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Healthy Snack Availability Near High- and Low-Income Urban Schools

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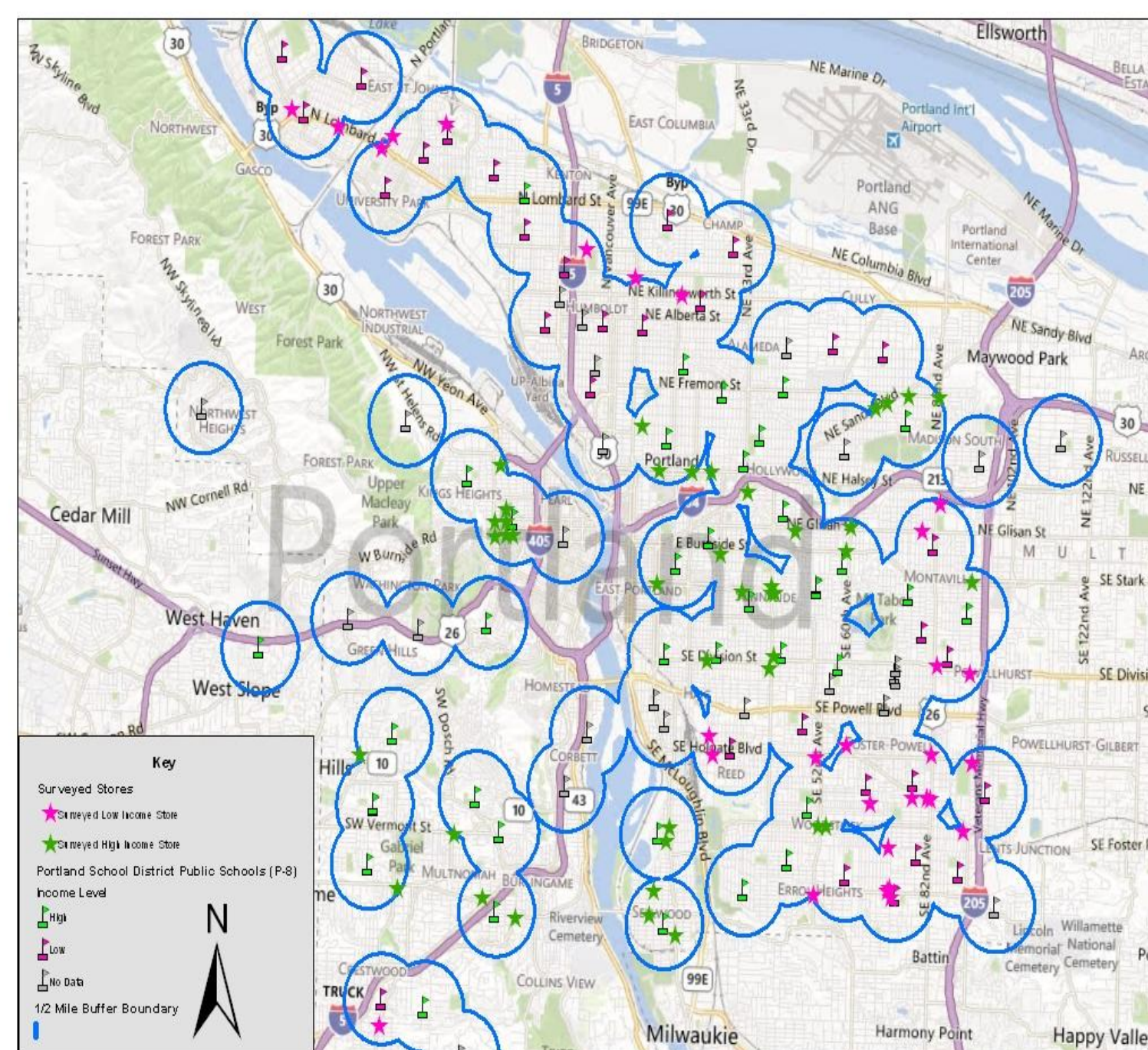
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Background

