

# USDA Food Assistance Programs (SNAP, the National School Lunch Program, and the School Breakfast Program) and Healthy Food Choices: Quasi-Experimental Evidence from Geographic Variation in Food Prices

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Preliminary: Please check before citing

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Slides available at  
<http://www.github.com/garretchristensen/FoodAPSAPPAM2017>

# Outline

- ▶ SNAP Background
- ▶ Food Price Variation Background
- ▶ SNAP Sufficiency
- ▶ Nutrition: Methods
- ▶ Nutrition: Results
- ▶ Conclusion

# SNAP Background

The Supplemental Nutrition Assistance Program (SNAP) is one of the largest government assistance programs.

- ▶ 2016: 44m recipients, cost of \$70 billion FY2016

[Source: USDA FNS]

- ▶ Started in 1964
- ▶ Paid for by Feds (the farm bill), administered by states
- ▶ Electronic Balance Transfer (EBT) in early 2000s
- ▶ Name changed to SNAP in 2008.

# How It Works

## Eligibility:

- ▶ Less than \$2,250/\$3,500 in countable assets. (Not home, sometimes car.)
- ▶ Less than net monthly income 100% of FPL, Gross 130% (\$2,021/\$2,628 family of 4)
- ▶ Earned income, dependent care, medical expenses, child support, excess shelter deductions.
- ▶  $Benefits = MaxBenefits(\$649/month) - NetIncome * 0.3$

[Source:USDA FNS]

# Recent Issues

- ▶ Large increase in recipients after financial crisis.
- ▶ ARRA: Benefits increased \$80/month in 2009, decreased in 2013.
- ▶ Able bodied without dependents 18-49(ABAWDs) eligibility maxes out at 3/36 months. Waived with high unemployment—kicking back in after Great Recession.
- ▶ Food insecurity among recipient households remains quite high (Coleman-Jensen et al., 2014).

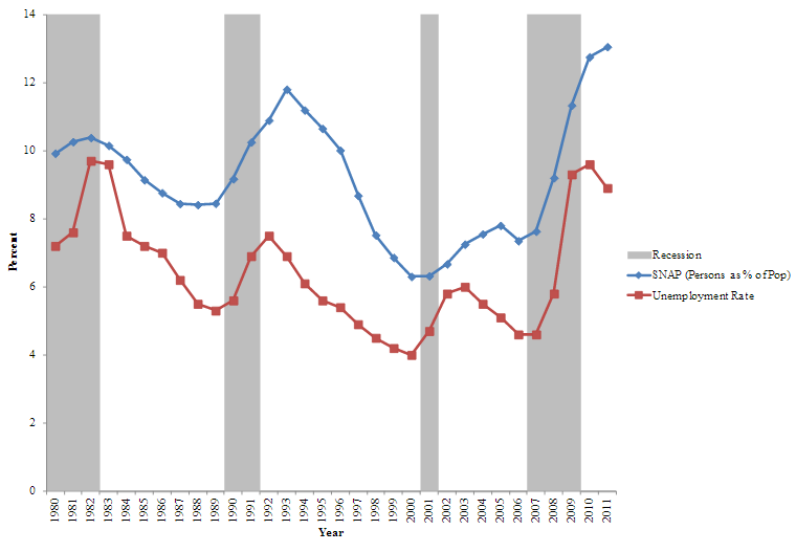
# Very Recent Issues

## Administration Proposals:

- ▶ \$193b (25+%) cut over 10 years
- ▶ Require ABAWDs work if <10% unemployment
- ▶ Eliminate minimum benefit (\$16)
- ▶ Eliminate increase in benefits beyond 6 people in household.

[Source: CBPP]

Figure 1: Trends in SNAP Participation and Unemployment Rate



Source: Author's calculations using CPS ASEC and BLS data

Ziliak 2015, "SNAP Matters"



