



Addressing Cardiometabolic Risk in Children and Adolescents: CHALLENGES AND SOLUTIONS

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Food Availability and Obesogenic Environments as Contributors to Overweight and Obesity in Childhood

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Disclosures

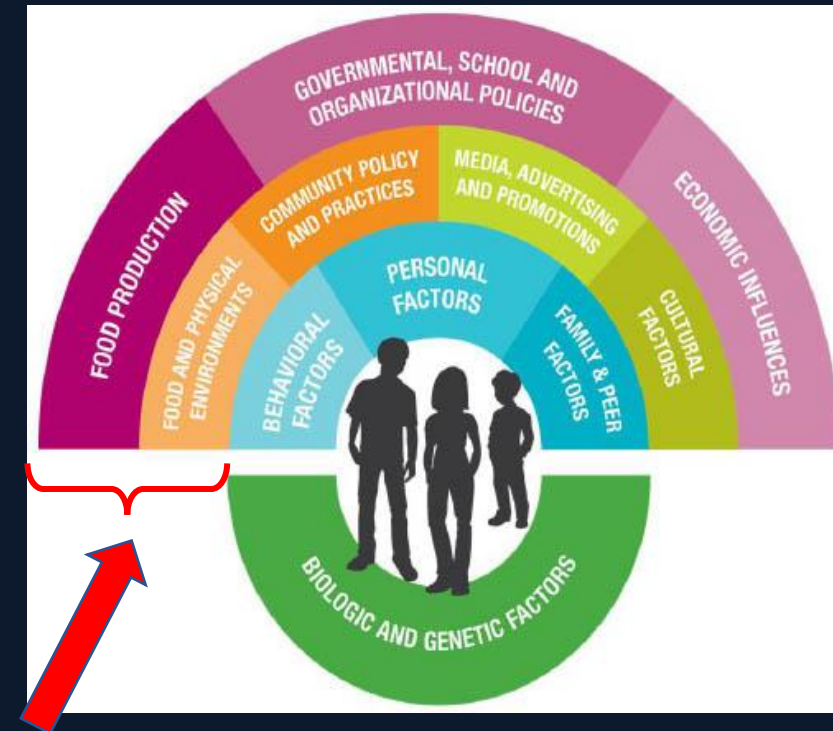
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- Consultant for Home Visiting Applied Research Collaborative (HARC)

Objectives

- By the end of this session, you will be able to:
 1. Explain the role of obesogenic environments as contributors to childhood obesity
 2. Discuss approaches to improve obesogenic environment to better tackle cardiometabolic risk in pediatric patients
 3. Describe how improvements in obesogenic environments can be implemented

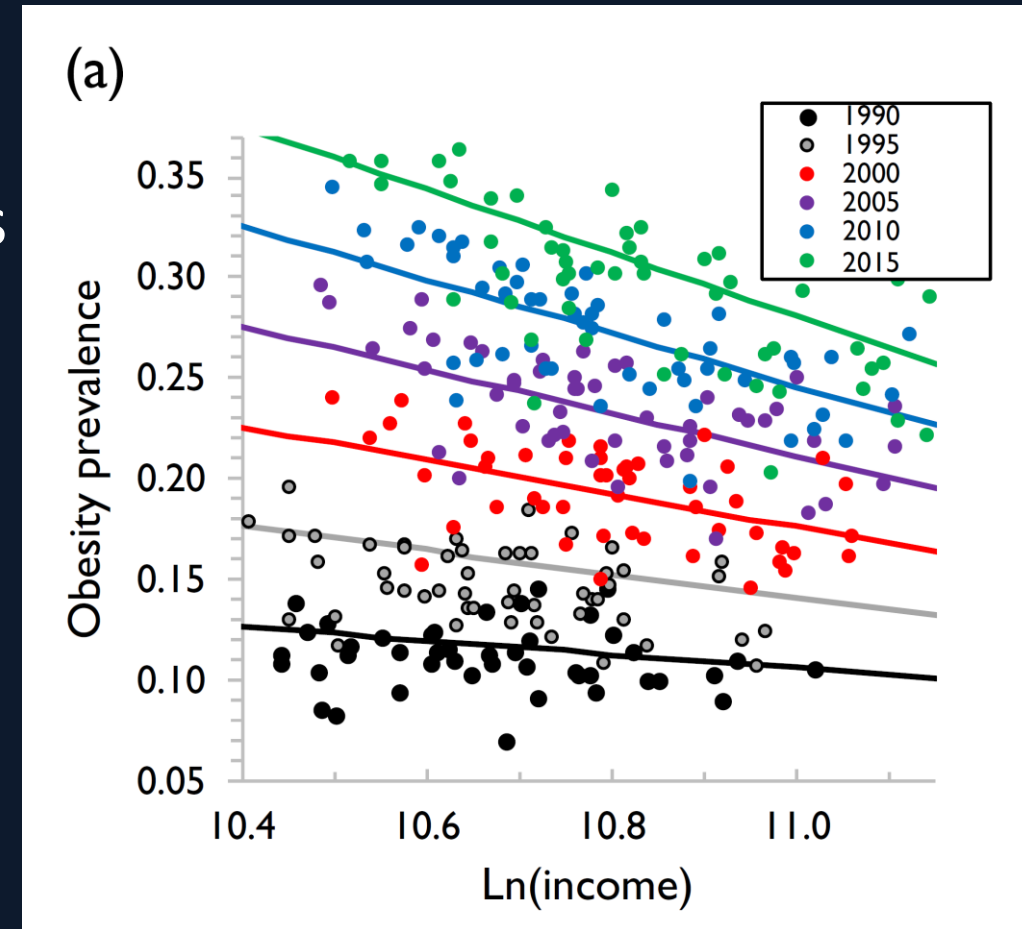
What do we mean by an “obesogenic environment”?

