The Use Case of Montana
School Level Poverty Measures
Montana Early Warning System

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School Level Poverty Measure Study - Montana

This research has three parts. It addresses the suitability, sensitivity, and consistency of alternative poverty measures using Montana's Statewide Longitudinal Data System resources.

- **State level** between eight poverty measures, 16 student and institutional outcome variables.
- **Locale level** between six poverty measures, 12 student outcome variables.
- **Proximity to school by locale** – two poverty measures, eight student outcome variables.

Our research responds to: Doan, S., Diliberti, M. & Grant, D. (2022). *Measuring School Poverty Matters, but How Should We Measure It: Comparing Results of Survey Analyses Conducted Using Various Measures of School Poverty.* Rand Corporation: Santa Monica, CA. https://www.rand.org/pubs/working_papers/WRA168-1.html.

Technical Papers: https://opi.mt.gov/Leadership/Data-Reporting/Research-Portal

Emerging Insufficiencies of NSLP Eligibility Data

Participation in the National School Lunch Program (NSLP) has become decoupled from income and poverty.

- Data can be incomplete since income data is only collected one time and family income can vary over a year.
- Data can be inconsistent in that it differs from participation rates.
- Data can overidentify poor students since family income is benchmarked at 130% of the poverty level.
- Data can have inaccurate accounting of students in Community Eligibility Provision districts.
- Data faced many constraints due to pandemic expansion of school meals programs.

Process

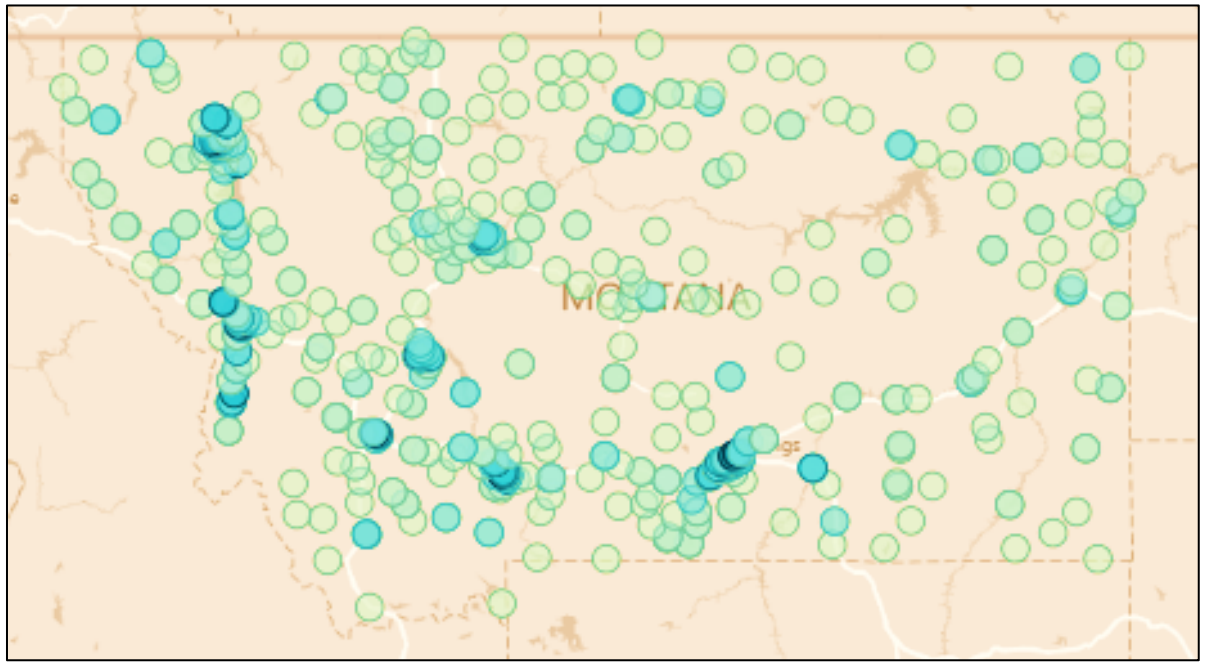
This study began with the requirements testing of the Spatially Interpolated Demographic Estimates (SIDE). **SIDE combines neighborhood characteristics (American Community Survey) as orientated around a geolocated point/address.**

The study looks to six different areas:

- The study looks at the state data, across locales (City, Town, Rural) and explores the effect of rurality (communities more/less than 25 miles from an urban center).