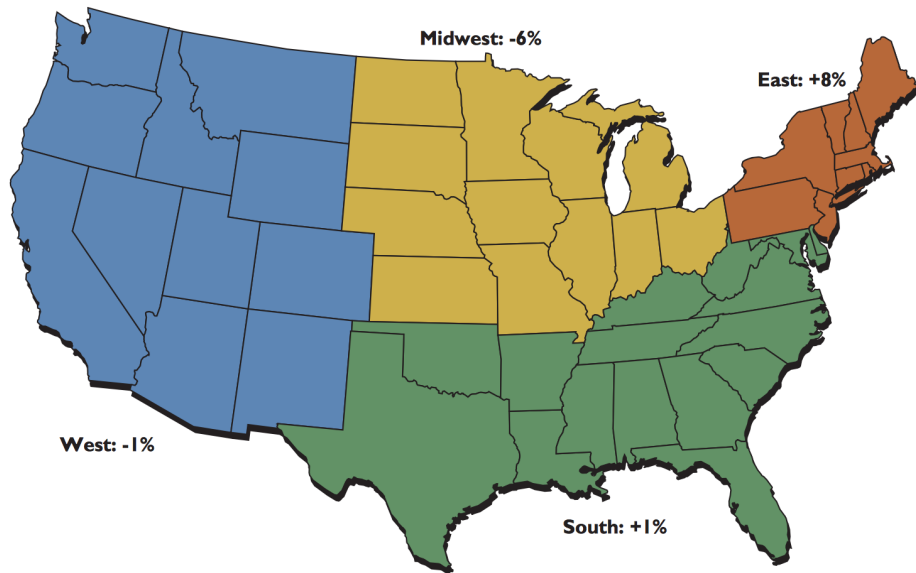
# Our Research I

- ▶ While legislated maximum SNAP benefits are fixed across 48 states, food prices vary significantly across geographic locations.
- ▶ Deductions for costs of housing, medical care, and dependent care help may not be sufficient to equalize real value of SNAP benefits geographically.
  - ▶ Small scale study in Philadelphia (Breen et al., 2011).
  - ▶ Quarterly Food at Home Price Database (QFAHPD) price variation (35 market groups) shows a \$10 increase in food price leads to 2.7 percentage point (5%) increase in household food insecurity. (3.1 pp, 12% for children) (Gregory & Coleman-Jensen, 2013).

# Our Research II

- ▶ What fraction of recipients can actually afford the TFP locally?
- ▶ **What does SNAP relative generosity do to nutrition?**
  - ▶ Literature: SNAP overall leads to modest changes in diet quality (Gregory et al. 2014).
- ▶ Other data (QFAPHD): What does SNAP relative generosity do to child health? (Bronchetti, Christensen, Hoynes)

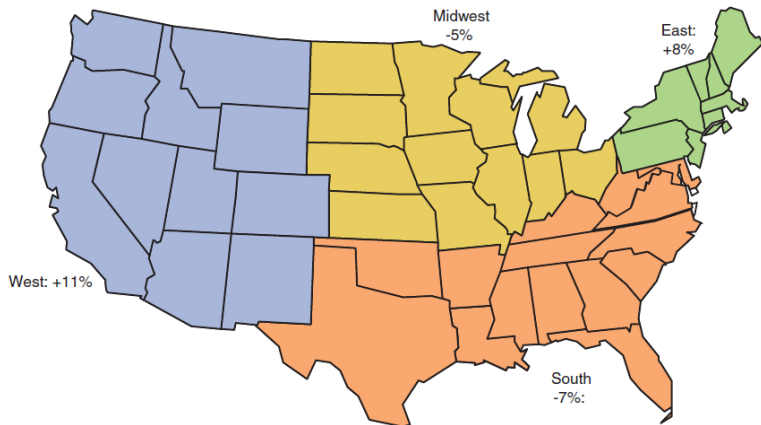
## Variation in food prices from national average, 2004-07



Source: Calculations by USDA, Economic Research Service using Bureau of Labor Statistics' average retail price data.

Figure1

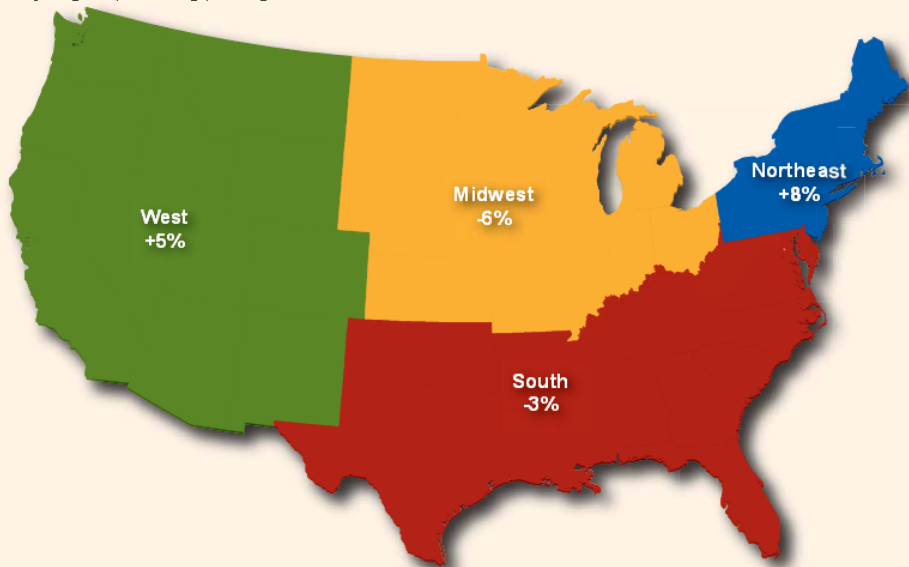
## Regional food prices differ from the national average

