ECHO
Environmental influences on Child Health Outcomes
A program supported by the NIH

Avera Research Institute

Association between community food environment with fruit, vegetable and sugar-sweetened beverage consumption among children in ECHO

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Nothing to Disclose

Acknowledgements:

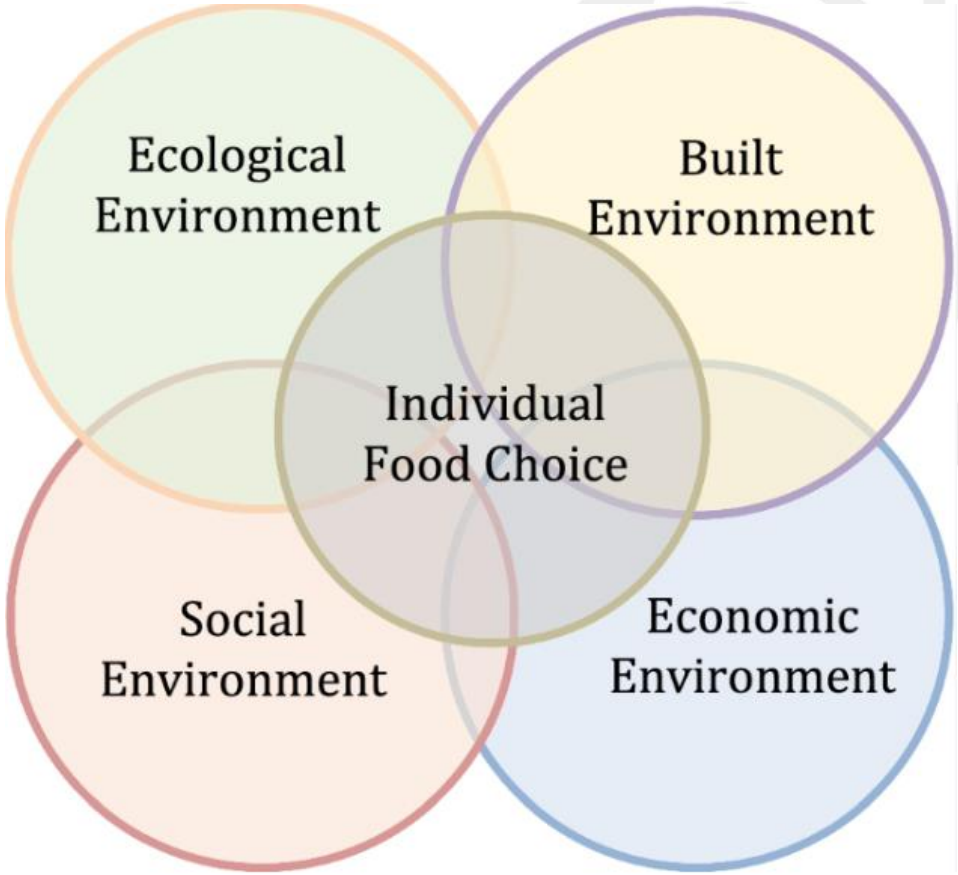
- Hockett CW, Knapp E, Ghidey R, Ziegler K, Elliott A, Aschner J, Camargo C, Dabelea D, Dunlop A, Ferrara A, Zhu Y, Chehab R, Santarossa S, Hartert T, Karagas M, Melough M, Ganiban J, MacKenzie D, McEvoy C, Lyall K, O'Conner T, Tompson A, Kerver J, Strakovsky R, McCormack L
- ECHO study staff and particpants that contribute to science and research
- National Institutes of Health, the ECHO Program

Background

- An obesity disparity exists between rural and non-rural children and adolescents (Ogden, 2018, Johnson & Johnson, 2015)
  - Diet likely contributes to this disparity, but the impact is unclear (McCormack & Meendering, 2016)

Background

- There are many multi-level factors that influence food choice
- Research on how community-level food environments shape dietary patterns has been limited to urban youth (Euler et al, 2019)



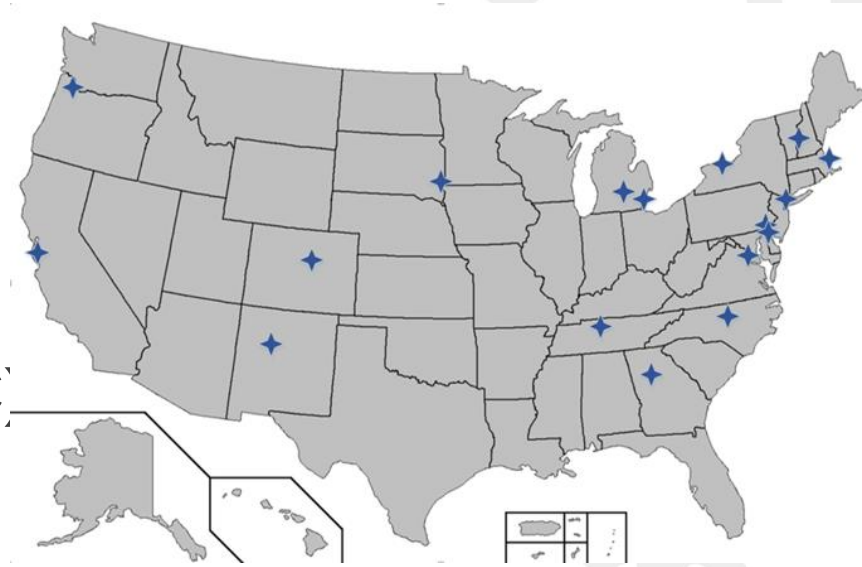
Research Question

- What community-level factors associated with food are related to fruit and vegetable and sugar-sweetened beverage consumption in children, and how does rurality impact this relationship?

