

Differentiating Rural Economic Disadvantage: Poverty Measures and Student Outcomes

Robin Clausen, PhD

Research Liaison

Montana Office of Public Instruction

Executive Summary

Understanding economic disadvantage in rural communities can prove challenging in the field of education due to missing data, the fact many schools do not participate in the National School Lunch Program (NSLP), or data originates from mid decennial US Census estimates which may underrepresent children and families that live in rural areas or tribal lands. The latter estimate is based on income data from the American Community Survey and uses geographic traits of a point (physical address) to triangulate income to poverty ratios calculated from the nearest 25 responses to income questions (Spatially Interpolated Demographic Estimate – SIDE). The process of accounting for variation in economic disadvantage in many Montana’s communities is opaque due to the homogeneity of socio-demographic indicators such as race/ethnicity. This provides the warrant for our study which is to provide a lens on variation within locales based on geography.

We ask three questions that clarify the role that SIDE estimates have in calculating economic disadvantage in Montana’s communities. First, are there differences in income to poverty ratios based on students that live near to school (less than 3 miles) and those that live far from school? Three miles was chosen since that is the typical diameter of a rural community or town in Montana.¹ This creates three measures based on student address: a value for the whole school based on student address, a value for the near students, and a value for the far students. Next, we look to how correlated these measures are to historical standards (NSLP). Finally, we triangulate differences between measures by looking to the degree to which they explain variation in common student outcome variables. This allows us to compare the degree to which different measures explain variation in student outcome variables.

First, there are important income-based differences between locales. The difference with NSLP Eligibility based on locale show higher rates of economic disadvantage in town locations (52% eligible) over city (48%), and rural areas (44%) ($p < .05$). This is repeated for rural areas in which Rural Remote communities are at a greater disadvantage than Rural Fringe and Distant communities ($p < .05$). The SIDE measure for the whole school is insignificant at the locale (size) level. When considering rurality (distance) there are important differences between Rural Remote (262.50) and Rural Fringe and Rural Distant communities (306.25) ($p = .000$). There are also important differences within rural locales on the relative distance from a community, in this case a school. These differences highlight that students residing at a distance from a rural school have lower incomes than students that are near to school. This differs from other locales (town, city) in which families residing at a distance from school have higher incomes in comparison to their peers.

¹ World Population Review. *Cities in Montana by Population*. Retrieved 12/3/2022 from <https://worldpopulationreview.com/states/cities/montana>. The average size of a Montana municipality is 7.58 sq nautical miles, slightly less than our three-mile diameter threshold.

Second, there are differences in how each measure are correlated to NSLP. Overall, the whole school mean student SIDE estimates are strongly correlated with the NSLP data for 2019. This is repeated for the population of students that are near to school. There is variation with the students residing at a distance from school. The relationship for all schools and city locales is moderate, whereas in the rural locales the magnitude of the relationship is stronger. Overall, the fidelity of the measures to the NSLP proxy is strong especially in rural areas. Nonetheless, this finding may pinpoint to a reason why the SIDE estimates may undercount student in poverty due to the reliance on data near to school rather than focusing on data far way.

Third, we look to differences in which selected student outcome measures are explained by the four measures. This allows us to benchmark among the four measure which measure tends to consistently explain the most variation. When analyzing the degree to which each measure explains with higher magnitude the variation in the student outcome variables, we witness the relative strength of the NSLP Eligibility measure in comparison to the SIDE measures. When looking at it from the standpoint of historical continuity, the SIDE measures were not able to consistently meet or exceed the r^2 values of the NSLP measure across community size and distance from an urban center when all things are held equal. When comparing the near and far populations, there were many values that exceeded the magnitude of the whole school variable. The most data points which exceeded the whole school SIDE value were with the near population, seen primarily in cities and towns. Overall, the r^2 values were most robust in Rural Fringe and Distant communities in comparison to the number of weak associations in cities. This occurred across all four measures indicating the relative sensitivity of these measures in certain contexts.

Understanding this relationship of proximity to school may be crucial in understanding the viability of the SIDE measures in rural contexts when understanding the students at a distance from school raises important challenges such as missing data and small school size. The way the School Neighborhood Poverty index approaches classifying economic disadvantage in rural schools based on a school address may be inappropriate due to reliance on 'near' factors rather than focusing on points at a distance. As we saw, near factors are more closely correlated to NSLP and explain to a greater degree variation in the student outcome data. As we indicate, this may be more of an issue with rural areas than with cities and towns since income to poverty ratios for far students are much lower than for near students in rural areas. Data pertinent to students near to school in rural contexts may not be sufficient in explaining school level poverty and student outcome trends.