

# *When Near Doesn't Compare with Far: Variation in Common Poverty Measures by Locale and Rurality*

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## Executive Summary

Geography determines educational opportunities and outcomes in Western states in diverse ways. Whether it is the advantages of increased school offerings in towns or cities, or the low pupil teacher ratios that we find in rural areas, differences are plentiful. Sometimes schools at a distance from an urban center experience relative advantages to those living in city environments. Other times, they may be at a disadvantage including resources and opportunities. Our study investigates differences in educational outcomes in multiple locales (size) and between different kinds of rural locations (distance from an urban center). Trends present in rural areas may not be present in towns or small cities. Moreover, trends in remote rural areas may be acute when compared to rural locales less than 25 miles from an urban cluster. This is seen in education policy when policymakers and researchers use poverty measures to better understand economic disadvantage in a community. Our assumption is that poverty measures account for variation between locale and rurality in different ways. Montana has roughly equal proportions of students residing in rural areas, towns, and small cities. Understanding this variation is important when directing scarce resources or better understanding the effectiveness of education programs. Moreover, recognizing suitability, sensitivity, and consistency of a poverty measure throughout these three kinds of communities is important.

In this study we ask four questions that address whether there is variation based on size and distance in how poverty measures account for economic disadvantage in a community. We consider six poverty measures in this study, including the Spatially Interpolated Demographic Estimates (SIDE). First, we look to a priori differences to establish if this variation is attributable to the use of the poverty measures or is the variation preexisting. We find three significant differences (suspension/expulsion rate, satisfactory attendance, and elementary Smarter Balanced math proficiency), however the remaining nine are not. This indicates that among the student outcome variables in this analysis, there is little a priori variation.

Next, we ask if there are stronger relationships between alternative poverty measures and NSLP Eligibility (National School Lunch Program) in certain locales. How do the poverty measures compare with NSLP data points based on locale and rurality? We find that there is indeed variation in that in certain contexts an alternative poverty measure may more closely align with FRPL. The main trait to capture is which poverty measures are consistent across locales and rurality. The SIDE measures are highly correlated and exhibit the most consistency by having the smallest range of Pearson values between locales.

Third, we also look to the ways that poverty measures explain variation in student outcome variables. Differences are apparent in the range of  $r^2$  values by poverty measure when the student outcome variable is separately regressed by each poverty measure. Relationships that may be strong in one

geographic context can vary in other geographic locations. Differences for Satisfactory Attendance are similar across poverty measures, however other student outcome measures vary widely in the range of variance explained by the poverty measures. For example, HS Graduation varies to a greater degree than Satisfactory Attendance. Trends for NSLP Eligibility vary less than the alternative poverty measures. However, the SIDE measures exhibit the least range of  $r^2$  in comparison to the other alternative poverty measures. This again establishes the consistency of SIDE measures.

Finally, we construct a model in which one dependent variable (satisfactory attendance rate) is explained by the predictor variables (other student outcome measures) while controlled by the different poverty measures (separately). This allows us to analyze differences between poverty measures. What we find is that when all things are held equal, when one poverty measure is exchanged for another, there are important differences in sign, sensitivity, and magnitude of the association. Common among poverty measures is the differences in the level of precision. For example, this is seen in Rural Remote areas with the ELA Proficiency outcome measure. The poverty measure with the least number of significant associations is the SIDE estimate based on school address. In most cases where NSLP Eligibility is significant, the magnitude of the finding from the SIDE based on student address value was significant and greater than NSLP Eligibility. Apart from Rural Remote areas, this point estimate's robustness carried across locale types, indicating that there is a greater level of consistency with this SIDE estimate (student) than the alternative poverty measures. This SIDE estimate may contribute to the analysis the same ways despite differences in geography.

By focusing in on achievement outcomes it becomes apparent which measures explain more of the variation. NSLP data has been noted to be very sensitive to achievement outcomes. (National Forum on Education Statistics, 2015; NCES, 2012). Commonly, the sign and significance of the analyses are consistent across poverty measures and locale types. Overall, there are more significant associations with the SIDE estimate based on student address than with the SIDE estimate based on school address. This is particularly true in Cities and the Rural area grouping.

This study of the impact of poverty measures in different geographical contexts found many differences between poverty measures and based on locale type and rurality. Overall, relations in Cities and Rural areas were stronger than in Town locales. Moreover, Rural Fringe and Rural Distant areas proved to have more stronger associations than in Rural Remote areas. However, this piecemeal variation may prove to be a problem. What is needed is a commonly held alternative proxy of economic disadvantage that is reliable across geographic locations. The SIDE estimates had the greatest level of consistency across locale types of the six poverty measures. Further investigation is warranted into aspects that may improve the SIDE application, for example, updating the vintage of the American Community Survey that is considered. This applies to the School Neighborhood Poverty dataset as well, which has outstanding issues with school addresses and the vintage of the application. As seen in this study, the SIDE Student estimates proved to be more consistent in understanding variation in the student outcome measures and is appealing based on being appropriate in multiple contexts such as with achievement outcomes.