

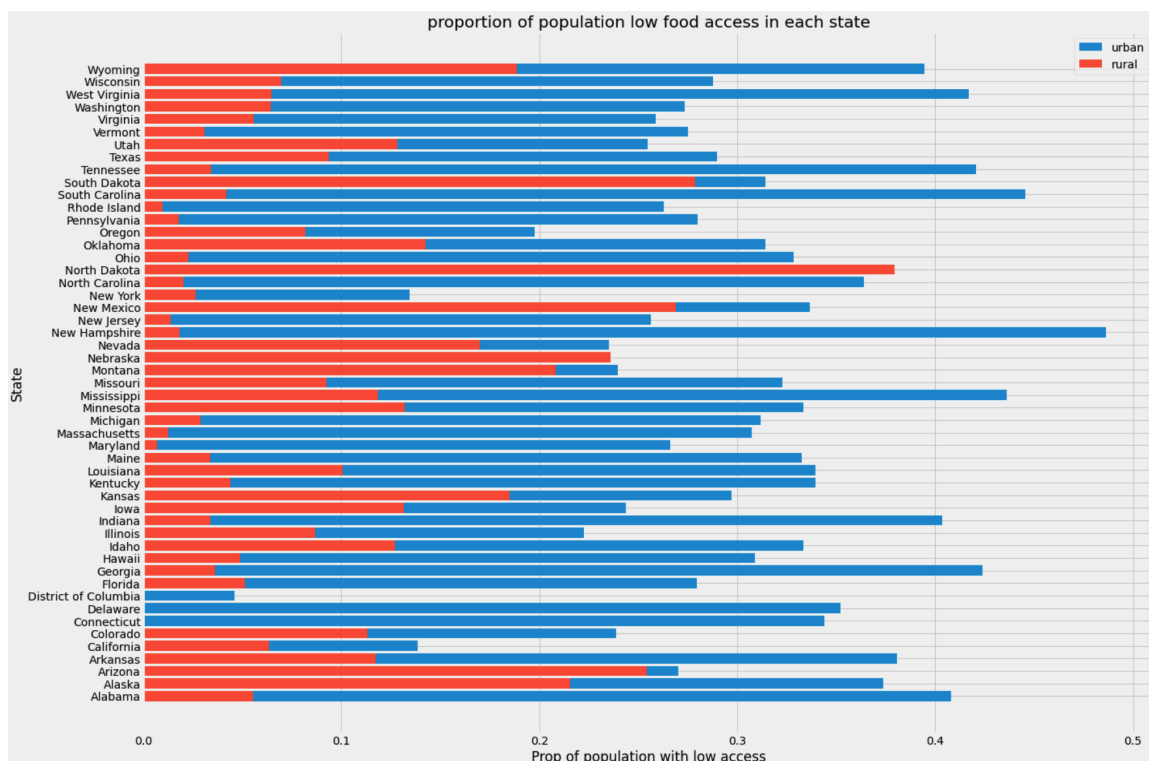
## Food Access Data Research

### Introduction

In the United States, there is a national problem of food scarcity and insecurity where data analysis can be applied to help understand the occurrence and trends of such problems. This data analysis will look at the demographics of food access, the geography of access, and explore the relationship between food access and income which will lead to a general policy recommendation to increase national food access to boost equity and equality. "Food deserts" occur when individuals don't have access to fresh and healthy food. For this analysis, a food desert is defined as anywhere that is more than one mile away from a supermarket in an urban area and 10 miles for rural areas.