- Environments that work to promote obesity development or reduce opportunities for healthy lifestyle
 - Lack of access to healthy foods
 - Easily accessible unhealthy foods/DoorDash?
 - Large portion sizes and increased eating out
 - Increased ultra-processed foods
 - Sedentary activities/screen time
 - Neighborhood characteristics (green space/parks, crime)
 - Lack of physical activity/gym class at school
 - Lack of access to gyms/recreation centers
- Typically systematic (rather than individual-level) factors



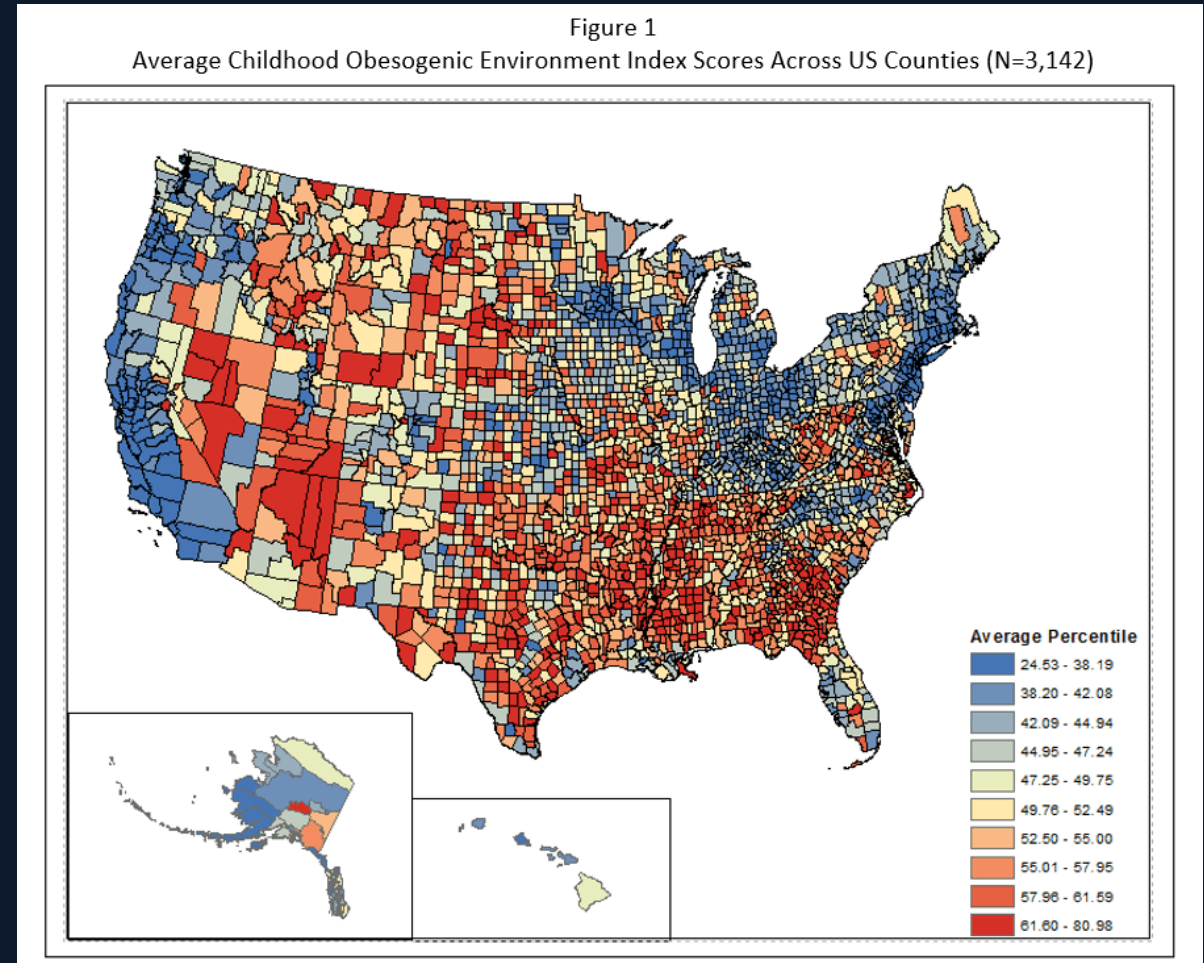
Association of obesity with poverty has developed over the past 30 years