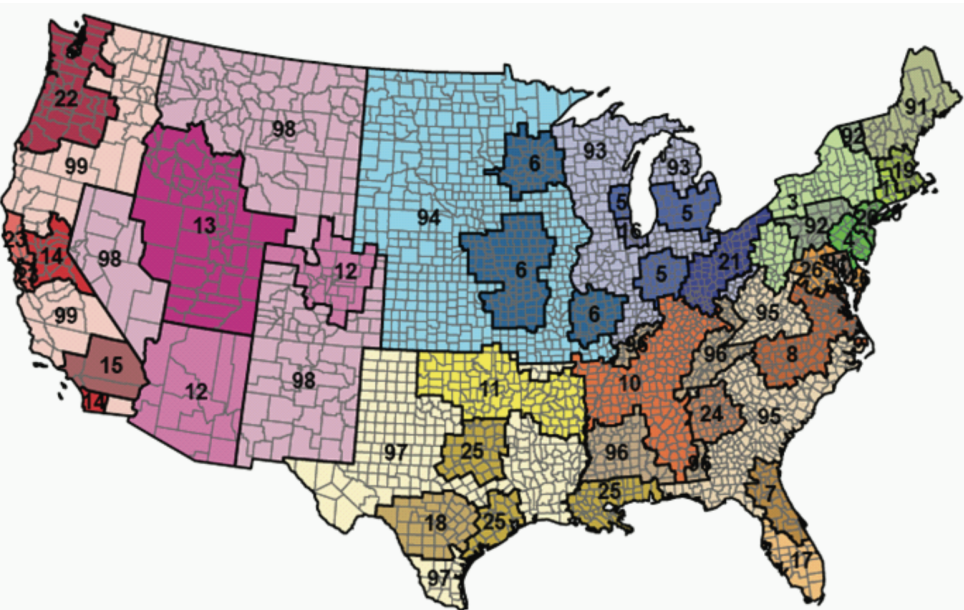


Source: Economic Research Service/USDA, using Bureau of Labor Statistics' average price data and Nielsen Homescan Data, 1998-2003.

## Food prices—variation from national average

*Retail food prices, on average, are highest in the East and lowest in the Midwest.*





▸ QFAHPD Visualization

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Our data: At census block group level, but no map.  
Sorry!

# FoodAPS

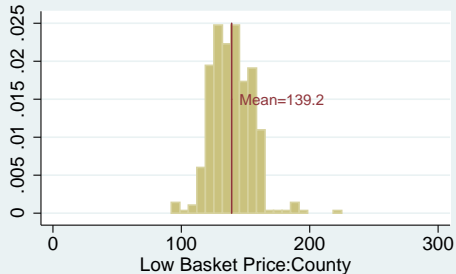
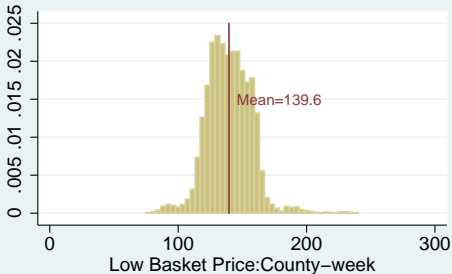
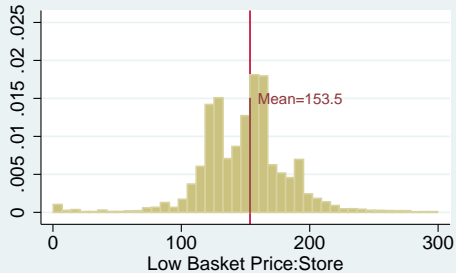
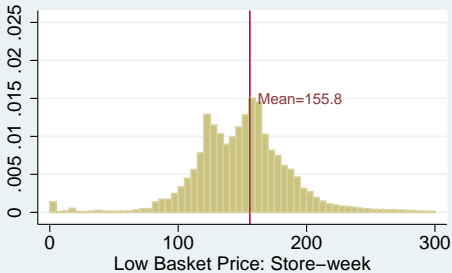
“USDA’s National Household Food Acquisition and Purchase Survey (FoodAPS) is the first nationally representative survey of American households to collect unique and comprehensive data about household food purchases and acquisitions.”

- ▶ FoodAPS lets us look at the relationship between food prices and SNAP adequacy at a much finer geographical level.
- ▶ Gunderson et al. use IRI InfoScan data at store (or regional chain) level to build basketprice measure.
- ▶ Index modeled after Thrifty Food Plan (TFP).



# Basket Prices

Medians by Store-week, Store, County-week, and County



# The Thrifty Food Plan (TFP)

- ▶ Well-defined basket of foods to obtain a nutritious diet at a minimal cost.
- ▶ You're supposed to be able to buy TFP with 30% of net income + food stamp benefits.
- ▶ That's where the 649 comes from:

$$\text{Benefits} = \text{MaxBenefits}(\$649/\text{month}) - \text{NetIncome} * 0.3$$

# SNAP Sufficiency for TFP

Are SNAP benefits adequate for SNAP households to purchase the TFP? If not, what is the shortfall?

