review by Schwartz, Buliung, and Wilson (2019).
- ³ See Butrica, Mudrazija, and Schwabish (2021).
- ⁴ Penchansky and Thomas (1981) describe access as having multiple dimensions that include availability, accessibility, accommodation, affordability, and acceptability. Our analyses focus on availability and accessibility, but also capture affordability.
- ⁵ Of course, average food costs are not the same as relative food costs. Although the food price data included in the model take national meal costs and local area tax rates into account, two counties with the same average food costs will have different relative costs if residents in one county are wealthier than residents in the other.

- ⁶ See Schimmel Hyde et al. (2020, 2021).
- ⁷ We use the North American Industry Classification System and the Standard Industrial Classification codes to identify establishments that sell food, including department stores, pharmacies, and gas stations. Those that do not sell food are excluded from the analysis.
- ⁸ We believe our definition of “likely healthy” and “likely unhealthy” food establishments follows conventional wisdom, and there is some evidence in the literature (e.g., Bonanno and Li [2015] and the citations within Treuhaft, Karpyn [2010]) to support this taxonomy. Of course, changing these classifications—or having better data on the exact types of foods provided in each type of establishment—might affect our conclusions. Smaller grocery stores may be the exception to this classification because they often offer a wider variety of foods than gas stations but still may not offer a full array of healthy foods such as fruits, vegetables, and lean proteins.

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Barbara Butrica is a senior fellow and labor economist at the Urban Institute with more than two decades of experience conducting research on the economics of aging, including older workers, pensions and retirement plans, Social Security, and retirement security. Her recent studies have examined how caregiving affects work and retirement savings, the role of debt on labor force participation and Social Security benefit claiming, the impact of the Social Security, pension, and tax systems on work incentives at older ages, and strategies for improving the employment prospects of low-income incumbent older workers. She received her PhD in economics from Syracuse University.

Stipica Mudrazija is a senior research associate in the Income and Benefits Policy Center at the Urban Institute, where he studies issues related to population, aging, retirement, intergenerational support, and long-term care for older adults. Before joining the Urban Institute, Mudrazija was a postdoctoral scholar at the Edward R. Roybal Institute on Aging at the University of Southern California, where his research projects focused on the ability of the health care system to provide long-term care to a growing older population of minorities in the United States, the availability of support systems for health and functional ability of older return migrants in Mexico, and the impact of the Great Recession on intergenerational transfers between older parents, adult children, and others. Mudrazija holds a bachelor's degree in economics from the University of Zagreb, a master's degree in public policy from Georgetown University, and a doctorate in public policy from The University of Texas at Austin.

Jonathan Schwabish is a senior fellow in the Income and Benefits Policy Center and a member of Urban's communications team, where he specializes in data visualization and presentation design. His research agenda includes disability insurance, retirement security, and nutrition policy. Schwabish is considered a leader in the data visualization field and is a leading voice for clarity and accessibility in research. He has written on how to best visualize data, including technical aspects of creation, design best practices, and how to communicate social science research in more accessible ways. He received his PhD in economics from Syracuse University.

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