

Beyond the Poverty Line: A Regional Health Equity Analysis of Above-Poverty Financial Hardship and Vision Burden in Western New York and the Finger Lakes

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TAKE-HOME MESSAGE

Financial hardship above the poverty line matters for vision health. Above-poverty ALICE hardship remained associated with greater vision-disability prevalence even after accounting for conventional poverty and other community characteristics, highlighting communities that may be missed when poverty alone is used to identify need.

Background

- Vision disability reflects both chronic disease burden and social conditions.
- Federal poverty measures may miss households struggling with locally determined basic living costs.
- United For ALICE (Asset Limited, Income Constrained, Employed) captures financial hardship above the poverty line, offering a complementary lens on community vulnerability.

Why This Matters

- Poverty alone may not identify all communities experiencing financial vulnerability.
- Above-poverty hardship may reveal communities whose health needs are hidden by conventional poverty measures.
- Linking small-area financial hardship with vision and diabetes burden can help identify places where eye-health needs and socioeconomic vulnerability overlap.

Objective

To examine whether above-poverty ALICE financial hardship provides additional information about community-level vision disability beyond conventional poverty and other community characteristics, and to identify geographic patterns of vision disability, diabetes, and financial hardship across Western New York and the Finger Lakes.

Methods

Study Design & Setting

Cross-sectional ecological study of 329 ZIP Code Tabulation Areas (ZCTAs) across 14 counties in Western New York and the Finger Lakes. 288 ZCTAs had matched United For ALICE data for the primary multivariable analysis.

Data Sources

CDC PLACES: Vision-disability and diagnosed-diabetes prevalence
U.S. Census/American Community Survey: Demographic, socioeconomic, and transportation/access measures
2020 Decennial Census: Rural population percentage
United For ALICE: Poverty and above-poverty ALICE financial hardship

Key Measures

Outcome: Self-reported vision-disability prevalence
Blindness or serious difficulty seeing even when wearing glasses
Primary exposure: Above-poverty ALICE households (%)
Households above the Federal Poverty Level but below the locally adjusted ALICE Threshold
Community characteristics: Diabetes prevalence • Poverty • Age ≥65 years
• No high school diploma • No vehicle access • Rural population

Analysis

- GIS mapping to examine geographic patterns
- Pearson correlations for unadjusted relationships
- Multivariable linear regression with heteroskedasticity-robust standard errors
- Diabetes modeled with linear + quadratic terms to account for nonlinearity

References

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Results

Study sample: The analysis included **329 ZCTAs** across Western New York and the Finger Lakes; **288 ZCTAs** had matched ALICE data and comprised the adjusted analytic sample.
Fourteen-county regional analysis: Allegany, Cattaraugus, Chautauqua, Erie, Niagara, Genesee, Livingston, Monroe, Ontario, Orleans, Seneca, Wayne, Wyoming, and Yates.