Study Sample

- Study population: Children 2-19 years of age participating in the **E**nvironmental influences on **C**hild **H**ealth **O**utcomes (ECHO)

- Inclusion criteria:
  - Complete diet data related to fruit/vegetable (F/V) and sweetened sugar beverage (SSB) consumption
  - An assigned Rural-Urban Continuum Codes (RUCC)
  - Area-level food-related factors
    - USDA Food Environment Index
    - County Health Rankings



Methods

- Exposure: **community food factors**
  - Factor analysis using four environmental food domains
    - **Access, Affordability, Assistance, and Availability**

- Outcomes: **1) fruit and vegetable and 2.) sugar-sweetened beverage consumption in the child participant**
  - Calculated from harmonized BLOCK Food Frequency Questionnaire (FFQ) and the Diet Screener Questionnaire (DSQ)

- Modifier: **rurality**
  - Defined by RUCC

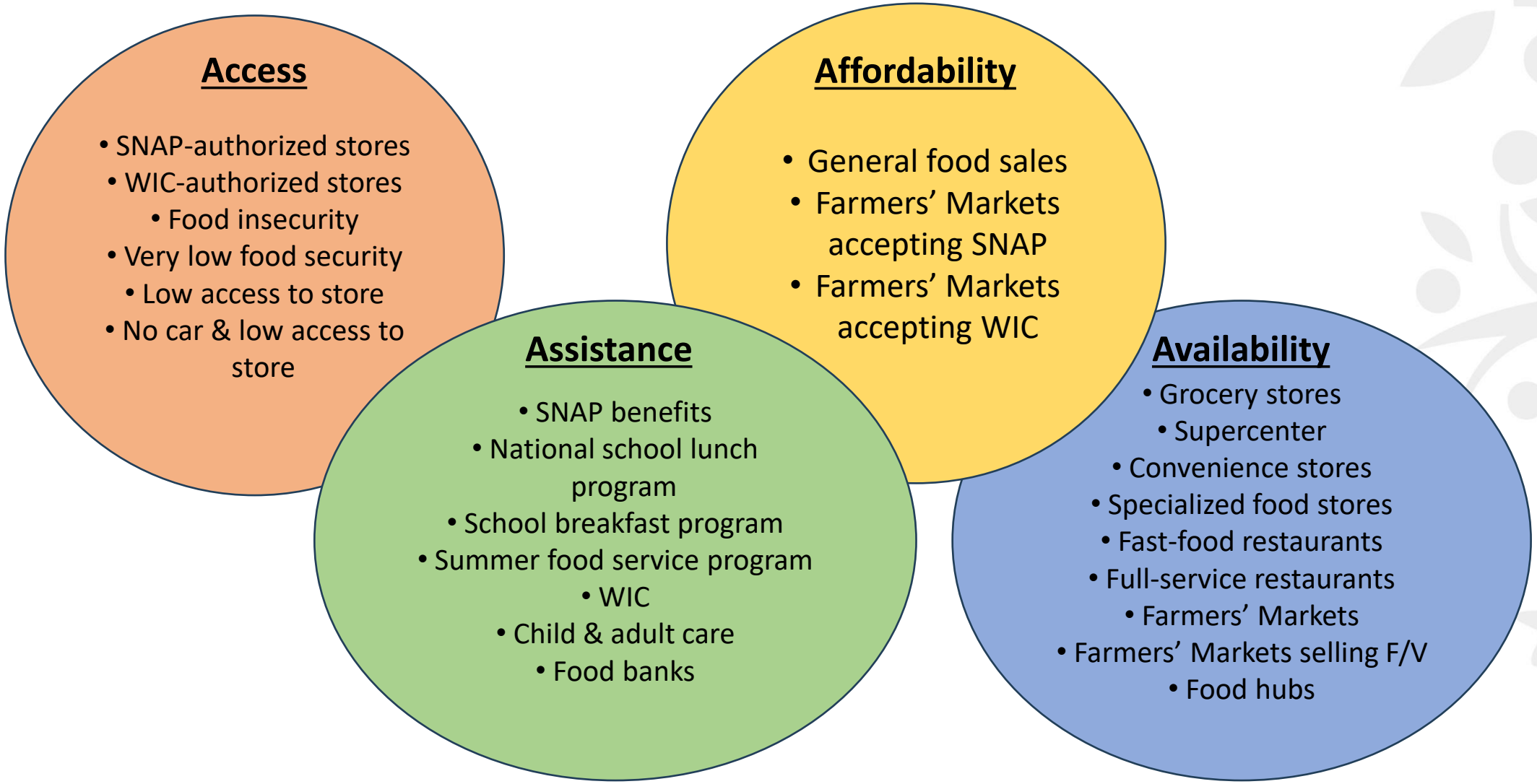
Table 1. Sociodemographics

	RUCC 1-3 (N=10,789)	RUCC 4-6 (N=1,375)	RUCC 7-9 (N=671)	Overall (N=12,835)
Sex				
Female	5,201 (48.2%)	700 (50.9%)	322 (48.0%)	6,223 (48.5%)
Male	5,588 (51.8%)	675 (49.1%)	349 (52.0%)	6,612 (51.5%)
Racialized Group Membership				
American Indian or Alaska Native	159 (1.5%)	<5	<20	177 (1.4%)
Asian	424 (3.9%)	<10	<5	429 (3.3%)
Black	1,763 (16.3%)	142 (10.3%)	6 (0.9%)	1,911 (14.9%)
Multiple Race	1,250 (11.6%)	72 (5.2%)	20 (3.0%)	1,342 (10.5%)
Native Hawaiian or other Pacific Islander	31 (0.3%)	<5	<5	35 (0.3%)
Other	317 (2.9%)	<5	<5	322 (2.5%)
White	6,592 (61.1%)	1,143 (83.1%)	624 (93.0%)	8,359 (65.1%)
Missing	253 (2.3%)	<5	<5	260 (2.0%)
Child Age				
Mean (SD)	8.40 (4.73)	8.90 (4.70)	5.88 (3.42)	8.33 (4.70)
Median [Min, Max]	8.05 [0, 24.1]	7.94 [1.02, 19.0]	5.55 [1.03, 20.5]	7.99 [0, 24.1]
Child Ethnicity				
Hispanic	2,191 (20.3%)	52 (3.8%)	13 (1.9%)	2,256 (17.6%)
Non-Hispanic	8,575 (79.5%)	1,319 (95.9%)	657 (97.9%)	10,551 (82.2%)
Missing	23 (0.2%)	<5	<5	28 (0.2%)
Maternal Education				
Associate's Degree	2,738 (25.4%)	167 (12.1%)	106 (15.8%)	3,011 (23.5%)
Bachelors Degree	2,940 (27.3%)	224 (16.3%)	127 (18.9%)	3,291 (25.6%)
High School, GED	1,212 (11.2%)	67 (4.9%)	21 (3.1%)	1,300 (10.1%)
Less than High School	423 (3.9%)	23 (1.7%)	7 (1.0%)	453 (3.5%)
Master's and Professional Degrees	2,603 (24.1%)	179 (13.0%)	53 (7.9%)	2,835 (22.1%)
Missing	873 (8.1%)	715 (52.0%)	357 (53.2%)	1,945 (15.2%)