### Demographics of Food Access

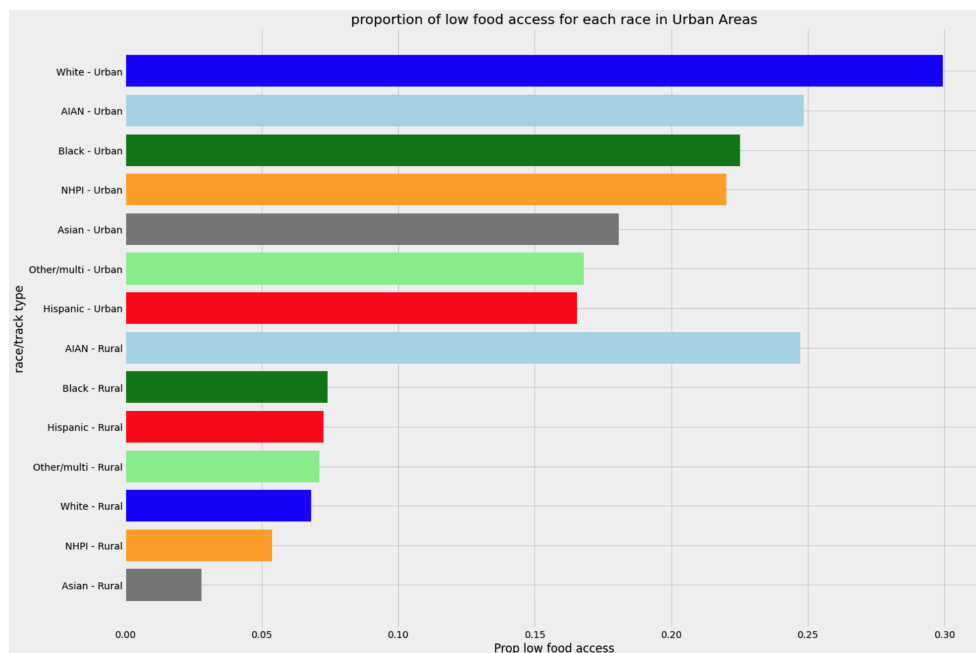
For demographic analysis of food analysis, all data was subsetting into urban and rural areas due to the nature of variation between the two areas. Cross comparisons would lead to confounding results and data weights were not able to be determined due to missing data.



**Figure 1 (left)** shows the 50 states and the corresponding proportion of the population that has low access to supermarkets. Accounting for the fact that most of the US population lives in urban areas, 22.22% of the US lives outside the range of a supermarket. When subsetting this data for the different rural and urban flags, different access

proportions were identified. In urban areas, this number rises to 26.74% of people living more than one mile from a supermarket. In rural areas, on the other hand, only 7.11% of people lived more than 10 miles from a

supermarket. In all states, except for North Dakota, a person living in rural areas is less likely to have low access to supermarkets than people living in urban areas.