- Children's snacking habits are influenced by their immediate food environments.
- Major shifts in dietary patterns affecting energy balance are a key underlying cause of obesity.
- One recent study found that nearly 40% of the energy consumed by youth came from solid fats and added sugars, and half of these calories were found in just 6 sources: soda, fruit drinks, and dairy desserts, grain desserts, pizza, and whole milk.¹
- Increasingly, findings show that factors such as corner stores near schools are related to obesity.^{2,3}
- In Multnomah County 26% of eighth grade students and 23.4% of 11th grade students are overweight or at risk of becoming overweight.⁴
- This study was conducted in preparation for a larger, community-based participatory research project (SNACZ) to create "healthy snacking zones" near schools in a rural Oregon county.

Setting and Sample

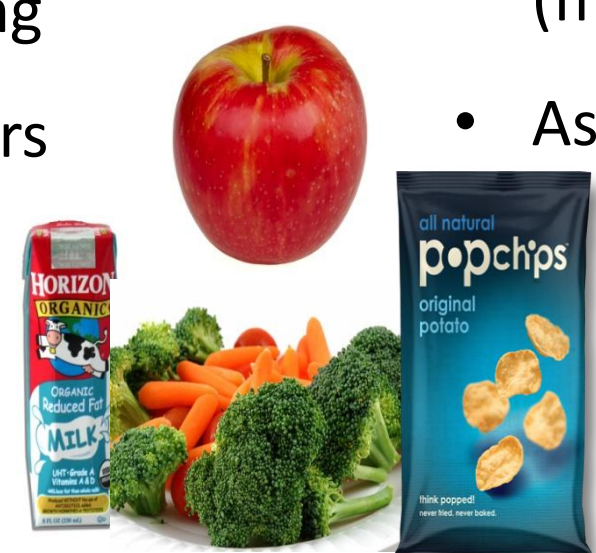
- Defined low- and high-income elementary and middle schools by % students on free and reduced-price lunch ($\geq 50\%$, $< 50\%$)
- Buffered schools by half-mile "walking" radius
- Identified food stores from NAICS
- Classified stores based on buffer location
- Ground-truthed store location, and type
- N= 71. n= 30 low-income stores, n= 41 high-income stores



Food Store Audit Instrument

A "healthy" snack or beverage is one that meets the following nutrition criteria per serving as packaged (IOM Standards):

- ≤ 200 calories
- $\leq 35\%$ total calories from fat
- $< 10\%$ total calories from saturated fat
- Zero trans fat, ≤ 0.5 grams/serving
- $\leq 35\%$ of calories from total sugars
- ≤ 200 mg sodium



The SNACZ Food Store Checklist:

- Was developed as part of a larger SNACZ study
- Shows high reliability
- Includes 50 items in beverage, snack, and fruit and vegetable (fresh, dried, canned) categories
- Assesses availability of multi-portion and single-portion snack items

Does the food environment surrounding low-income urban schools offer fewer healthy snack options than what is available near high-income urban schools?

Results

Percent availability of healthy snacks & beverages in single-serving sizes by store type

Store Location	High-income urban	Low-income urban
Beverages		
Fruit Juice	29.27	40.00
Vegetable Juice	0	0
Low-fat milk	12.20	3.33
Nonfat milk	2.44	0
Flavored milk	12.20	3.33
Soy milk	0	0
Snacks		
Chips	24.39	13.33
Chex Mix	0	0
Corn nuts	41.46	33.33
Pretzels	0	0
Crackers	2.44	0
Rice Cakes	0	0
Popcorn	0	0
Nuts & seeds	78.05	80.00
Trail mix	0	0
Cookies	0	0
Graham crackers	0	6.67
Granola bars	75.61	63.33
Bagels	0	0
Muffins	0	0
Popsicles	0	0
Yogurt*	56.10	23.33
Fruits		
Apple	46.34	36.67
Apricot	12.20	10.00
Banana	43.90	40.00
Blueberries	9.76	3.33
Cherries	9.76	0
Grapefruit*	24.39	6.67
Grapes	7.32	3.33
Melon*	36.59	6.67
Nectarine	21.95	10.00
Orange	39.02	23.33
Peach	21.95	13.33
Pear	21.95	6.67
Pineapple*	24.39	3.33
Plum	24.39	10.00
Strawberries	7.32	3.33
Mixed Fruit*	36.59	10.00
Other fresh fruit	51.22	36.67
Applesauce*	14.63	0
Other canned fruit*	46.34	20.00
Dried fruit*	43.90	16.67
Vegetables		
Broccoli	4.88	0
Carrots	12.20	10.34
Cauliflower	2.44	0
Celery	9.76	0
Tomatoes	21.95	16.67
Mixed vegetables	14.63	6.67
Other fresh vegetables	34.15	16.67