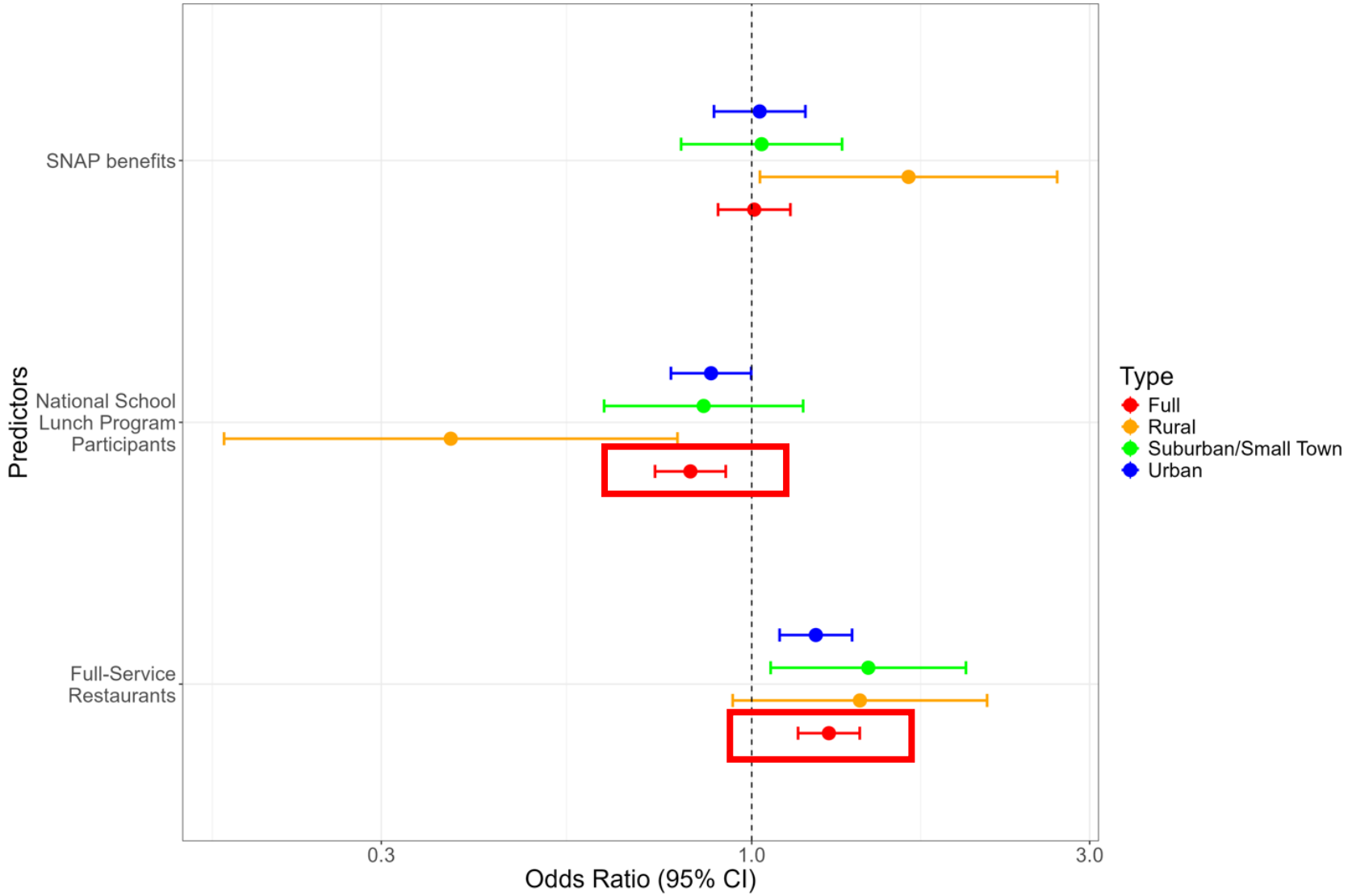
Table 2. Outcomes

	RUCC 1-3 (N=10,789)	RUCC 4-6 (N=1,375)	RUCC 7-9 (N=671)	Overall (N=12,835)
Dichotomized Fruit/Veg Consumption				
Less than once per day	2,227 (20.6%)	295 (21.5%)	77 (11.5%)	2599 (20.2%)
Once per day or more	8,562 (79.4%)	1,080 (78.5%)	594 (88.5%)	10,236 (79.8%)
Fruit and Vegetable consumption				
Less than once per week	486 (4.5%)	64 (4.7%)	17 (2.5%)	567 (4.4%)
Once per week	169 (1.6%)	<35	<5	203 (1.6%)
Twice per week	275 (2.5%)	<40	<10	316 (2.5%)
3-4 times per week	508 (4.7%)	61 (4.4%)	16 (2.4%)	585 (4.6%)
5-6 times per week	789 (7.3%)	104 (7.6%)	35 (5.2%)	928 (7.2%)
Once per day or more	8,562 (79.4%)	1,080 (78.5%)	594 (88.5%)	10,236 (79.8%)
Dichotomized Sug/Sweetened Bev Consumption				
Less than once per week	5,359 (49.7%)	704 (51.2%)	427 (63.6%)	6,490 (50.6%)