The goal is to gauge variation in rural communities.

- There are differences between rural fringe/distant and remote locales.
- Indicators in rural communities are relatively homogenous (race/ethnicity).
- Often, people in rural communities speak of differences based on ‘in town’ and ‘out of town.’



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Assessing Alternatives

How sensitive and consistent are the alternative measure is to past and future trends? Our research questions include:

- Are there difference in how alternative poverty measures are **correlated** with NSLP and the degree to which they are **classified** in the same quartile?
- How much variation in the dependent variables (student outcome and institutional) is **explained** by each measure of school poverty?
- Do different school poverty measures create estimates in the same **direction, significance, and magnitude**?

Correlations Using Statewide Data

		Correlation	Count	Lower C.I.	Upper C.I.
All Schools	CEP Direct Certification	0.562	79	0.508	0.611
	Eligibility	1.000	673	--	--
	Participation	0.926	653	0.914	0.936
	Longevity	0.855	298	0.822	0.883
	SAIPE	0.592	671	0.541	0.639
	School Address	-0.623	671	-0.667	-0.574
	SNP Estimate	-0.621	643	-0.667	-0.571
	Student Address	-0.682	599	-0.723	-0.637
Eligibility Quartile 3	CEP Direct Certification	--	8	--	--
	Eligibility	1.000	169	--	--
	Participation	0.523	162	0.401	0.627
	Longevity	0.497	74	0.302	0.651
	SAIPE	0.224	168	0.075	0.363
	School Address	-0.223	169	-0.361	-0.074
	SNP Estimate	-0.239	155	-0.382	-0.084
	Student Address	-0.194	157	-0.340	-0.039

Differences: Student Groups (More/Less than 3 Miles from a School)

We compared In-Town Versus Out-of-Town Students by Locale and Rurality

- Statewide students at a distance have higher mean IPR values (292.96) than students close to school (275.62) (p=.000).
- The pattern is consistent when looking at the mean difference in cities between far and near populations (34.10) (p=.002).
- Town populations also exhibit the same variation with higher income to poverty ratios among far populations in comparison to near populations (+22.6) (p=.000).
- This trend reverses in rural areas in which students near to school have higher mean incomes than students at a distance.
- This is seen also in Rural Remote areas in which students who live far from school (250.80) having significantly lower IPRs than students who live near to school (262.50).
- Students that live in Rural Fringe and Rural Distant communities also exhibit a significant mean difference in the same direction (+13.07).

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Bivariate Correlations Comparing NSLP Eligibility to SIDE Estimates (Proximity)

	Whole School SIDE	Students at a Distance	Students Near School
All School	-.722**	-.584**	-.724**
City	-.793**	-.324*	-.769**
Town	-.673**	-.609**	-.731**
Rural	-.753**	-.692**	-.743**
Rural Fringe/Distant	-.763**	-.682**	-.750**
Rural Remote	-.751**	-.707**	-.734**

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Variance Explained by Poverty Measure (State)