Figure 1 A: Vision Disability Prevalence, Western New York and the Finger Lakes

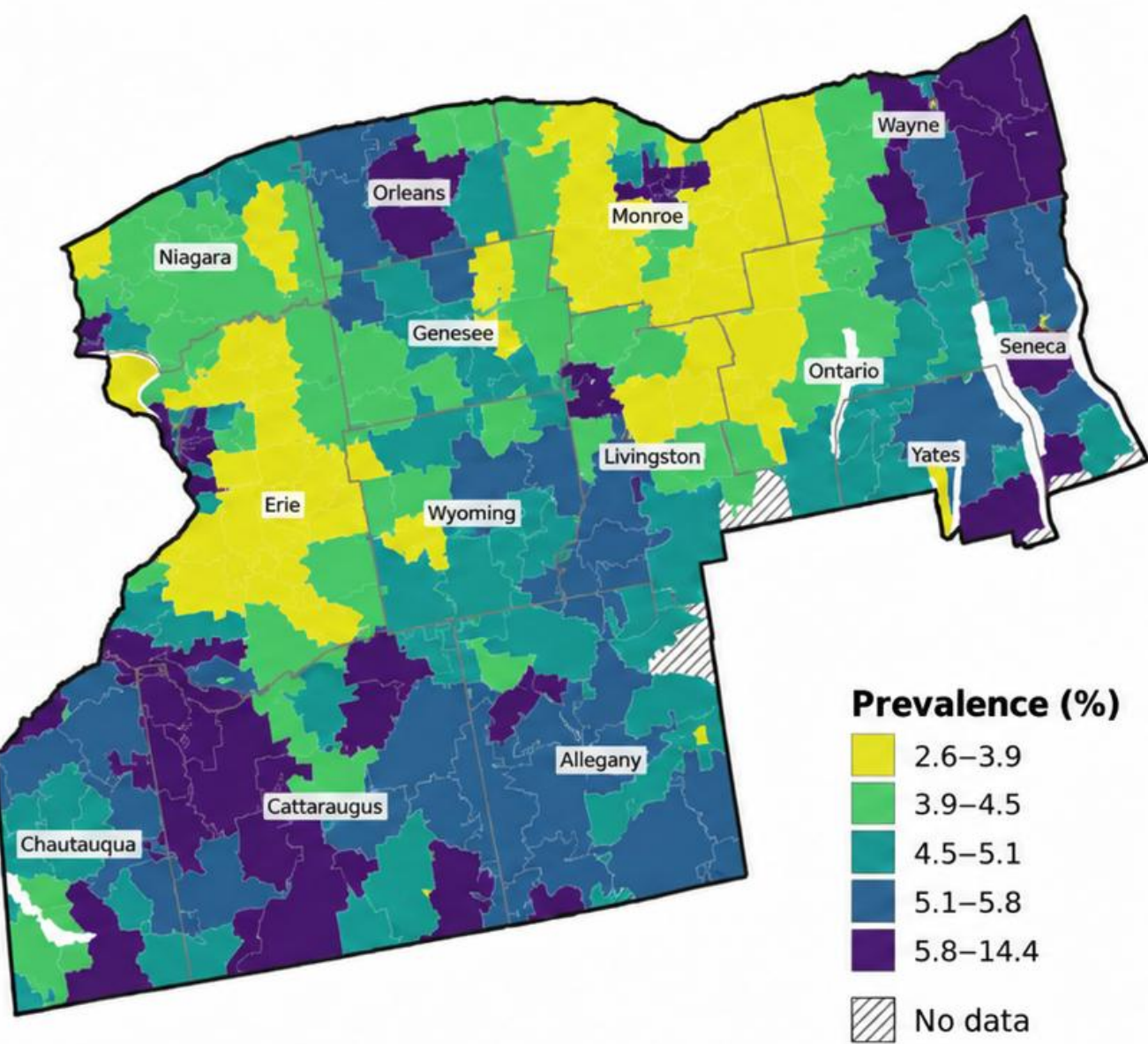


Figure 1 B: Above-Poverty ALICE Households, Western New York and the Finger Lakes

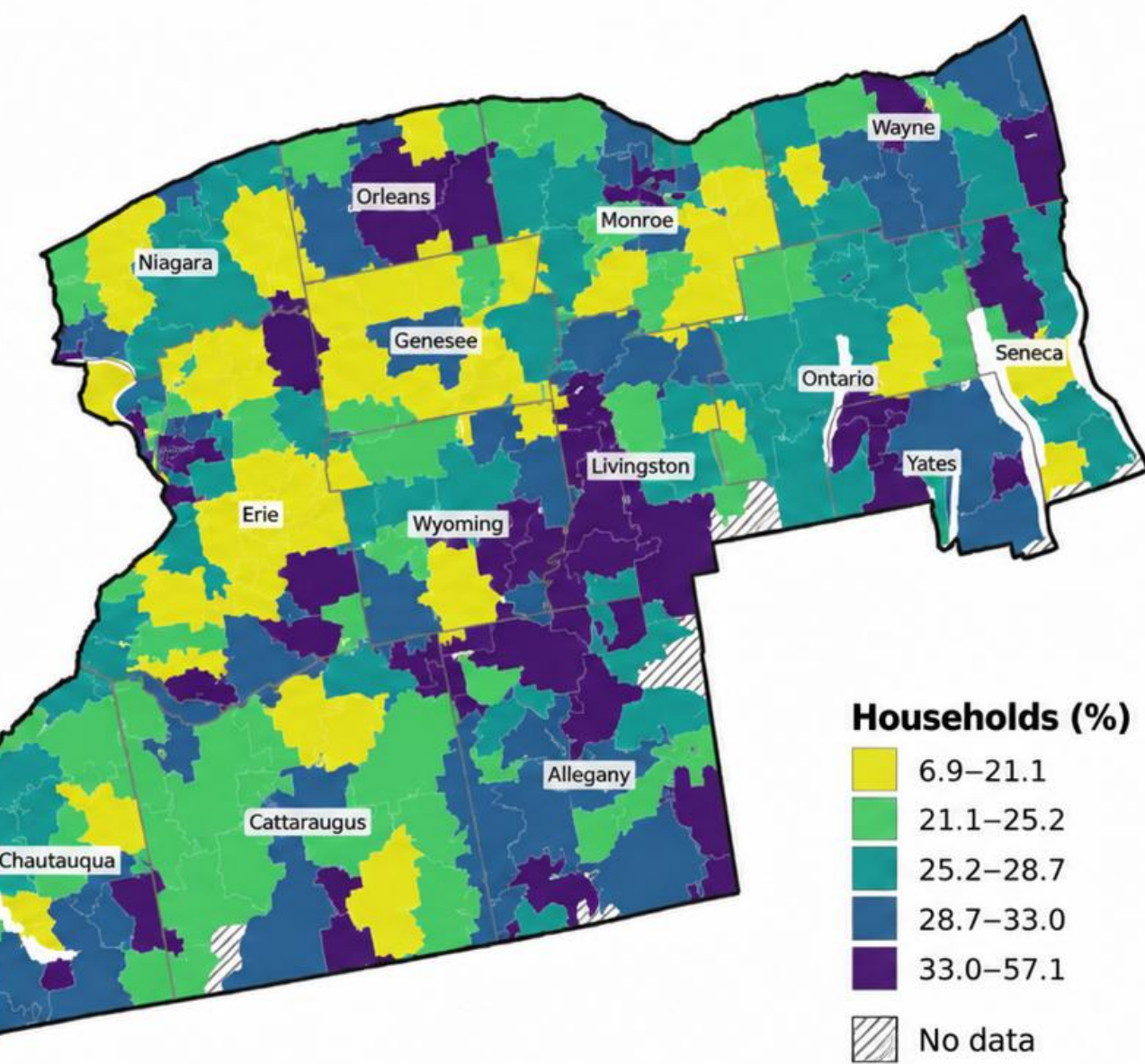
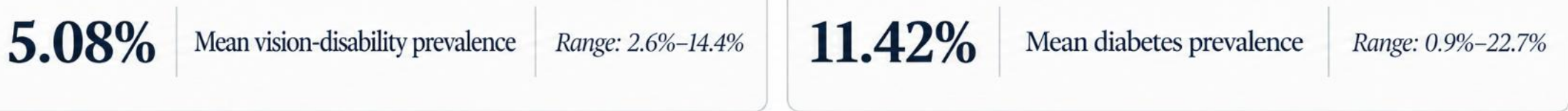