More than once per week	5,430 (50.3%)	671 (48.8%)	244 (36.4%)	6,345 (49.4%)
Sugar/Sweetened Beverages				
Less than once per week	5,359 (49.7%)	704 (51.2%)	427 (63.6%)	6,490 (50.6%)
Once per week	1,057 (9.8%)	129 (9.4%)	55 (8.2%)	1,241 (9.7%)
Twice per week	1,032 (9.6%)	128 (9.3%)	62 (9.2%)	1,222 (9.5%)
3-4 times per week	1,158 (10.7%)	128 (9.3%)	52 (7.7%)	1,338 (10.4%)
5-6 times per week	1,015 (9.4%)	138 (10.0%)	38 (5.7%)	1,191 (9.3%)
Once per day or more	1,168 (10.8%)	148 (10.8%)	37 (5.5%)	1,353 (10.5%)

Least absolute shrinkage and selection operator (LASSO) was used to select the community food factors to be included in the multi-level regression modeling.

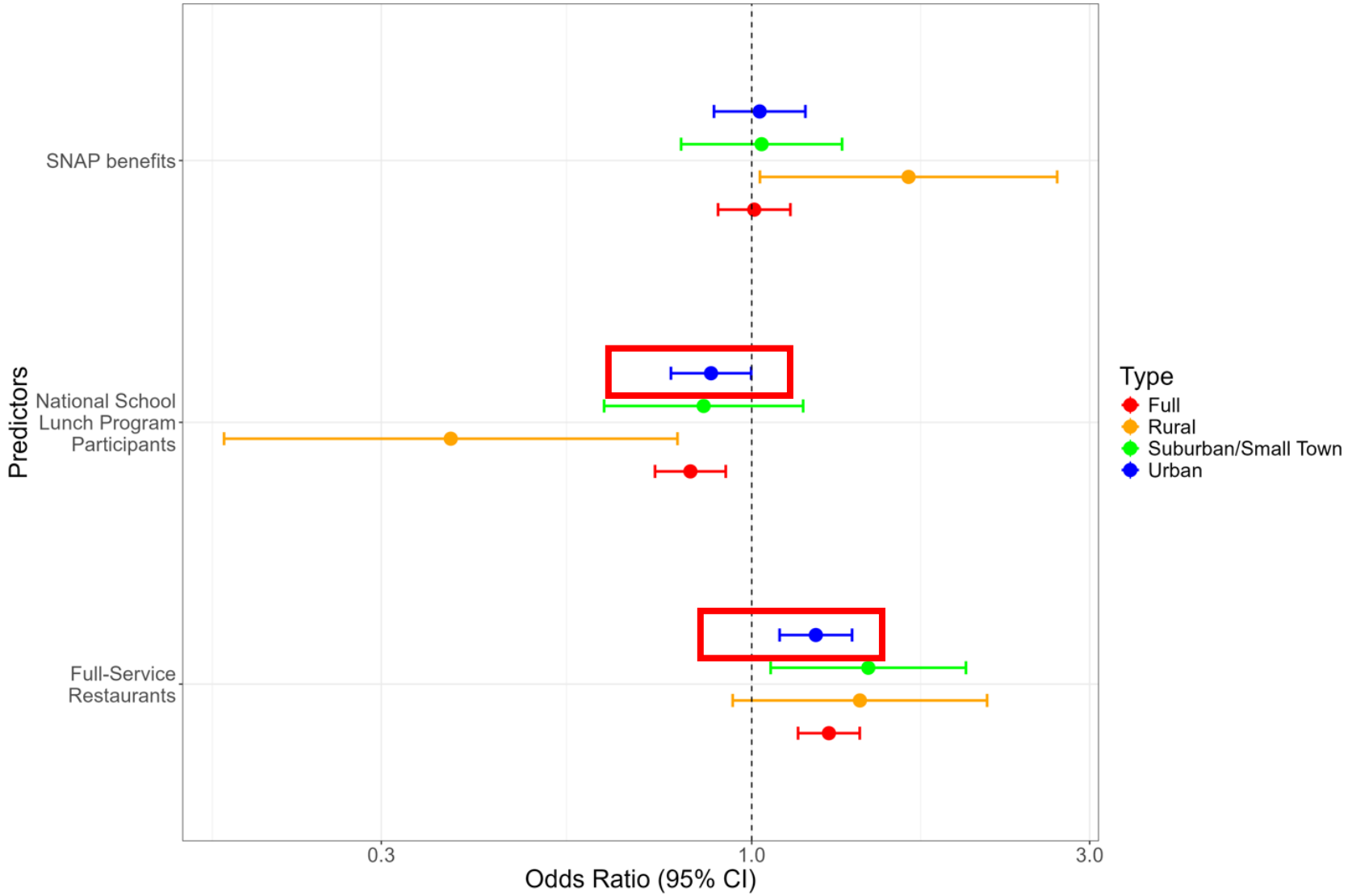


Fruit & Vegetables



Adjusting for child age category, sex, race, ethnicity, maternal education, income, rural category, and census region