Percent availability of healthy snacks & beverages in any size serving by store type

Store Location	High-income urban	Low-income urban
Beverages		
Fruit Juice	100.00	96.67
Vegetable Juice	26.83	20.00
Low-fat milk*	80.49	50.00
Nonfat milk*	53.66	23.33
Flavored milk	17.07	23.33
Soy milk	26.83	20.00
Water	90.24	96.67
Snacks		
Chips*	58.54	26.67
Chex Mix	70.73	56.67
Corn nuts	73.17	73.33
Pretzels*	56.10	23.33
Crackers	87.81	73.33
Rice Cakes	19.51	6.67
Popcorn*	29.27	6.67
Nuts & seeds	92.68	90.00
Trail mix	7.32	13.33
Cookies	31.71	20.00
Graham crackers	70.73	53.33
Granola bars	87.81	70.00
Bagels	4.88	0
Muffins	0	0
Popsicles	9.76	0
Yogurt*	58.54	26.67
Fruits		
Apple	51.22	40.00
Apricot	14.63	13.33
Banana	46.34	43.33
Blueberries	21.95	13.33
Cherries	21.95	10.00
Grapefruit*	24.39	6.67
Grapes	19.51	6.67
Melon	41.46	20.00
Nectarine	21.95	10.00
Orange	39.02	26.67
Peach	21.95	13.33
Pear	21.95	6.67
Pineapple	26.83	16.67
Plum	24.39	10.00
Strawberries	21.95	10.00
Mixed Fruit*	39.02	10.00
Vegetables		
Broccoli	21.95	13.33
Carrots	26.83	17.24
Cauliflower	21.95	10.00
Celery*	24.39	6.67
Tomatoes	21.95	16.67
Mixed vegetables*	26.83	6.67

*Statistically significant ($p < 0.05$) difference between high-income urban and low-income urban

Analysis: A statistical test for the pairwise difference between two proportions was performed to evaluate the relationship between percentage of each single-serving size available and any size product available in the two location categories.

Discussion

Findings

- Healthy snack items were found less frequently in single size servings than larger, multi-serving portions.
- There was a statistically significant difference in the occurrence of eight single-serving size healthy snacks in low-income urban stores compared to high-income urban stores.
- There was a statistically significant difference in the occurrence of ten any-size serving healthy snacks in low-income urban stores compared to high-income urban stores.

Strengths

- Developed a reliable tool for use in evaluating potential corner-store snack interventions in rural Oregon.
- Assessed and found disparities in healthy snacks near high- and low-income schools.

Limitations

- This instrument evaluates snacks based on IOM criteria. Low-fat chips, Rice Krispy treats, and corn nuts, and other unlikely "healthy" snacks fit the criteria, and therefore it may not promote nutritious snacking.
- The checklist captured variety of snack options, but not variety within snack foods, simply availability. For example, if a store sold one brand of nuts/seeds only, this lack of variety would not be recorded.
- The study does not inform purchasing practices of children in the food environment surrounding their schools. Availability of healthy snacks does not indicate children will purchase them over other high fat and sugar snacks.

Implications for Practice

- Public Health literature indicates the need for studies that could inform environmental and policy solutions for populations at highest risk of obesity. This study indicates that interventions targeted at the food environment surrounding urban schools might have success in preventing childhood obesity.
- Overall, the lack of single-serving healthy snack items in all stores indicates that children who do consume convenience store foods may benefit from healthier, single portion options to inhibit overconsumption and snacks high in fat, sugar, and sodium.

Literature

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