Compare TFP cost to:

- ▶ SNAP benefit received + 30% of net income
- ▶ Legislated maximum SNAP benefit

# Sufficiency Rates of SNAP for Recipient Households by Distance from Stores

	Average Net Income	N	Average Max Benefits	N
Census Region Median	78%	1444	83%	1581
State Median	79%	1444	76%	1581
County Median	79%	1436	74%	1572
20-mile Median	78%	1338	73%	1464
10-mile Median	78%	1311	73%	1433
5-mile Median	77%	1224	72%	1338
3.4-mile Median	77%	1174	74%	1281
2.5mile Median	77%	1123	72%	1225
10-nearest Median	79%	1338	77%	1464
5-nearest Median	78%	1332	71%	1458

## Sufficiency Rates of SNAP for Recipient Households by Distance from Stores

	Average Net Income	N	Average Max Benefits	N
Census Region Minimum	100%	1444	100%	1581
State Minimum	99%	1444	100%	1581
County Minimum	94%	1436	100%	1572
20-mile Minimum	95%	1338	100%	1464
10-mile Minimum	93%	1311	100%	1433
5-mile Minimum	91%	1224	99%	1338
3.4-mile Minimum	90%	1174	100%	1281
2.5mile Minimum	90%	1123	99%	1225
10-nearest Minimum	91%	1338	100%	1464
5-nearest Minimum	89%	1332	98%	1458
2-nearest Minimum	83%	1332	85%	1458

## Characteristics of Households by SNAP Sufficiency

Characteristic	SNAP Recipients			SNAP Eligible		
	No	Yes	P-value	No	Yes	P-value
Family Size	2.78	2.65	0.43	2.52	2.21	0.11
Household Max Age	50.83	49.35	0.30	53.22	53.00	0.89
Household Min Age	27.00	28.14	0.65	34.82	37.21	0.43
<b>Household Income</b>	2392.80	1950.32	0.05	3059.18	2355.08	0.04
Percent of Poverty Line	141.95	124.20	0.12	209.82	172.74	0.08
HH Has Earned Income	0.50	0.53	0.57	0.60	0.55	0.21
Household Max Education	20.08	19.65	0.10	20.76	20.24	0.09
HH Has Elderly Member	0.30	0.27	0.40	0.38	0.37	0.83
<b>Metro Area</b>	0.97	0.83	0.01	0.97	0.83	0.02
High Food Security	0.34	0.32	0.52	0.45	0.50	0.44
Marginal Food Security	0.25	0.21	0.24	0.23	0.19	0.13
Low Food Security	0.24	0.26	0.57	0.21	0.16	0.08
Very Low Food Security	0.18	0.21	0.40	0.11	0.16	0.02
Trouble Paying Bills	0.30	0.27	0.45	0.18	0.17	0.83
High Price Area	0.88	0.00	0.00	0.90	0.00	0.00
Northeast	0.22	0.09	0.25	0.29	0.09	0.13
Midwest	0.24	0.34	0.33	0.16	0.35	0.05
South	0.33	0.43	0.25	0.32	0.42	0.33
West	0.21	0.14	0.49	0.22	0.14	0.39

# Nutrition: Overview

- ▶ Use local relative generosity of SNAP to measure nutrition impacts.
- ▶ Cross-sectional data: use Oster's 2016 improvement to Altonji, Elder, Taber 2005 method to compare with and without observable controls.
- ▶ National School Lunch Program and the School Breakfast Program as mediators.
- ▶ Outcomes:
  - ▶ Healthy Eating Index (total, fruit, veg)
  - ▶ Percent of calories from added sugar, solid fat, alcohol
  - ▶ Alcohol (Grams)
  - ▶ Self-reported nutrition status

# Healthy Eating Index

- ▶ Created by USDA's Center for Nutrition Policy and Promotion (CNPP) to assess conformance to the *Dietary Guidelines for Americans*. Updated every five years. (Guenther et al.).
- ▶ Valid for age  $> 2$ .
- ▶ Nine adequacy, three moderation components.
- ▶ Density approach (per 1000 calories).
- ▶ Zeros prevalent in component scores.
- ▶ National average 60/100.



# Healthy Eating Index

HEI-2010 Dietary Component	Max Score	Moderation
Total Fruit	5	
Whole Fruit	5	
Total Vegetables	5	
Greens and Beans	5	
Whole Grains	10	
Dairy	10	
Total Protein Foods	5	
Seafood and Plant Proteins	5	
Fatty Acids	10	
Refined Grains	10	M
Sodium	10	M
Empty Calories	20	M

Note: See CNPP factsheet for scoring standards.