Fruit & Vegetables



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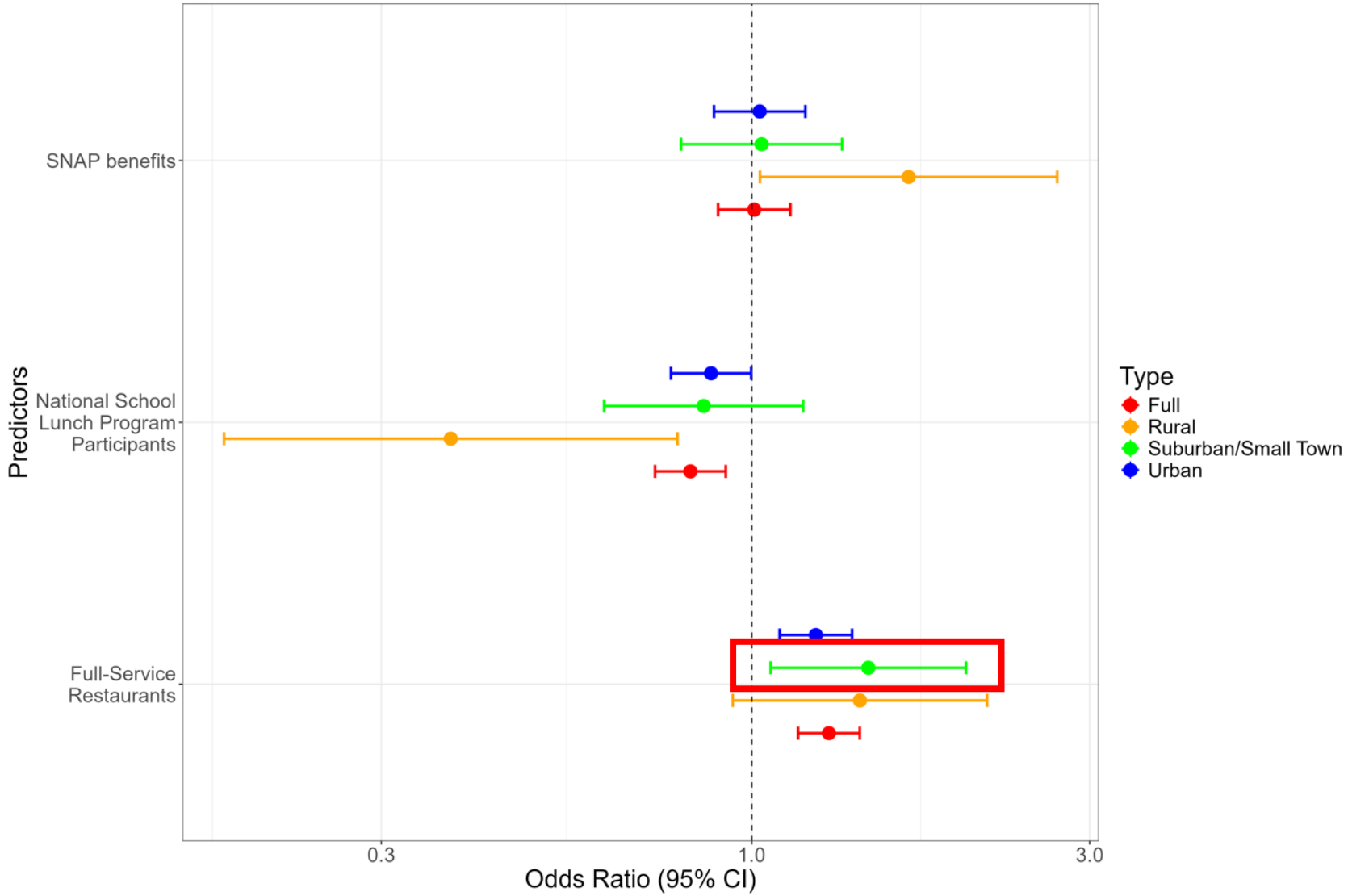

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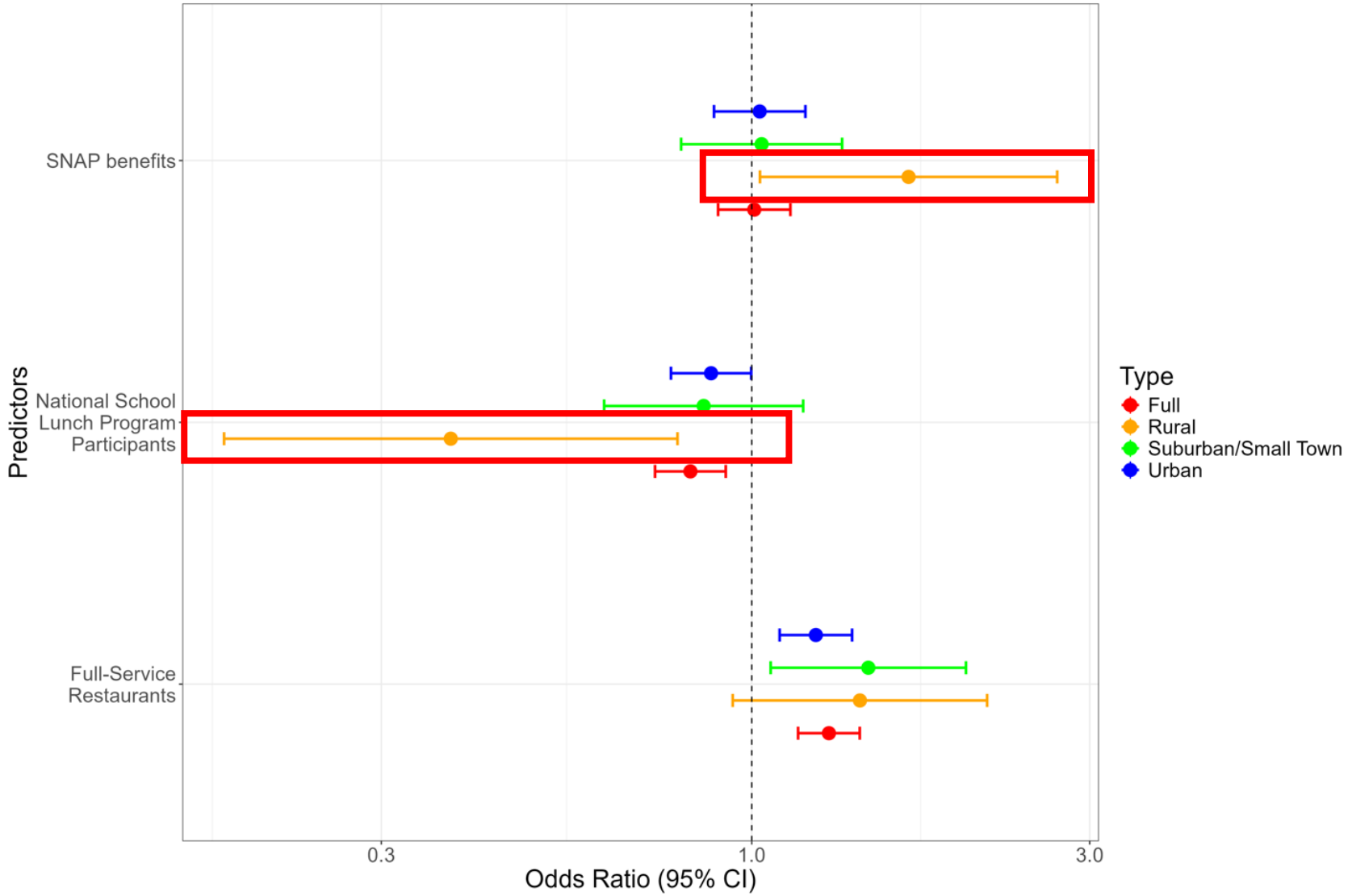