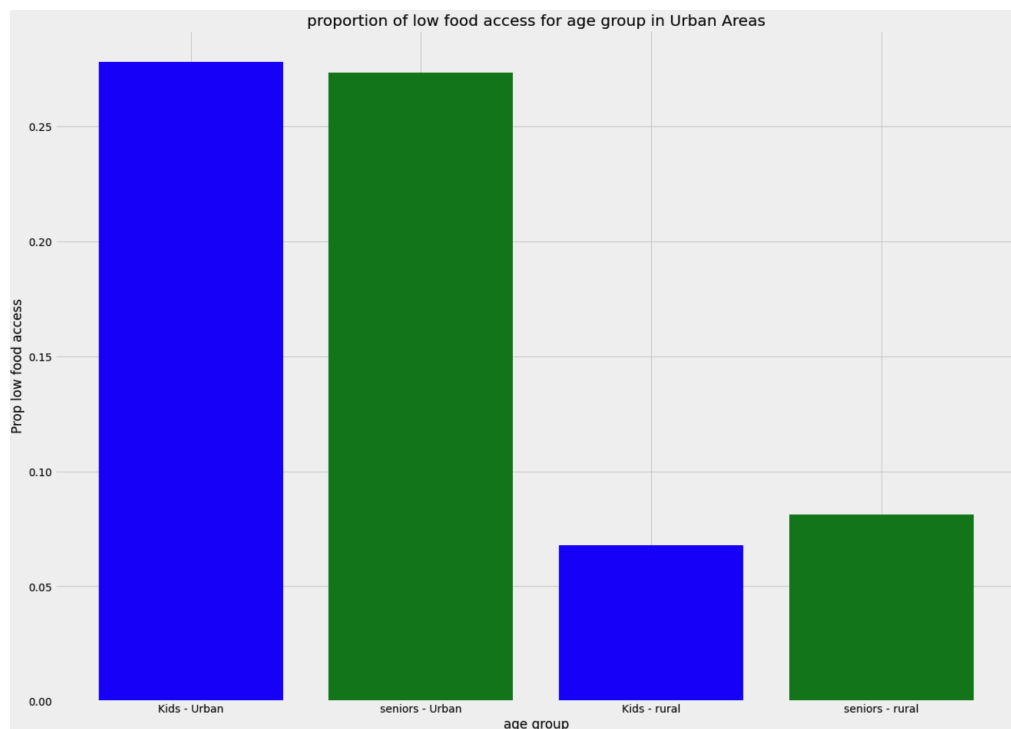


**Figure 2 (left)** demonstrates the proportion of each race, subsetting for urban and rural areas, that have low access to supermarkets. White populations in urban tracts had the highest proportion of people with low food access (.2993) while Hispanic population in urban tracts had the lowest proportion (.1655) of people with low access to supermarkets. In rural areas, the American Indian [Native American] or Alaska Native race had the highest rural proportion (.2472) living with low access. In fact, the AIAN proportions were very close as the proportion for

urban tracts was (.2484). This signals that AIAN populations face similar lack of access in both urban areas. The order of the different races did not maintain a consistent ranking between urban and rural areas. Asian tracts in rural areas the best access as only 2.80% of Asians living in rural areas lacked access to food.

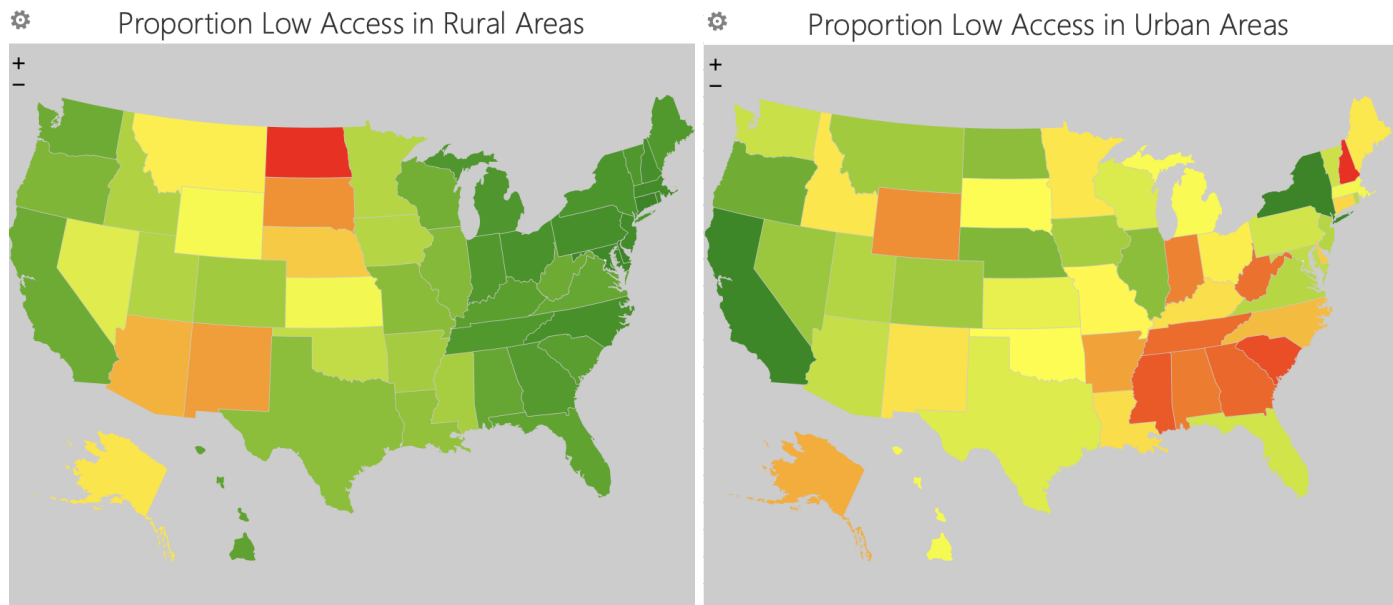
**Figure 3 (right)** shows the share of kids and seniors, in both urban and rural settings, that have low access. In urban areas, Kids had a slightly higher proportion of share with low access (.2780) than seniors (.2735). In rural areas, the spread was slightly larger with seniors having a larger proportion of low access (.0813) compared to kids (.0678).