- In the US, obesity and obesogenic environments affect low-income populations more
- This was not always the case—relatively recent development!
 - Using state-level data, one study found that as recently as 1990, income and obesity were not related, but this association has gotten progressively stronger since then
- What has changed?



Childhood Obesogenic Environment Index

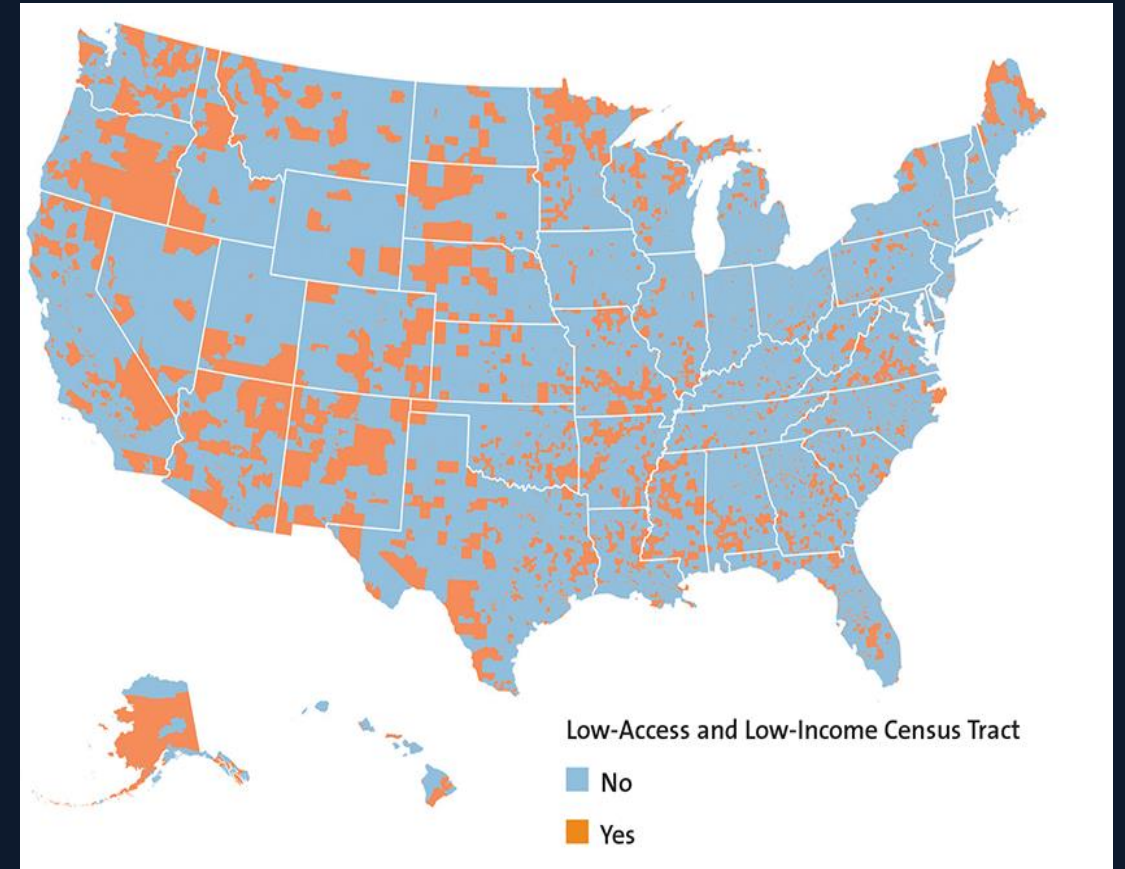
- A census-tract level index of 10 community-level variables associated with physical activity, healthy eating, or overweight/obesity among youth.
 - Access to grocery stores, farmer's markets, full-service and fast-food restaurants, convenience stores
 - Births at baby-friendly hospitals
 - Proximity to exercise opportunities and schools
 - Walkability
- Higher in South and West, and in rural areas
- New theoretical construct—not yet related to actual childhood obesity rates