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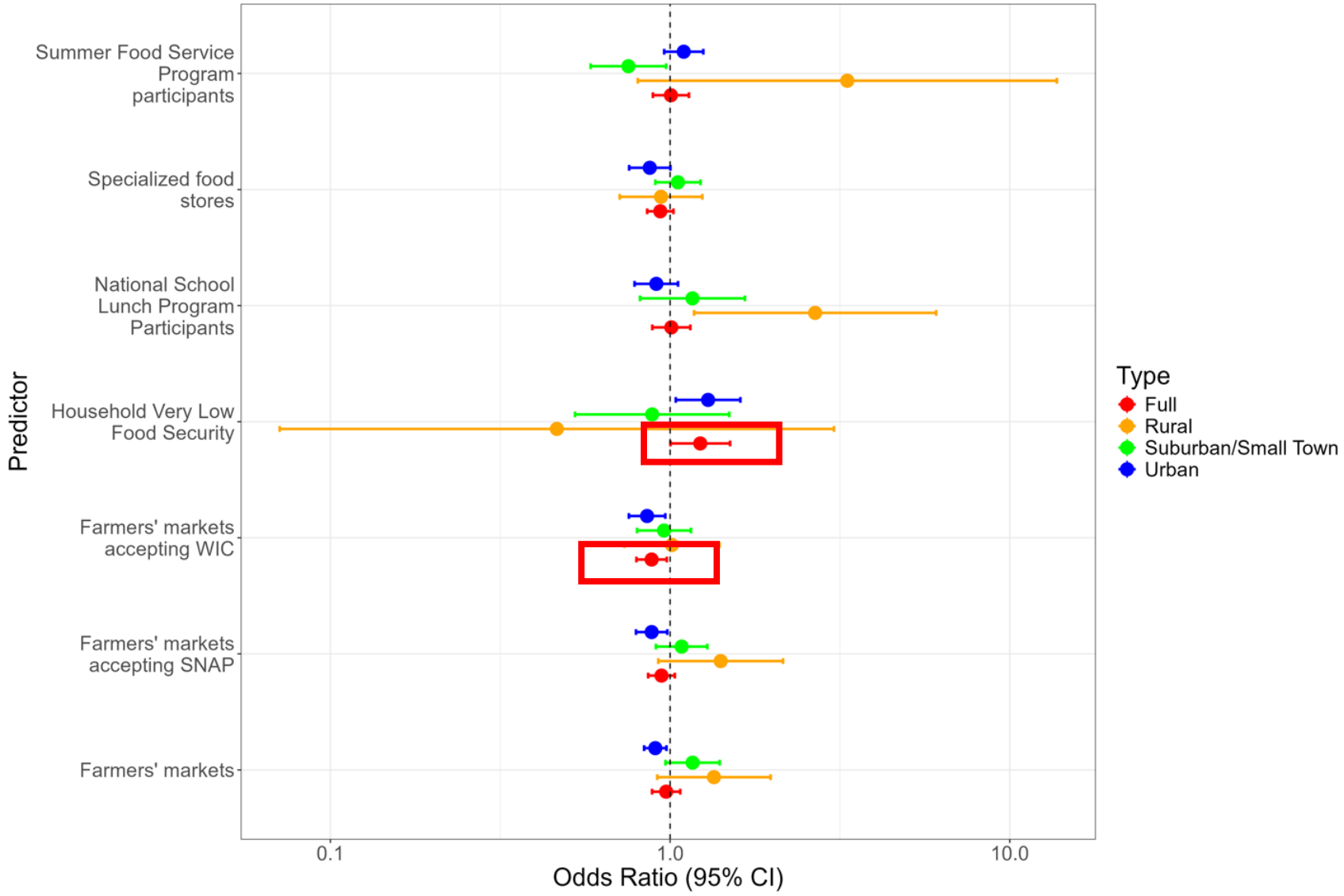
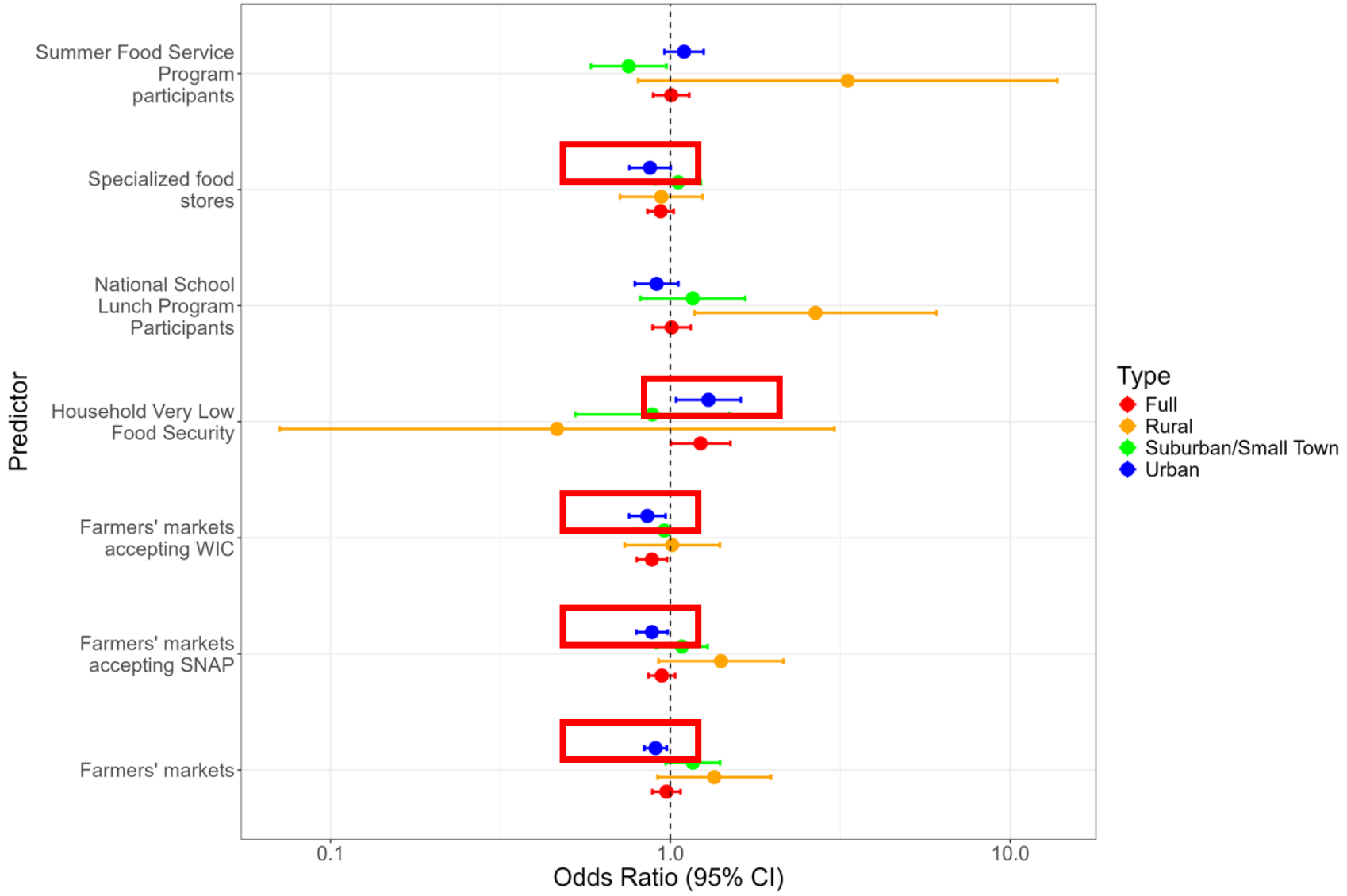
Sugar-Sweetened Beverages