# Nutrition: Controlling for Observables

$$Nutrition_{ij} = \alpha + \beta \cdot f(TFP_{ij}, MAXSNAP_{ij}) + X_{ij} \cdot \theta + \delta_j + \epsilon_{ij}$$

- ▶ Focus on  $\log(SNAPMAX_{ij}/TFP_{ij})$  as independent variable of interest, though it could be  $\log(TFP_{ij})$ , sufficiency[0/1], or gap[continuous].
- ▶  $X$  is rural, metro, income, trouble with bills, large expenditure, household size, car ownership, tobacco use, days since SNAP receive, WIC eligibility, WIC use, age, race, sex, non-food CPI (9).
- ▶ State fixed effects

# Methods: Controlling for Observables

- ▶ Individual level
  - ▶ Assume FAH consumed by all, assign FAFH to individual
- ▶ Primary sample: SNAP participants
  - ▶ Children and adults separately
- ▶ Placebo: > 300% Federal
- ▶ Regressions weighted according to complex survey design.

User's Guide Pg 55

## Methods: Oster 2016

$$Y = \beta X + \Psi \omega^0 + W_2 + \epsilon$$

$X$  is treatment of interest.

$\omega$  observed,  $W$  is not.

What happens to our effect estimate if we assume the unobservables have a similar correlation to treatment as the observables?

Depends on relative degree of selection on observed and unobserved variables ( $\delta$ ), as well as  $R^2$  resulting from controlling for unobservables,  $R_{max}$ .

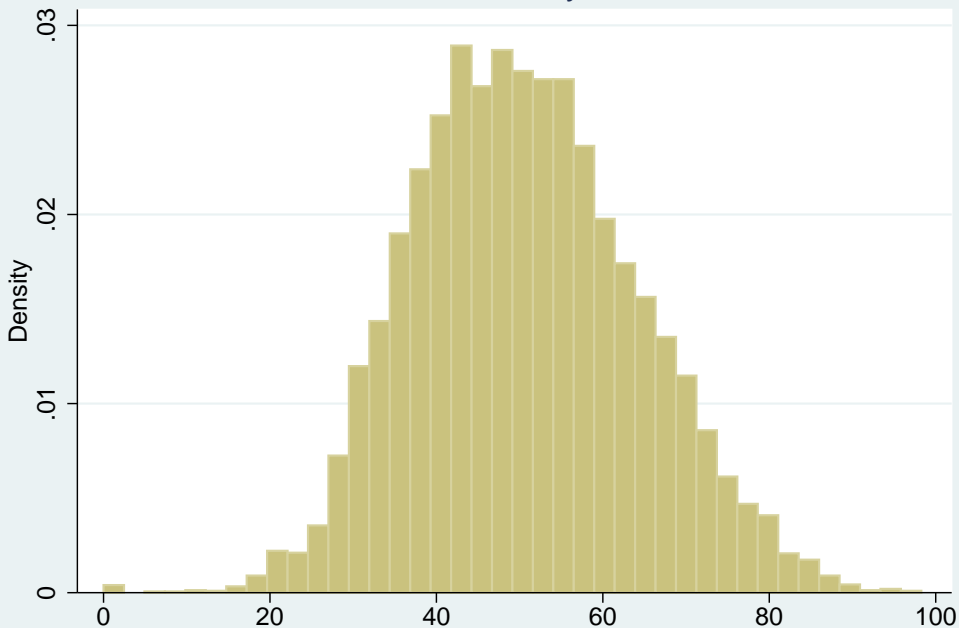
Altonji, Elder, Taber (2005) implicitly assume  $R_{max}=1$ . Perhaps unlikely due to measurement error or idiosyncratic variation.

Bellows & Miguel 2009, Nunn & Wantchekon 2011 assume  $R_{max} = \tilde{R} + (\tilde{R} - \hat{R})$ .