Food Availability and Access

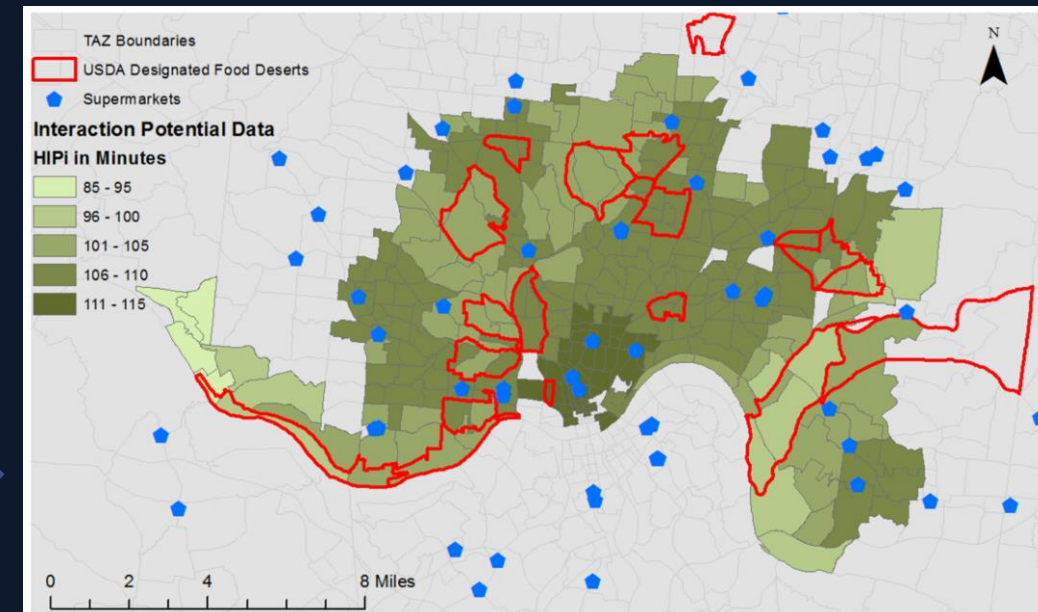
- USDA Food deserts (neighborhood):
 - Low-access: at least 33% must travel an inconvenient distance to reach nearest supermarket/grocery store
 - Low-income: at least 20% poverty; median income < 80% statewide value
- 12.8% of US population lives within low-income/low-access Census Tract
 - 6.2% lack access to a supermarket
 - Greater in rural or dense urban areas

Food Deserts
in America (2010)