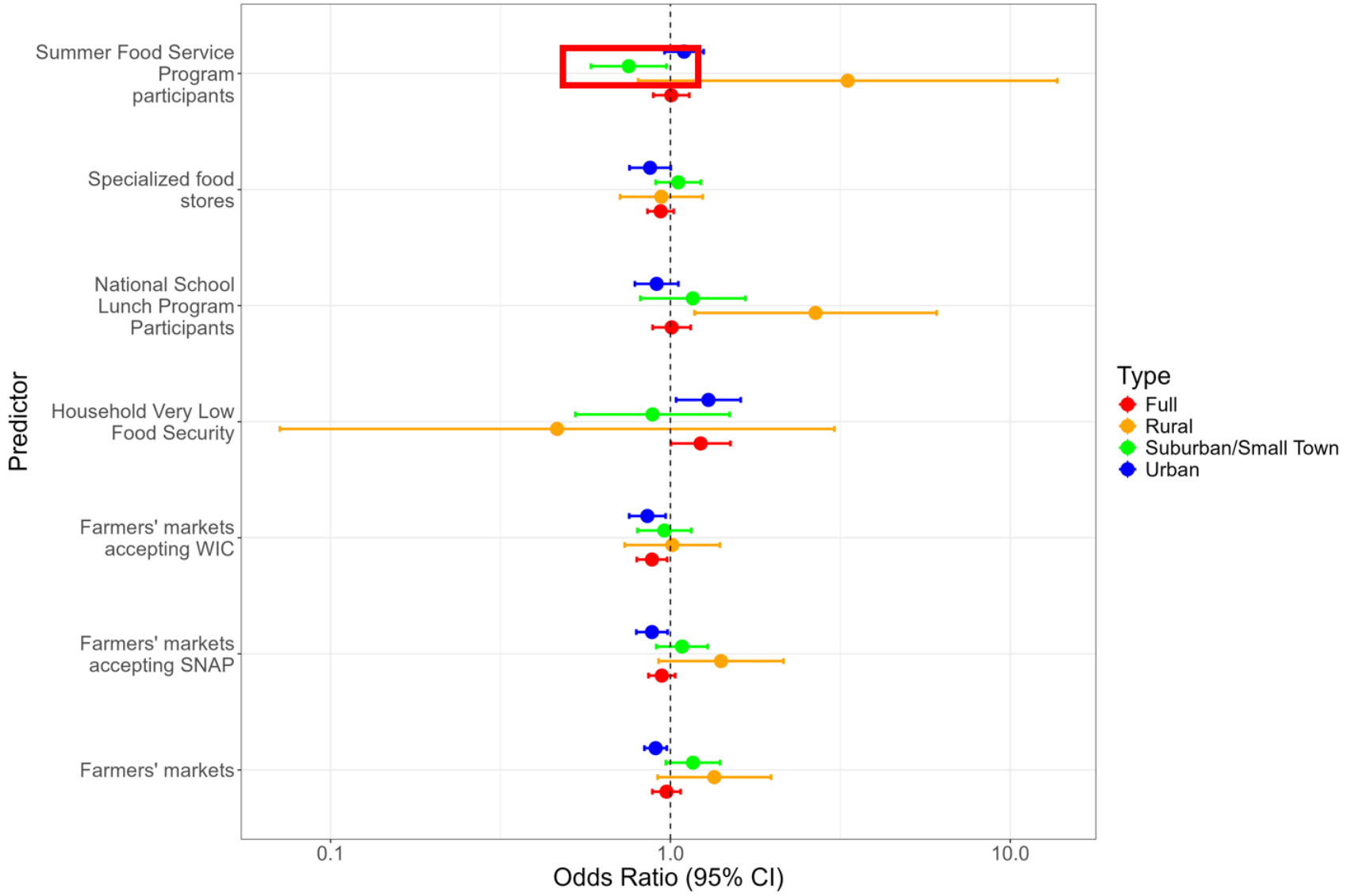
Adjusting for child age category, sex, race, ethnicity, maternal education, income, rural category, and census region:

