Back to the Roots

Remapping Poverty in Wisconsin

BACKGROUND

Over the years, there has been much debate on the accuracy of the federal poverty measurement, called the official poverty measure (OPM), in assessing both the well-being of the United States and the number of citizens that require federal economic support. As a result, many alternative poverty measures have surfaced for supplemental use and or replacement for the federal measurement. Considering the spatial importance of these measures in determining eligibility for federal assistance like the Community Eligibility Provision that qualify schools to offer universal school lunch or Community Economic Development grants through the Health Food Financing Initiative, accurate spatial representation of poverty is essential for federal policy .

As the OPM standardizes each threshold nationally, social scientists often recommend measurements that consider geographic differences in cost of living or adjust for changes in the standard of living over time, (IRP, 2016). To visualize the spatial difference between such measures, this project compares the percentage of families living below the federal poverty line to percentages of families living below the median familial income for the state of Wisconsin ($55,638) and 50% below the median familial income ($27,819) to explore the following questions:

1.Does the strength of influence of demographic variables change depending on which poverty measurement is used throughout Wisconsin?

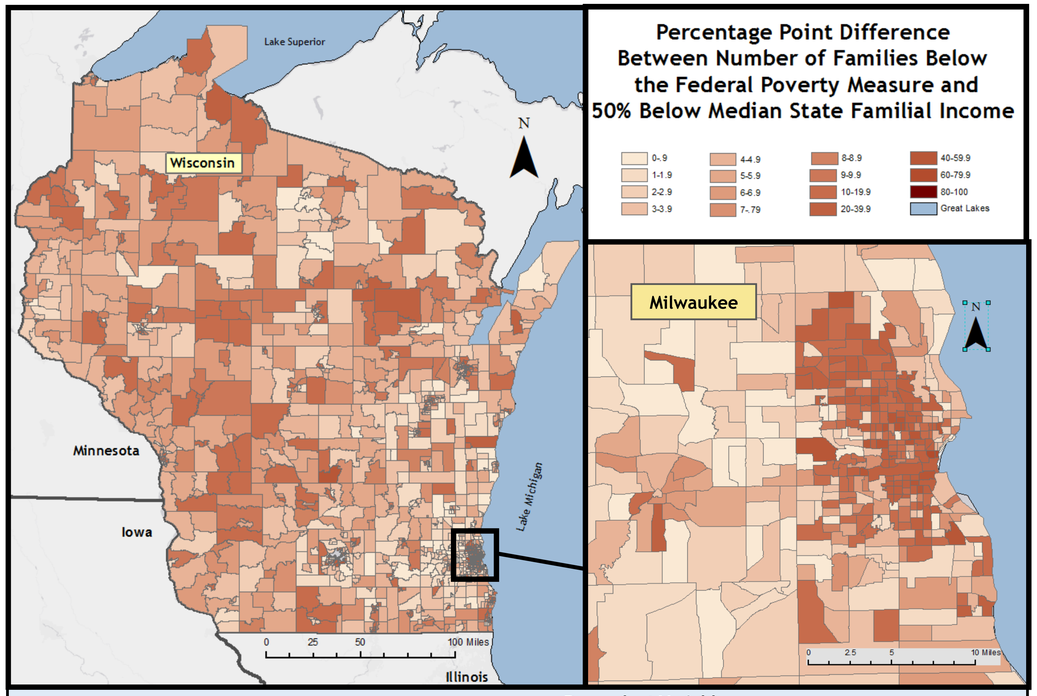
2. Is there spatial clustering of specific demographic variables with different measurements or clustering of census tracts that have a high absolute difference between the two measurements?

METHODOLOGY

To calculate the percent of families living below the median family income and 50% below the median, I assumed normal distribution throughout each income bracket and calculated the percentage of families within each bracket that would live below the median line and 50% below the median line. Then, I tallied all families in lower income brackets and divided by the total families per census tract.

I chose four demographic variables that are often associated with poverty to regress against each measurement, all from 2015 ACS data: percent African American, percent Hispanic, percent population that are homeowners, and percent population over 60 years. Using a Lagrange Multiplier Test with a Queens Continuity order of 1 in GeoDa, I regressed all variables against the percent families below the federal poverty line, percent of families below 50% the median family income and the percent families below the median family income for Wisconsin.