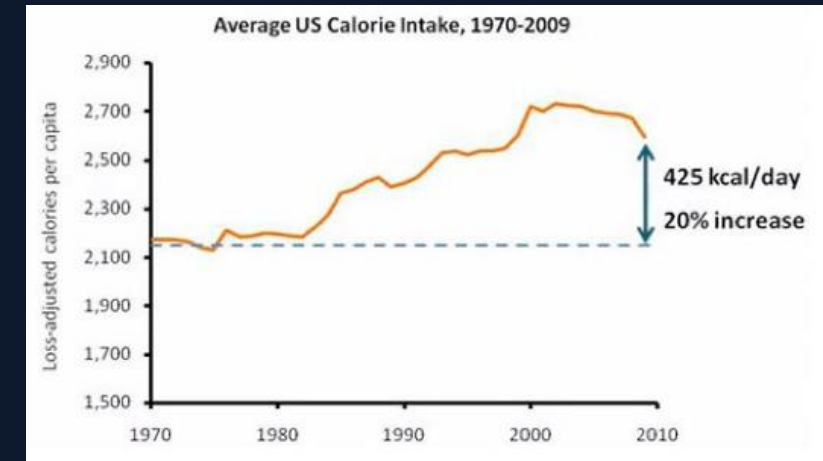
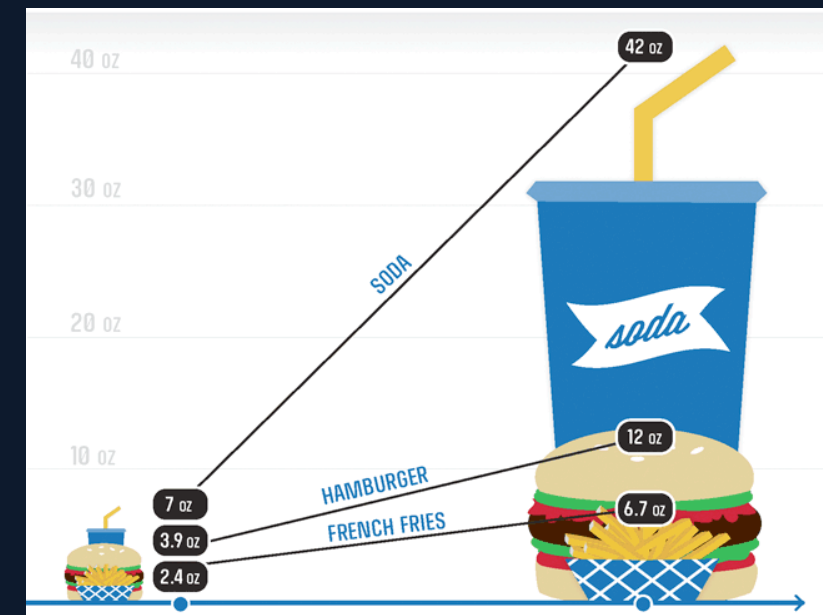
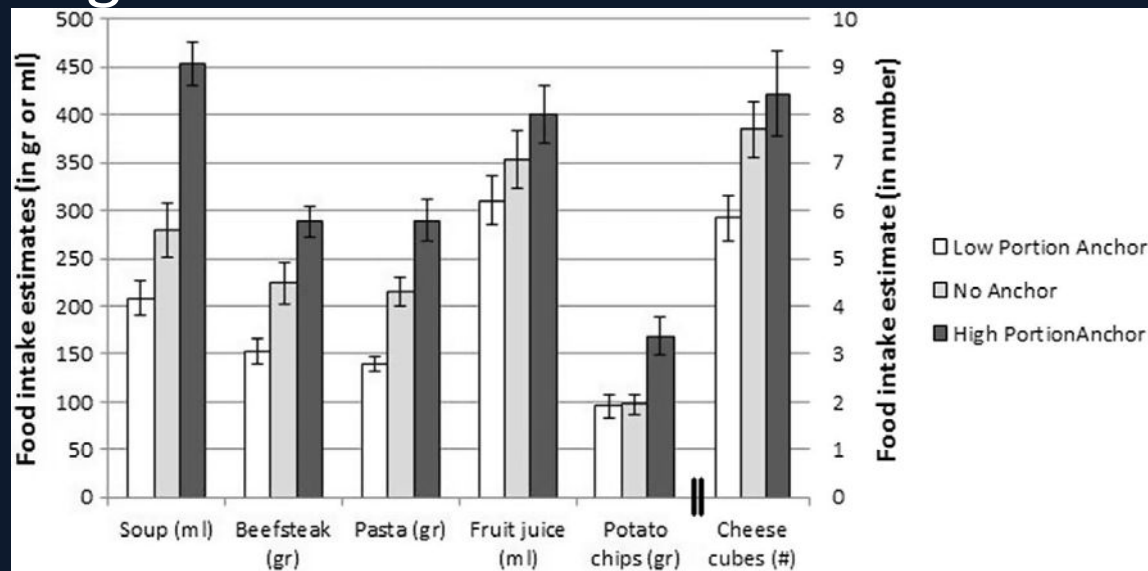
How are food deserts impacting childhood obesity?