Sugar-Sweetened Beverages



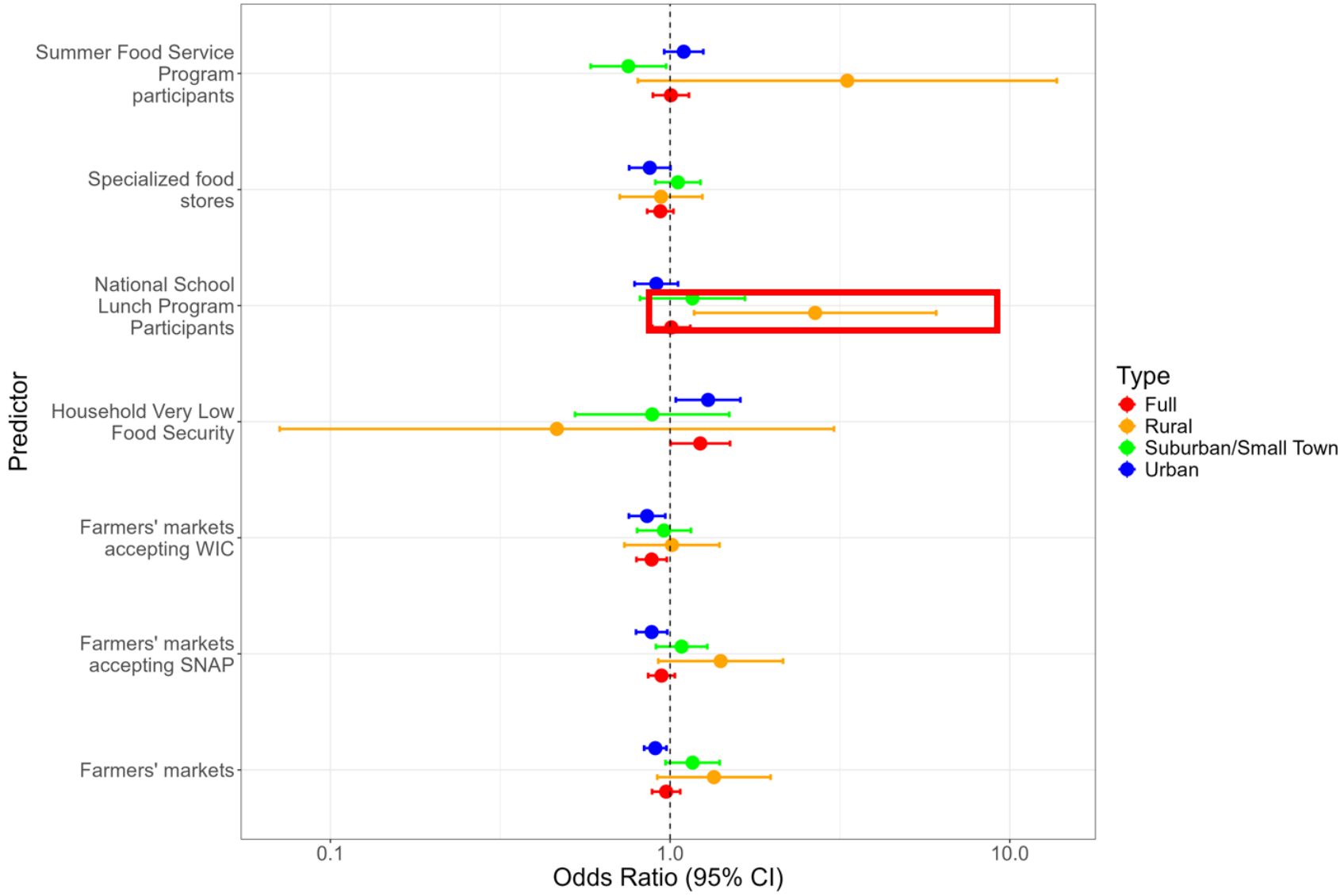
Adjusting for child age category, sex, race, ethnicity, maternal education, income, rural category, and census region:

Sugar-Sweetened Beverages



Adjusting for child age category, sex, race, ethnicity, maternal education, income, rural category, and census region:

Sugar-Sweetened Beverages



Adjusting for child age category, sex, race, ethnicity, maternal education, income, rural category, and census region:

Conclusions

- Different community-level food factors are associated with healthy consumption of F/V and SSB in children based on where you live
- Hypothesis generating analysis
- More research is needed to better understand multi-level relationships
  - rurality needs be considered

THANK YOU!

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Hockett CW, et. al., Associations between the community food environment and fruit and vegetable and sugar-sweetened beverage consumption in children in the ECHO Cohort.

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