

Project Abstract - Ajay Mahenthiran

Limited Choices, Higher Risks: How Food Access Shapes Diabetes and Obesity Prevalence

Background

The U.S. has continued to see a rise in the prevalence of diabetes from 10.3% in 2011 to 11.6% in 2021, with disproportionate effects on low-income and minority populations. Additionally, obesity, a noted major risk factor for type 2 diabetes, currently affects over 40% of U.S. adults, especially in communities with less access to healthy meal options. This observational study investigates the association between food accessibility and diabetes/obesity prevalence at the county level, hypothesizing that counties with higher rates of limited food access will exhibit higher diabetes and obesity burdens.

Methods

This cross-sectional ecological study analyzed data from the 2024 County Health Rankings & Roadmaps (CHR&R) program, encompassing 2,369 U.S. counties. The exposure, "limited access to healthy foods," was defined as the percentage of low-income residents without proximity to a grocery store, categorized into top quartile (high access barriers) versus bottom 50% (low barriers). Primary (diabetes prevalence) and secondary (obesity prevalence) outcomes were binary (high/low) based on median splits. Covariates included demographics (% age ≥ 65 , % female), race/ethnicity (% Non-Hispanic Black, % Hispanic, % Non-Hispanic White), health access/behavior (% uninsured, % physically inactive), and socioeconomic status (% unemployed, median income). Propensity score matching (1:1 greedy matching without replacement) and ATT weighting were used to balance covariates. Logistic regression produced odds ratios to compare outcomes between exposure groups post-balancing.

Results

After propensity score matching and ATT weighting, no notable association was found between limited food access and diabetes (OR: 0.89; 95% CI: 0.70–1.12) or obesity (OR: 1.03; 95% CI: 0.83–1.28). Covariate balance improved immensely through the ATT weighting by the inverse propensity scores (standardized differences $< 10\%$; variance ratios 0.8–1.2 per Rubin's Rules).

Conclusions

This investigation found rather limited evidence connecting food access to diabetes/obesity prevalence at the county level after adjusting for socioeconomic and behavioral factors. Disparities appear to have been driven more strongly by the structural determinants (e.g., income, insurance) than food environment alone. Future work could aim to use finer-grained (e.g., census tract) data and longitudinal designs to

potentially clarify causal pathways. These findings underscore the need for multilevel interventions addressing both the environmental and systemic drivers of metabolic disease disparities.