- Proximity/density of:
 - Convenience stores: **More unhealthy eating**, but mixed re: weight status
 - Fruit/vegetable markets: Mixed associations
 - Grocery stores: Mostly not associated
 - **Supermarkets**: Generally associated with **lower weight status**
 - Full-service restaurants: Mixed associations
 - Fast-food restaurants: **More fast-food eating**, but mixed re: weight status
- Overall, food deserts may have limited impact on obesity status
 - Potentially due to transportation—those in food deserts can travel to non-deserts from home or work



Portion size

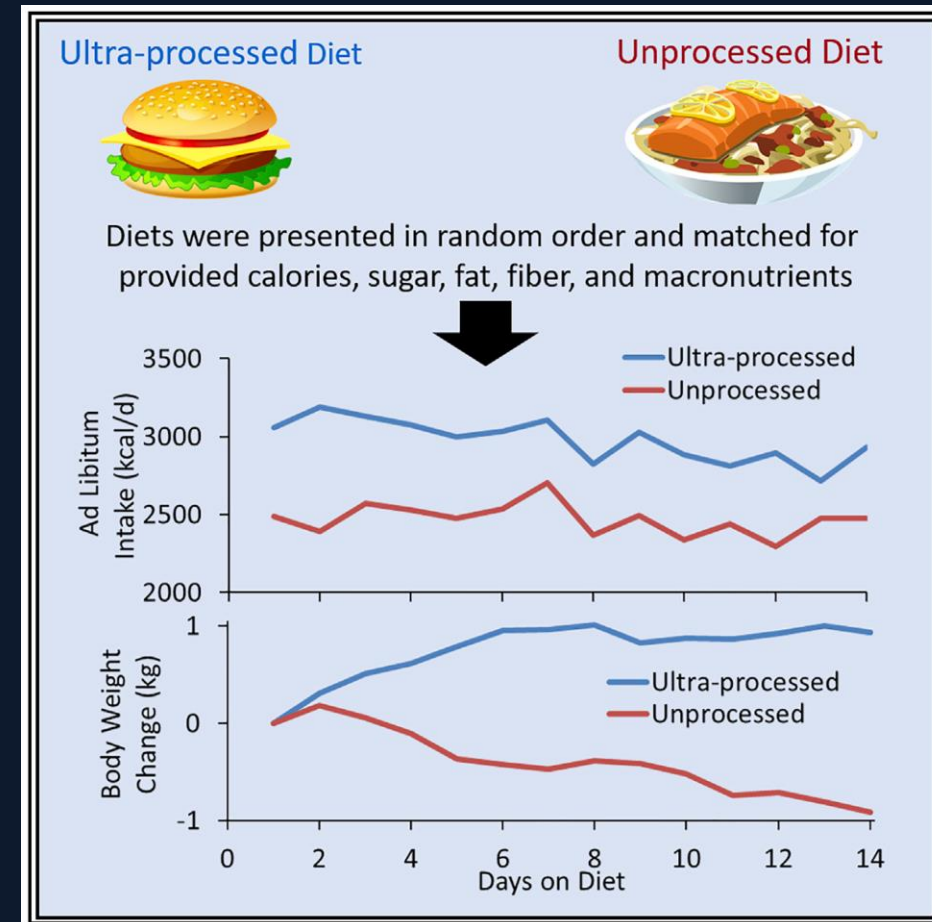
- Has increased significantly since the early 1980s, contributing to 20% increase in kcal per day
 - Greater intake of sugar-sweetened beverages (SSB) associated strongly with childhood obesity and metabolic syndrome
- Portion size serves as an “anchor” for how much to eat—doubling of portion size can lead to 30-45% higher intake



Guyenet et al., *J Clin Endocrinol Metab.* 2012 Mar; 97(3): 745–755; Young and Lesley, *Am J Pub Hlth* 2002; 92:246-249; Marchiori et al, *Appetite* 2014; 81:108-115; Rodriguez et al, *Public Health Nutrition* 2016; 19(13), 2424–2434

Food processing

- Ultra-processed foods (UPF)
 - Cheap foods that store well (preservatives)
 - 50-60% of caloric intake in developed countries
 - Associated with greater obesity, cardiometabolic risk
- In a randomized trial, a UPF diet led to:
 - ~500 kcal/day greater food intake
 - Greater intake of carbohydrate and fat, despite matched “presented” diets
 - Faster eating rate
 - Weight gain (vs. weight loss with unprocessed), particularly fat mass

