Level of neighborhood deprivation predicts fruit & vegetable and sugar-sweetened beverage intake in children aged 12–24 months

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Background

- 2020-2025 Dietary Guidelines for Americans include children under two for first time[1]
  - Recommends intake of fruits & vegetables, avoidance of sugar-sweetened beverages
- Diet quality disparities are associated with neighborhood socio-economic environment (SEE) in older children and adults[2]
- Little is known about neighborhood effect on complementary diet patterns[3]
- The Deprivation Index[4] (Figure 1) summarizes SEE into a composite score
  - 0 = lowest neighborhood deprivation
  - 1 = highest neighborhood deprivation
- We assessed intake of fruits and vegetables and sugar-sweetened beverages by neighborhood SEE in a cohort of children from 12-24 months of age

Methods

The PREVAIL Cohort is a CDC-sponsored, 2-year prospective birth cohort in Cincinnati, OH

Inclusion

- Delivery of healthy, term, singleton infant
- Live in greater Cincinnati
- Completion of food frequency questionnaire at 12, 18, and/or 24 months of age (*n*=207)

Data Collection

- Demographics, address, & socio-economic position data collected at baseline
- Addresses were geocoded using DeGAUSS[5] software, merged with Deprivation Index
- Categorized by quartile of score
  - High SEE (least deprived)
  - High Mid & Low Mid (intermediate scores)
  - Low SEE (most deprived)
- Food frequency questionnaire administered at 12, 18, and 24-month clinic visits
  - Foods classified by primary components

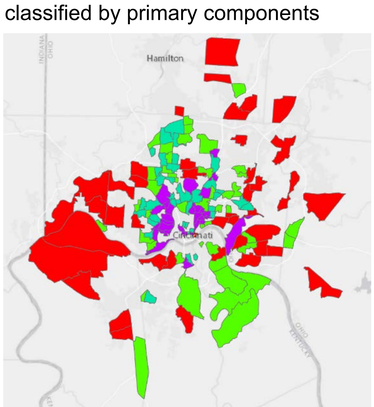

Figure 1. PREVAIL census tracts by Deprivation Index category

Results

Figure 2: Demographic comparison High to Low socio-economic environment

High SEE *n*=52		Low SEE *n*=49
87% White	88% Black	
81% Married	16% Married	
23% Publicly insured	90% Publicly insured	
15% ≤HS Education	78% ≤HS Education	
10% income <$25k/year	65% income <$25k/year	

All $p<0.001$
*Intermediate SEE categories (*n*=106) were intermediate in all variables

Figure 3: Intake of fruit and vegetables and sugar-sweetened beverages by socio-economic environment

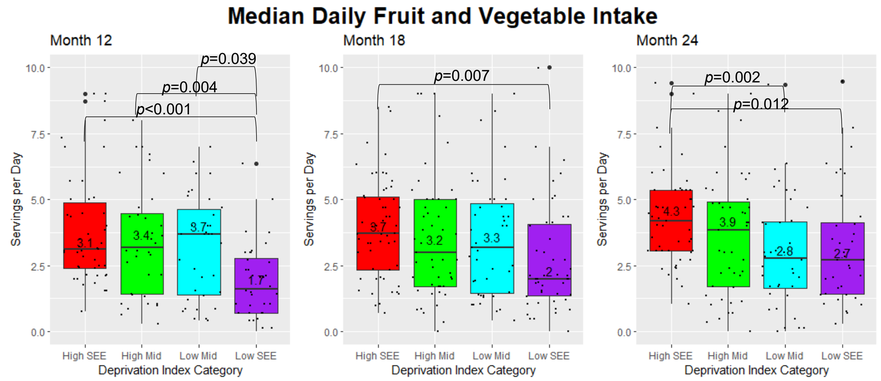

Table 1: Servings of fruits and vegetables by SEE

	12M	18M	24M
	RR	RR	RR
	n=155	*n*=196	*n*=177
High	REF	REF	REF
High Mid	1.04	0.96	0.84
Low Mid	0.83	0.95	**0.64***
Low	**0.56***	**0.70***	**0.71***
Poisson regression			
***p*<0.05**			

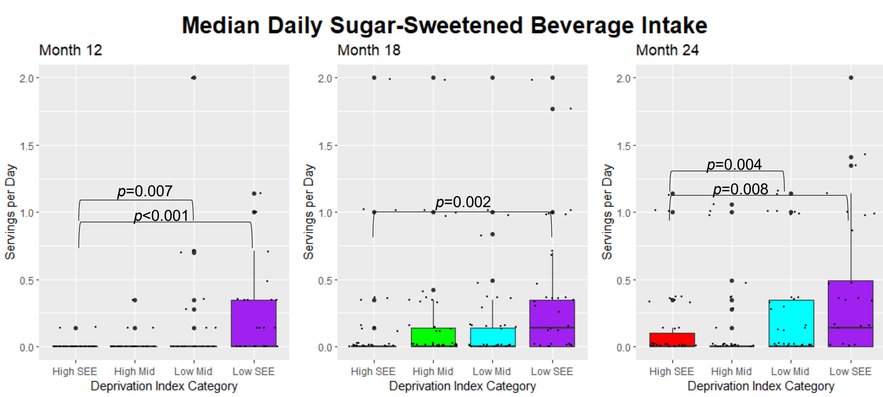

Table 2: Odds of any sugar-sweetened beverage intake

	12M	18M	24M
	OR	OR	OR
	n=155	*n*=196	*n*=177
High	REF	REF	REF
High Mid	1.89	1.88	0.68
Low Mid	**5.70***	**2.77***	2.16
Low	**13.39***	**4.55***	**3.70***
Logistic regression			
***p*<0.05**			

Table 3: Generalized estimates for fruit and vegetatble and sugar-sweetened beverage servings by socio-economic environment in children aged 12-24 months

		Fruits and Vegetables 207$_{subjects}$, 522$_{observations}$			Sugar-Sweetened Beverages 207$_{subjects}$, 522$_{observations}$		
		RR	SE	*p*	RR	SE	*p*
SEE	High-Mid	0.95	0.08	0.519	1.63	0.97	0.412
	Low-Mid	**0.78**	**0.07**	**0.008**	*2.76*	*1.47*	*0.056*
	Low	**0.68**	**0.07**	**<0.001**	**4.68**	**2.38**	**0.002**
Child age	Years	1.10	0.07	0.150	**2.43**	**0.61**	**<0.001**

Discussion

- Distribution of census tracts clearly segregated by race, income, education, marital status
  - All factors associated with differences in diet and diet-related health disparities in adults
  - Deprivation Index category acts as proxy for multiple measures
  - More granular measure than "food desert" or "median income"
- Low SEE associated with lower fruit and vegetable, higher sugar-sweetened beverage intake at each time-point & longitudinally
  - Current model for nutrition support underused
    - Structural barriers (transportation, child-care) cited as reasons[7]
    - **Locating services within low-income communities could improve diet, diet-related health disparities**
  - Identifying neighborhoods at risk for nutrition disparities will
    - Enable outreach
    - Better target resources
- Strengths
  - Cohort design
  - Novel use of environmental predictor, population
  - US Census-derived deprivation measure
- Limitations
  - Limited number of high-income Black families
  - Generalizability

Statistical Analysis

- Deprivation Index categories assigned by quartile of score (1st=High, 4th=Low)
- Medians: Kruskal-Wallis; Pairwise comp.: Holm
- Regression models: Poisson, Logistic
- Longitudinal model: Generalized Estimating Equation
- All analysis performed using R statistical software[6]

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