Fairly equal distribution in urban areas shows that there isn't a huge difference unlike the rural areas where seniors are more likely to be in an area for food deserts. Notably, kids



and seniors in both face a greater proportion of low food access than the average for urban tracts. For rural tracts, seniors had worse access than rural average while kids had better access to food.

## Access to Food - Spatial Geographic Analysis



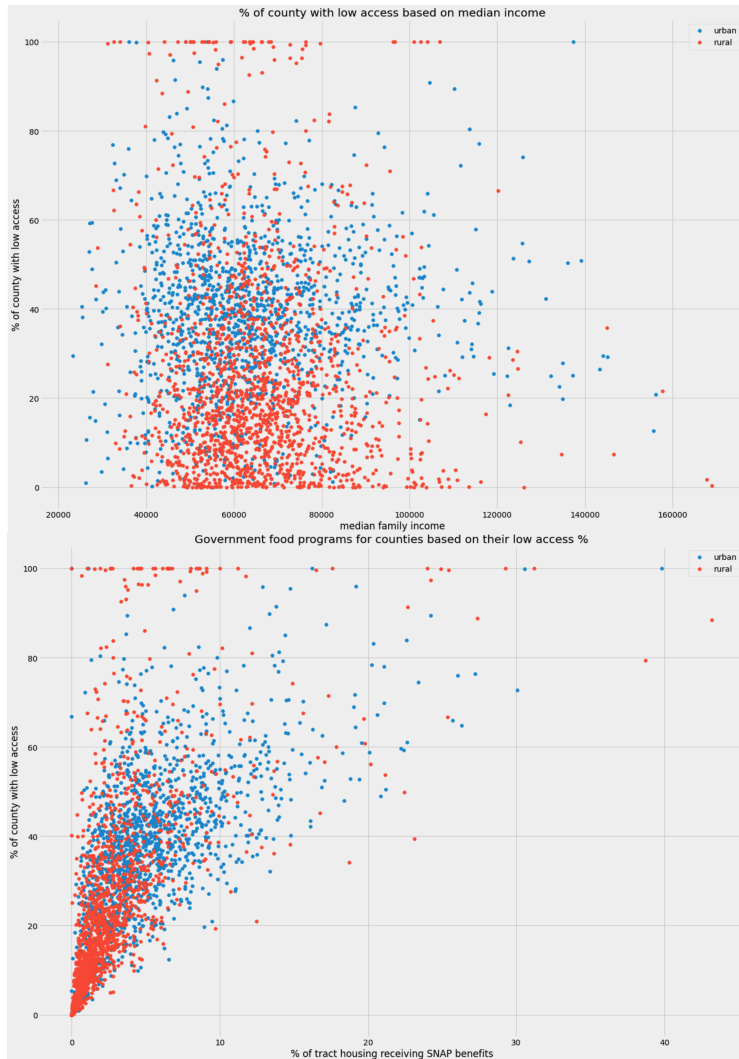
**Figure 4 (by rural census tract- left, urban census tract - right)**

Food accessibility has to be subsetting by urban and rural tracts in order to not hide the geo-spatial patterns of low food access in the United States. Looking at food access based on rural areas, there is a suggested presence of a cluster of states in the Western part of the Midwest where there is a high proportion of the population with low access. States along and near the East Coast and West Coast have a low proportion of the population with low access. Thus, it appears that rural central US has more food deserts. Looking at the spatial distribution of states with low access based on their urban areas, there are a few more suggested clusters of states with high rates of low access. Mainly, the American South, along with some Northeastern Heartland states and the Northeast (Maine, New Hampshire, Connecticut, Massachusetts) were some of the regions with high proportions of low access. Comparing both urban and rural spatial maps, both Alaska and Wyoming had a high proportion of low access while states like California and New York, some of the states with the most densely populated urban areas, both had better than national average access. A combined ranking for food access, not accounting for urban and rural tracts, would produce misleading results that would obscure the spatial pattern identified above. As such, separate rankings are necessary. **Table 5 (right)** shows the ranking of states based on the proportion of population with low access, in ascending order with rural tracts on the left and urban on the right.