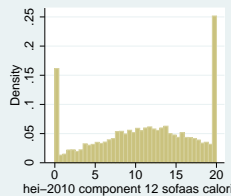
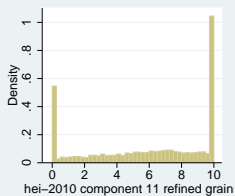
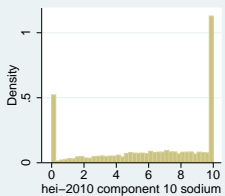
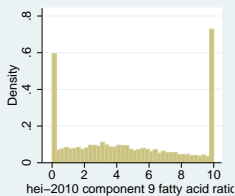
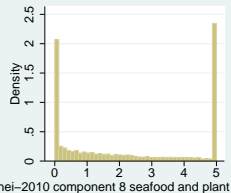
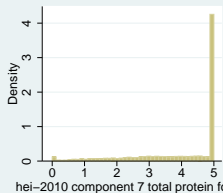
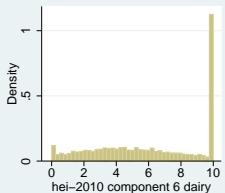
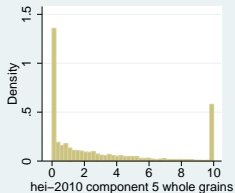
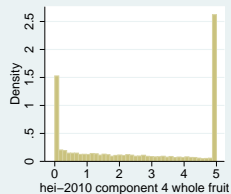
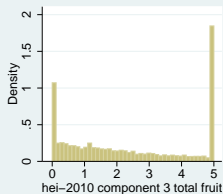
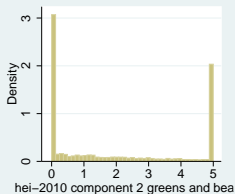
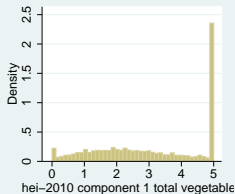
$R_{max}$  is a flexible parameter in Oster's method, but  $1.3 \times \tilde{R}$  performs well in tests.

$$\beta^* \approx \tilde{\beta} - \delta(\hat{\beta} - \tilde{\beta}) \frac{R_{max} - \tilde{R}}{\tilde{R} - \hat{R}}$$