	Eligibility	Participation	SAIPE	School Address SIDE	School SNP	Direct Certification	Longevity	Student Address SIDE	All Poverty Indicators
Satisfactory Attendance Rate	0.082	0.111	0.029	0.056	0.067	0.208	0.113	0.059	0.274
Suspension/Expulsion Rate	0.147	0.136	0.346	0.153	0.165	0.057	0.008	0.154	0.900
ELEM SBAC ELA Proficiency	0.358	0.307	0.059	0.097	0.166	0.318	0.143	0.083	0.588
ELEM SBAC Math Proficiency	0.348	0.295	0.066	0.107	0.179	0.309	0.150	0.104	0.441
HS ACT Composite	0.330	0.261	0.143	0.251	0.265	0.445		0.281	--
ELEM SBAC Interim ELA	0.145	0.121	0.072	0.08	0.096	0.199	0.187	0.062	0.608
ELEM SBAC Interim Math	0.257	0.235	0.07	0.146	0.17	0.151	0.175	0.131	0.615
						Meet or Exceed NSLP			

Sensitivity of Estimated Association of School Poverty Measures and Outcome/Financial Measures to Attendance Rate									
	Naive	**Eligibility**	**Participation**	**SAIPE**	**School Address SIDE**	**School SNP**	**Direct Certification**	**Longevity**	**Student Address SIDE**
HS Dropout Rate	-3.54 * (1.643)	-1.692 (2.006)	-1.766 (1.852)	-2.364 (1.703)	-3.202 (1.742)	-2.958 (1.748)	-2.683 (1.887)	-- --	-2.486 (2.129)
EWS Dropout Probability	0.899** (0.283)	-0.559 (0.318)	-0.676* (0.312)	-0.603* (0.300)	-0.825** (0.296)	-0.813* (0.299)	-0.010 (0.804)	-1.200 * (0.590)	-0.572 (0.347)
HS Graduation Rate	0.012*** (0.003)	0.009* (0.004)	0.008* (0.004)	0.011*** (0.003)	0.011*** (0.003)	0.011 (0.003)	0.002 (0.004)	-- --	0.012** (0.004)
Post Secondary Enrollment	0.624*** (0.185)	0.487* (0.212)	.428* (0.204)	0.583** (0.186)	0.590** (0.190)	0.571** (.189)	1.302 (0.651)	-- --	0.511* (0.201)

Achievement Outcomes by Locale

	Naïve	Eligibility	SAIPE	Longevity	School Address SIDE	Student Address SIDE	Direct Certification	All Poverty Indicators (Constant)
Rural (Within 25 Miles)								
ELEM SBAC ELA Proficiency	0.139* (0.067)	0.163 (0.086)	0.117 (0.070)	0.031 (0.751)	0.056 (0.068)	0.170* (0.070)	0.013 (0.071)	0.277 (0.167)
ELEM SBAC Math Proficiency	0.189** (0.063)	0.154 (0.079)	0.174** (0.065)	0.053 (0.087)	0.113 (0.064)	0.228*** (0.066)	0.103 (0.065)	0.354* (0.169)
HS ACT Composite	0.070*** (0.018)	0.059* (0.025)	0.062** (0.020)	-- --	0.069** (0.023)	0.069** (0.023)	0.041 (0.022)	-- --
Rural Remote								
ELEM SBAC ELA Proficiency	0.111* (0.050)	0.187** (0.069)	0.092 (0.050)	-0.039 (0.068)	0.051 (0.051)	0.084 (0.060)	0.020 (0.049)	0.508** (0.182)
ELEM SBAC Math Proficiency	0.185*** (0.052)	0.192** (0.070)	0.052** (0.052)	0.009 (0.071)	0.128* (0.053)	0.163* (0.063)	0.100 (0.051)	0.673*** (0.177)
HS ACT Composite	0.028*** (0.007)	0.010 (0.008)	0.025*** (0.007)	-- --	0.021 (0.008)	0.013 (0.009)	0.020* (0.010)	-- --

Conclusions

- Eligibility consistently explains variation in student outcome measures to a greater degree than alternative poverty measures.
- Sensitivity and consistency is dependent on context. Poverty measures have different results when compared to others. At the state level, results are mixed pointing to the need for a nuanced look at the construction of each measure.
- Companion studies found variation by locale and the suitability of the SIDE measures due to consistency across locales.