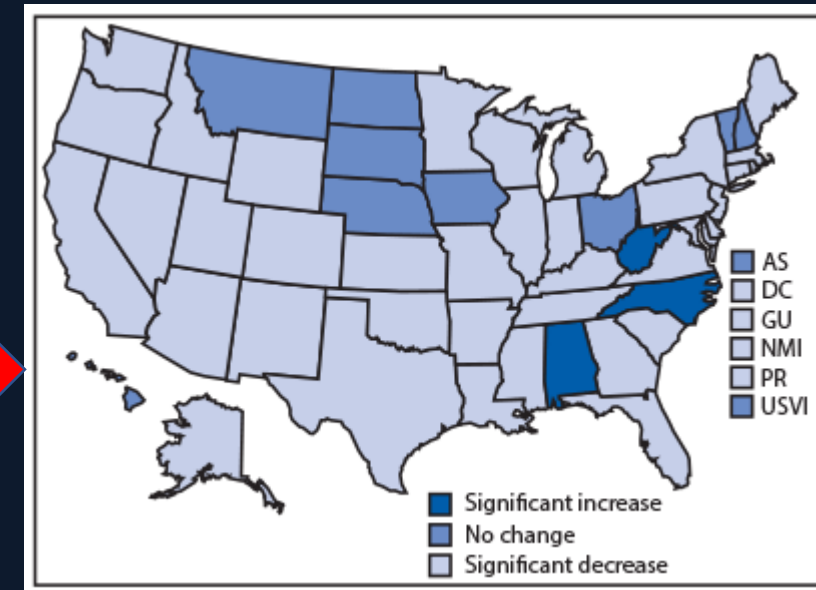


Addressing obesogenic environments requires systems-level approaches

- Infrastructure enhancements (e.g., sidewalks, bike lanes, parks)
- Policy implementation (e.g., sugar-sweetened beverage tax, healthy school foods)
- Public-private partnerships (e.g., access for community to use school gyms)
- Program development (e.g., Safe Routes to School)
- Financial incentives/disincentives (e.g., WIC vouchers for fruit/vegetables, remove incentive for unhealthy advertising to kids, tax incentives for supermarkets in food deserts)

USDA Food assistance programs

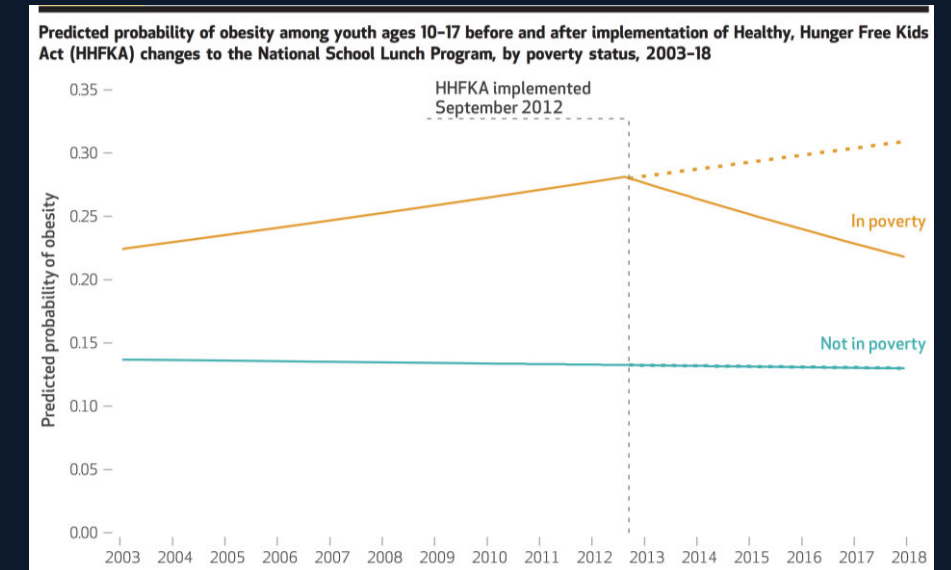
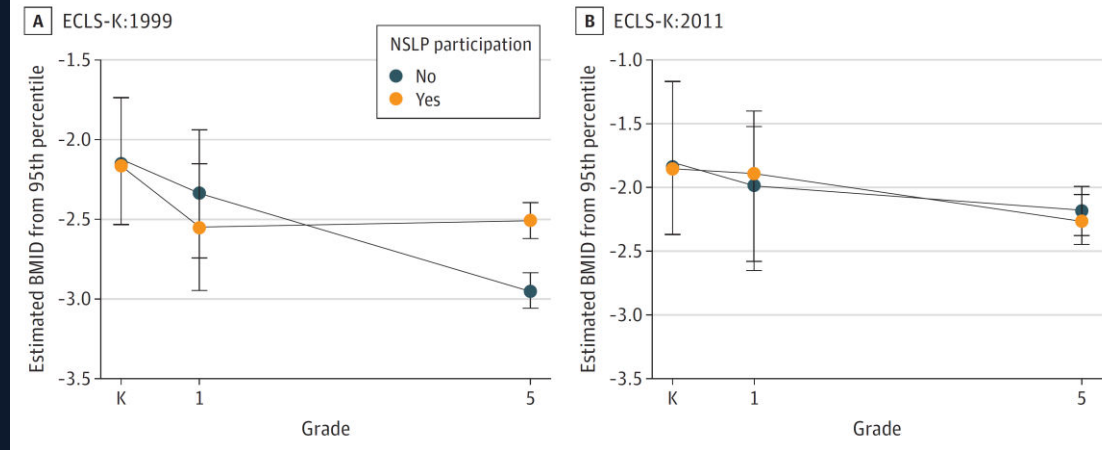
- Special Supplemental Nutrition Program for Women, Infants and Children (WIC)
 - 2009 changes: Increased focus on fruit and vegetable (FV) consumption through cash value vouchers, vouchers for farmer's markets
 - Increase in FV purchasing or consumption after program change
 - Reversal of obesity rate trends in 2-4 year-old WIC participants (annual increase to decrease) in 41 states/territories
- Supplemental Nutrition Assistance Program (SNAP)
 - Super SNAP/ Gus Schumacher Nutrition Incentive Program: Increase in FV, nuts and legumes, plus decrease in SSB and no change in less healthy options; generally cost-effective
 - Standard SNAP: SNAP participants no more likely to buy FV than eligible non-participants