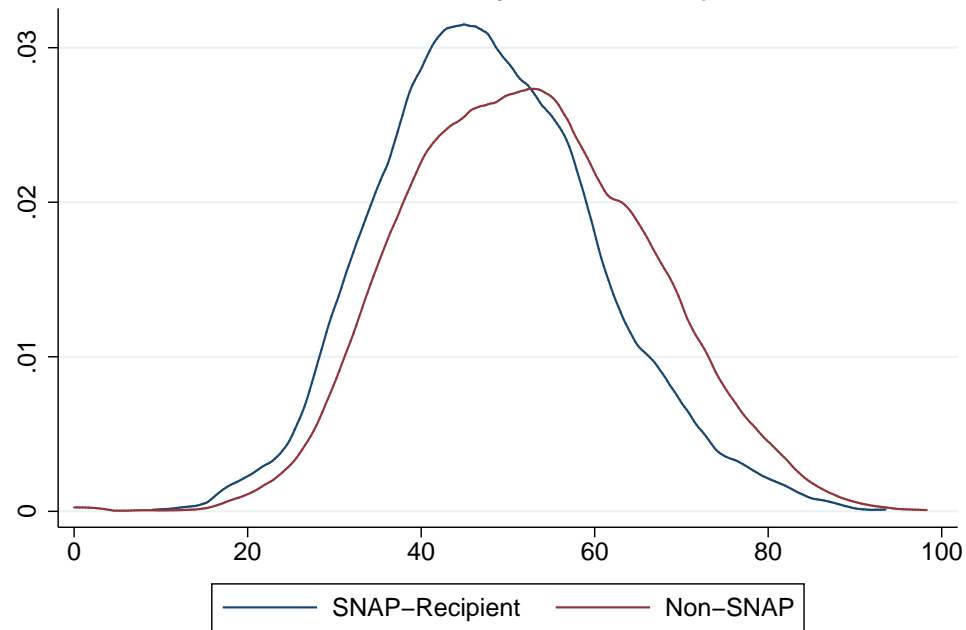
# HEI 2010 Score by Individual



# HEI Category Scores

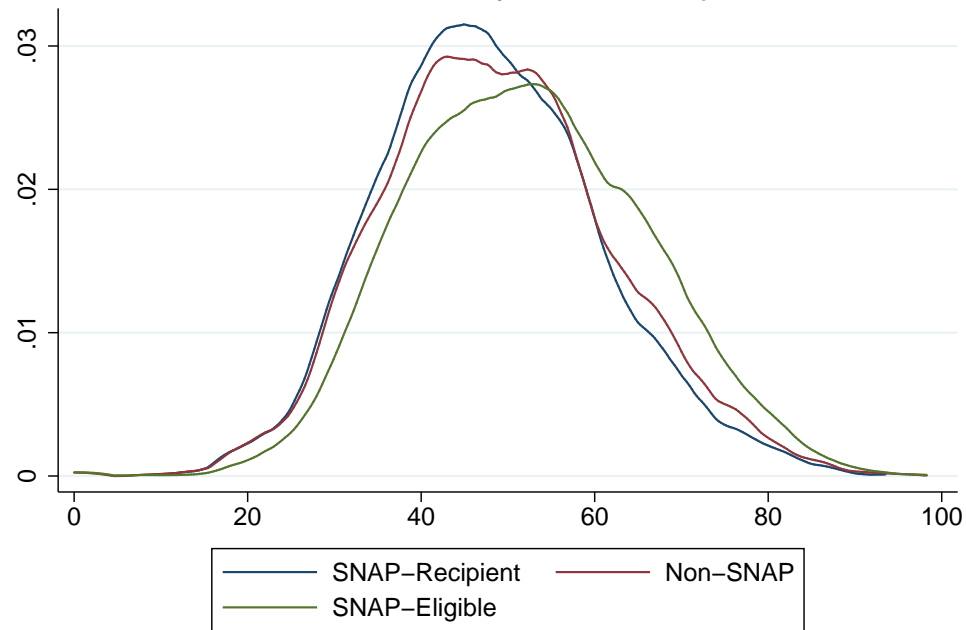


## Individual HEI Scores by SNAP Recipient Status

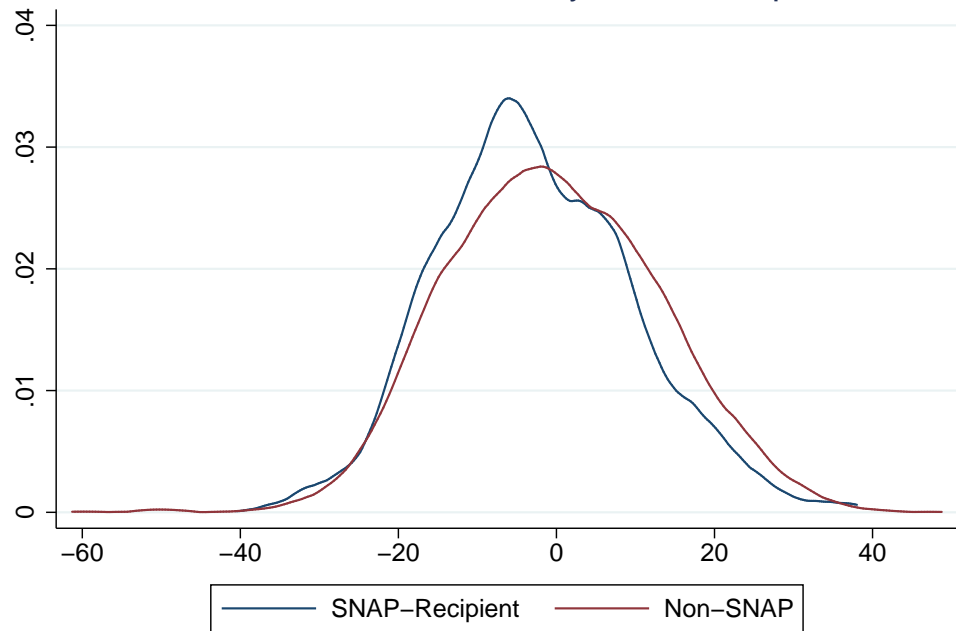




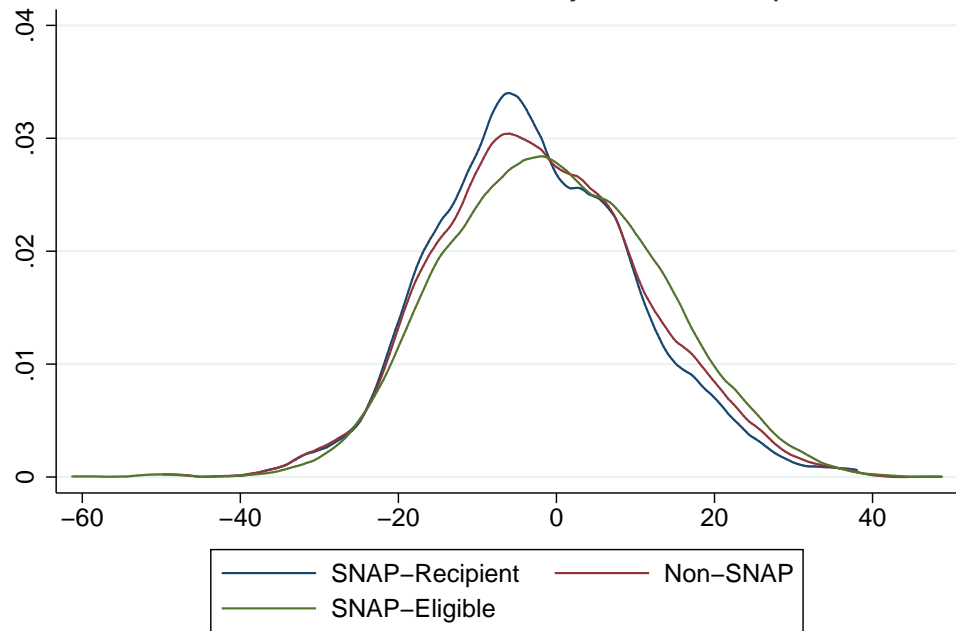
# Individual HEI Scores by SNAP Recipient Status