State		State	
Delaware	0.000000	District of Columbia	0.045951
Connecticut	0.000243	New York	0.134652
Maryland	0.006900	California	0.138502
Rhode Island	0.009548	Oregon	0.197551
Massachusetts	0.012716	Nebraska	0.211806
New Jersey	0.013670	North Dakota	0.221975
Pennsylvania	0.017794	Illinois	0.222504
New Hampshire	0.018255	Nevada	0.235207
North Carolina	0.020482	Colorado	0.238874
Ohio	0.022919	Montana	0.239508
New York	0.026243	Iowa	0.243760
Michigan	0.028794	Utah	0.254897
Vermont	0.030889	New Jersey	0.256370
Indiana	0.033617	Virginia	0.258728
Maine	0.033810	Rhode Island	0.262700
Tennessee	0.034325	Maryland	0.265998
Georgia	0.036228	Arizona	0.270166
South Carolina	0.041910	Washington	0.273467
Kentucky	0.044075	Vermont	0.275199
Hawaii	0.048931	Florida	0.279727
Florida	0.051132	Pennsylvania	0.280046
Alabama	0.055465	Wisconsin	0.287879
Virginia	0.055782	Texas	0.289772
California	0.063351	Kansas	0.297137
Washington	0.064325	Massachusetts	0.307317
West Virginia	0.064719	Hawaii	0.309027
Wisconsin	0.069482	Michigan	0.311891
Oregon	0.081911	South Dakota	0.314087
Illinois	0.086596	Oklahoma	0.314101
Missouri	0.092311	Missouri	0.322759
Texas	0.093611	Ohio	0.328315
Louisiana	0.100413	Maine	0.332538
Colorado	0.113240	Minnesota	0.33248
Arkansas	0.117160	Idaho	0.333467
Mississippi	0.118466	New Mexico	0.336474
Idaho	0.127237	Kentucky	0.339420
Utah	0.128504	Louisiana	0.339607
Iowa	0.131584	Connecticut	0.344037
Minnesota	0.131973	Delaware	0.352161
Oklahoma	0.142541	North Carolina	0.363974
Nevada	0.169907	Alaska	0.373800
Kansas	0.184896	Arkansas	0.380744
Wyoming	0.188844	Wyoming	0.394677
Montana	0.208269	Indiana	0.403466
Alaska	0.215629	Alabama	0.407964
Nebraska	0.235869	West Virginia	0.416940
Arizona	0.254177	Tennessee	0.420602
New Mexico	0.268927	Georgia	0.423883
South Dakota	0.278664	Mississippi	0.436204
North Dakota	0.379322	South Carolina	0.445681
		New Hampshire	0.486415

In rural tracts, Delaware has 0% of its population living in a food desert compared to 37.93% of North Dakota rural residents living in a food desert. For urban tracts, New Yorkers have the greatest access to supermarkets (at only 13.47% of urban residents living far from a supermarket) and New Hampshire residents having the worst access where 48.64% of people living in urban tracts live further than 1 mile from a supermarket.

## Poverty



**Figure 6 (left)** shows the correlation between the median family income and % of each county with low access. In this analysis, there isn't a strong correlation between the two variables. The majority of tracts have a median income of 40k and 80k. Within this range, there is no clear pattern. We do see a small negative correlation on the upper range of the median income, especially after a median household income of 120k. As a result, income is not necessarily an indicator of if a tract is going to have a large proportion of population with low access to supermarkets.

**Figure 7 (left)** is the % of tract receiving SNAP benefits compared to the % of counties with low access to supermarkets. There is a distinct positive correlation between the two variables. SNAP is the largest federal program to provide low income households with food subsidies. As demonstrated in this scatterplot, the more households receiving SNAP benefits. The more likely they are to live in a tract with worse food access. As such, there is an indication that being in poverty correlates to living in a tract with lower food access.

## Recommendation

In order to improve food access across the nations, there are two major areas that need to be addressed. Native American & Native Alaskan populations disproportionately have poor access in rural areas compared to other races in rural areas. This could be an indicator of the social structure of Native American and Alaskan cultures (hunting and local farming might be prevalent) however strategic policy should ensure that such communities have access to supermarkets should they want it. Additionally, new supermarkets should be added near census tracts where a large proportion of the population is receiving SNAP benefits. Snap benefit recipients are more likely to have to travel further to a supermarket which places a burden on them, sometimes costing extra money and time for transportation to just get food. Policy should place a minimum quota on supermarkets for such areas. Additional policy for minimum supermarket quotas should be implemented for the American Southwest urban areas and Central United States in rural areas.