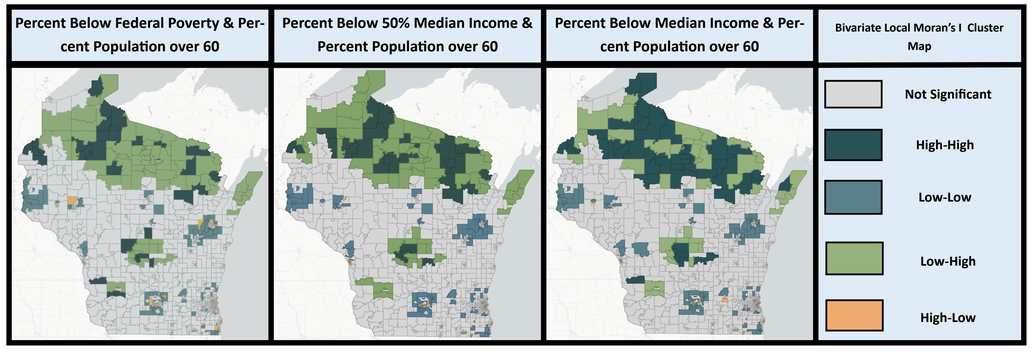
As the percent of the population over 60 has the biggest influence in estimating all three poverty measurements, an exploratory spatial data analysis was used to explore the relationship further. Specifically, a bivariate local Moran's I with a Queens Continuity order of 1 in GeoDa was used to illustrate the spatial autocorrelation can between the elderly population and poverty levels throughout the state.



	Dependent Variables					
	Percent of Families Below Federal Poverty Line 2015 (Spatial Lag Model)		Percent of Families Below 50% Median Family Income for Wisconsin 2015 (Spatial Lag Model)		Percent of Families Below Median Family Income for Wisconsin 2015 (Spatial Lag Model)	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
CONSTANT	12.639	0.000	6.553	0.000	12.286	0.000
Percent African American	0.172	0.000	0.016	0.002	0.034	0.000
Percent Hispanic	0.210	0.000	-0.015	0.105	-0014	0.299
Percent Homeowners	-0.121	0.000	-0.089	0.000	-0.157	0.000
Percent Over 60 years	1.746	0.002	1.211	0.002	3.298	0.000
Lag Coefficient	0.229	0.000	0.519	0.000	0.341	0.000
R-Squared	0.433		0.552		0.489	

RESULTS

From the results above, it seems that regardless of poverty measurement, age has the strongest influence on the percent of families in poverty per census tract. Notice that the percent of homeowners is consistently negatively correlated with poverty, which makes sense, but the percent Hispanic is positively correlated with the official poverty measure, but negatively correlated with both relative poverty measures. However, upon further investigation, the coefficients for percent Hispanic on both relative poverty measurements have associated p-values that are above 0.05 significance, meaning we cannot reject the null that these coefficients are zero, meaning they may not be correlated. Percent African American is statistically positively correlated across all measures, but has a higher correlation with the official poverty measure that does not account for social security benefits and out of pocket expenses. While the official poverty measure variables have higher coefficients of determination, more variance of the data is explained by model for 50% below median income level. The multicollinearity condition number, which reflects if the independent variables are correlated with each other. Since I am not concerned with anything under 30, 11 is a safe value.



Utilizing bivariate local Moran's I in GeoDa with a Queens continuity at an order of 1, I analyze spatial distributions. While areas that have high-low and low-high spatial correlation cancel out and represent spatial randomness, I am able to focus on areas of high values surrounded by high values and areas of low values surrounded by low values. High-High areas in this case show locations high in poverty surrounded by high percentages of populations over 60. Given this analysis, I am not concerned with the results, simply interest in the distribution.

DISCUSSION

While I think this project could benefit policies of some kind, I am fairly disappointed by the turn out. If I were to repeat it I would do many things differently. First, I would choose a state that has a higher median income. Wisconsin's median income is just about the same as the national median income. When compared to the national poverty level (though different than the national median income), there is going to be less difference than if I were to compare it to a state with high income levels like Maryland, for example. Second, if I had more time, I would have preferred to calculate relative poverty levels based on median incomes for counties so that I could show geographic changes of relative income levels. Returning to the idea of switching states, Wisconsin is fairly rural, meaning that there is fewer urban areas that would dramatically change cost of living standards which would also impact the county level analysis.

There are many errors associated with this project, with the main flaw being my method for calculating the percentage of families living below the median state income and 50% below the median income. I assumed that income was normally distributed for ease of calculation, but it is highly unlikely that the distribution of family income is normal. Another disappointment is my comparisons with demographics. I believe this project would be have been more interesting had I chosen to compare poverty to factors like pollution or voting rates or health care variables.

With this said, I do believe that these methods, once improved, could be applied to compare other poverty measures in the future.

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Class: UEP 294, December 2017
Projection: NAD 1927 StatePlane Wisconsin Central FIPS 4802
Data Sources: U.S. Census Bureau, ACS 2015. Esri Basemap
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