Figure 1. Geographic distribution of self-reported vision disability and above-poverty ALICE financial hardship across the study region

Unadjusted Relationships (n=288 ALICE-matched ZCTAs)

- Vision disability was strongly correlated with diabetes prevalence (**r=0.882; P<0.001**).
- Above-poverty ALICE hardship was also positively correlated with vision disability (**r=0.366; P<0.001**).
- Conventional poverty and above-poverty ALICE were only weakly correlated (**r=0.116; P=0.050**).



* In the full 329-ZCTA sample, the diabetes–vision correlation was $r=0.820$.

Adjusted Associations with Vision Disability

Table 1. Adjusted associations with vision-disability prevalence

Community-level factor	β (95% CI)	P value
Diabetes prevalence, centered (%)	0.4806 (0.4428, 0.5183)	<0.001
Diabetes prevalence ²	0.0195 (0.0120, 0.0270)	<0.001
Above-poverty ALICE households (%)	0.0127 (0.0058, 0.0196)	<0.001
Poverty (%)	0.0306 (0.0173, 0.0438)	<0.001
No high school diploma (%)	0.0334 (0.0213, 0.0455)	<0.001
No vehicle access (%)	0.0226 (0.0075, 0.0376)	0.003
Population age ≥65 years (%)	−0.0276 (−0.0444, −0.0109)	0.001
Rural population (%)	−0.0011 (−0.0024, 0.0002)	0.086

N=288; R²=0.941. β coefficients represent adjusted percentage-point differences in ZCTA-level vision-disability prevalence associated with a one-percentage-point increase in each community-level factor. Diabetes prevalence was mean-centered; the linear and squared diabetes terms should be interpreted jointly. Heteroskedasticity-robust standard errors were used.

Key Findings

- **Diabetes burden was strongly associated with vision disability**, with evidence of a nonlinear relationship at higher diabetes prevalence (**quadratic term, P < 0.001**).
- **Above-poverty ALICE and conventional poverty were only weakly correlated (r = 0.116; P = 0.050)**, suggesting they capture different dimensions of financial hardship.
- **Above-poverty ALICE remained independently associated with greater vision disability after adjustment (β = 0.013; 95% CI, 0.006–0.020; P < 0.001).**
- **Higher percentage of adults aged ≥25 years without a high school diploma and lack of vehicle access were positively associated with vision disability**, whereas rural population percentage was not independently associated (**P=0.086**).
- **25 ZCTAs (8.7%)** were simultaneously in the highest quartile for vision disability, diabetes prevalence, and above-poverty ALICE hardship, identifying areas where multiple burdens overlapped.

Implications

- **Financial hardship above the poverty line may provide information not captured by conventional poverty measures alone.**
- **Above-poverty ALICE may help identify communities experiencing economic vulnerability alongside elevated vision burden.**
- Integrating **small-area socioeconomic and health data** may support more targeted eye-health outreach, prevention, and population-health planning.

Conclusions

Vision disability varied substantially across Western New York and the Finger Lakes and was associated with both diabetes burden and socioeconomic conditions. Above-poverty ALICE hardship remained associated with vision disability after adjustment for conventional poverty and other community characteristics. Looking beyond poverty alone may help identify communities warranting further assessment and eye-health intervention.

Future Research Directions

- Validate these findings using individual-level and longitudinal data to better assess temporality and underlying mechanisms.
- Incorporate clinically measured vision outcomes and eye-care utilization, rather than relying only on self-reported vision disability.
- Apply spatial regression and access-focused measures such as travel time, provider availability, transportation resources, and eye-care capacity to better characterize place-based inequities.

Limitations

- Ecological, cross-sectional design limits individual-level and causal inference.
- Vision disability and diabetes were based on model-derived, self-reported CDC PLACES estimates, rather than clinical measures.
- Data sources differed in temporal coverage and geographic availability.
- ALICE data were unavailable for some ZCTAs, reducing the adjusted analytic sample from 329 to 288.

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DISCLOSURES

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