# Individual HEI Score Residuals by SNAP Recipient Status



# Individual HEI Score Residuals by SNAP Recipient Status



# Results

HEI Total Score: SNAP School Children			
	(1)	(2)	(3)
$\ln(\text{SNAPMAX}/\text{TFP})$	-5.031 (4.255)	8.630* (4.696)	13.24 (9.123)
N	3620	3551	3551
$R^2$	0.002	0.120	0.160
Mean	53.25	53.25	53.25
Effect10	-0.480	0.823	1.262
$\text{Beta}(R_{\max} = 1)$		158.7	136.5
$\text{Delta}(R_{\max} = 1)$		-0.0345	-0.0642
$\text{Beta}(R_{\max} = 1.3\tilde{R})$		16.63	22
$\text{Delta}(R_{\max} = 1.3\tilde{R})$		-0.752	-0.923
Controls		YES	YES
State FE			YES

# Results

Nutrition Outcomes: SNAP School Children			
	(1)	(2)	(3)
	HEI-Veg	HEI-Fruit	SOFA
$\ln(\text{SNAPMAX}/\text{TFP})$	1.526 (0.926)	0.555 (1.191)	-7.739 (6.626)
N	3851	3851	3851
$R^2$	0.085	0.154	0.127
Mean	3.205	2.580	31.75
Effect10	0.145	0.0529	-0.738
$\text{Beta}(R_{\max} = 1.3\tilde{R})$	2.317	1.449	-13.10
$\text{Delta}(R_{\max} = 1.3\tilde{R})$	-0.966	-0.619	-1.140
Controls	YES	YES	YES
State FE	YES	YES	YES

# Results

## Nutrition Outcomes: FPL > 300%FPL School Children

	(1) HEI Total	(2) HEI Veg	(3) HEI Fruit	(4) SOFA	(5) Alcohol
$\ln(\text{SNAPMAX}/\text{TFP})$	-34.45 (50.43)	-0.113 (3.927)	-1.159 (4.500)	7.891 (16.79)	-21.05 (456.2)
N	230	257	257	257	257
$R^2$	0.442	0.535	0.477	0.364	0.421
Mean	53.02	3.205	2.565	31.81	67.22
Effect10	-3.284	-0.0108	-0.110	0.752	-2.006
$\text{Beta}(R_{\max} = 1.3\tilde{R})$	-42.51	0.101	-0.970	7.848	-20.99
$\text{Delta}(R_{\max} = 1.3\tilde{R})$	-3.255	0.538	4.922	20.06	22.47
Controls	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES

# Results

## Nutrition Outcomes: SNAP Adults

	(1)	(2)	(3)	(4)	(5)
	HEI Total	HEI Veg	HEI Fruit	SOFA	Alcohol
$\ln(\text{SNAPMAX}/\text{TFP})$	10.27 (10.49)	1.475 (1.062)	0.401 (1.188)	-8.201 (6.069)	-21.38 (83.26)
Observations	2145	2311	2311	2311	2311
R-squared	0.168	0.089	0.176	0.127	0.066
Mean	53.18	3.206	2.589	31.78	67.97
Effect10	0.978	0.141	0.0382	-0.782	-2.038
$\text{Beta}(R_{\max} = 1.3\tilde{R})$	18.42	2.235	1.217	-13.44	-17.95
$\text{Delta}(R_{\max} = 1.3\tilde{R})$	-0.909	-1.027	-0.501	-1.166	4.310
Controls	YES	YES	YES	YES	YES
State FE	YES	YES	YES	YES	YES

# Results

## Obesity: SNAP Adults

	Obese		Overweight			
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(\text{SNAPMAX}/\text{TFP})$	0.367*** (0.121)	0.352*** (0.102)	0.422* (0.248)	0.0644 (0.0846)	0.120* (0.0654)	0.106 (0.171)
Observations	2350	2289	2289	2350	2289	2289
R-squared	0.008	0.074	0.106	0.000	0.062	0.093
Mean	0.280	0.280	0.280	0.581	0.581	0.581
Effect10	0.0350	0.0335	0.0402	0.00614	0.0115	0.0101
$\text{Beta}(R_{\max} = 1.3\tilde{R})$		0.407	0.503		-2.419	-0.225
$\text{Delta}(R_{\max} = 1.3\tilde{R})$		-10.69	-6.547		-0.389	0.383
Controls		YES	YES		YES	YES
State FE			YES			YES



# Nutrition

## Tentative conclusions

- ▶ No statistically significant improvements in HEI with higher SNAP purchasing power.
- ▶ Sign indicates more fruit and vegetables, less sugar, fat, and alcohol.
- ▶ Similar (insignificant) HEI results in children and adults.
- ▶ Significantly higher obesity among SNAP recipient adults with higher SNAP purchasing power.

Thank You