National School Lunch Program (NSLP)

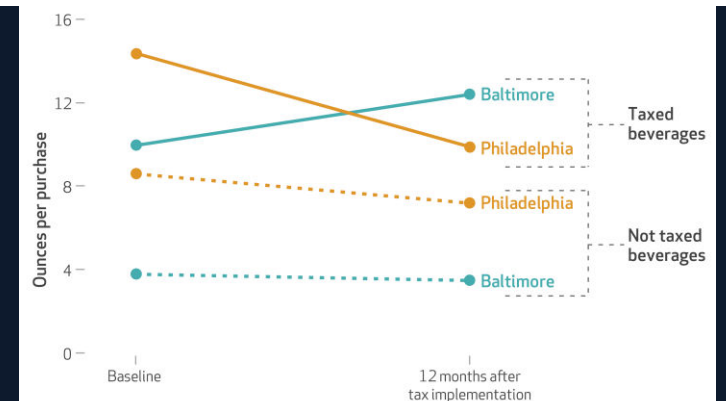
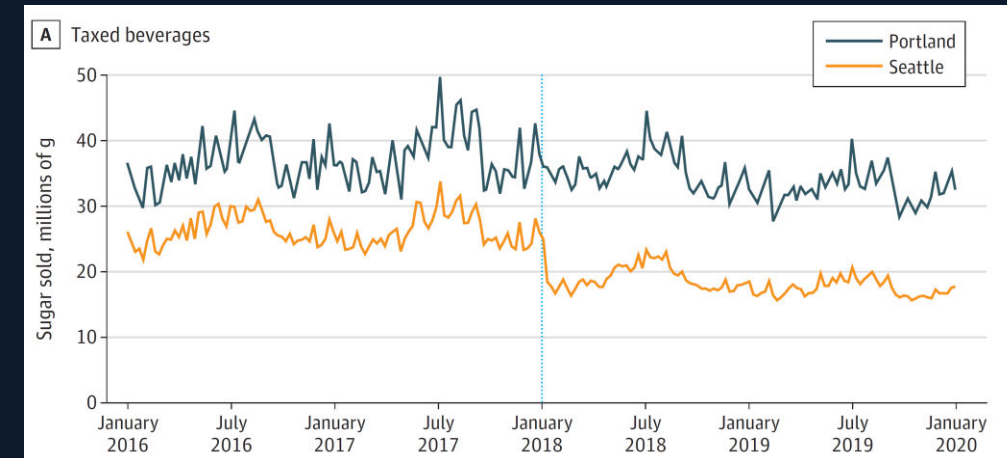
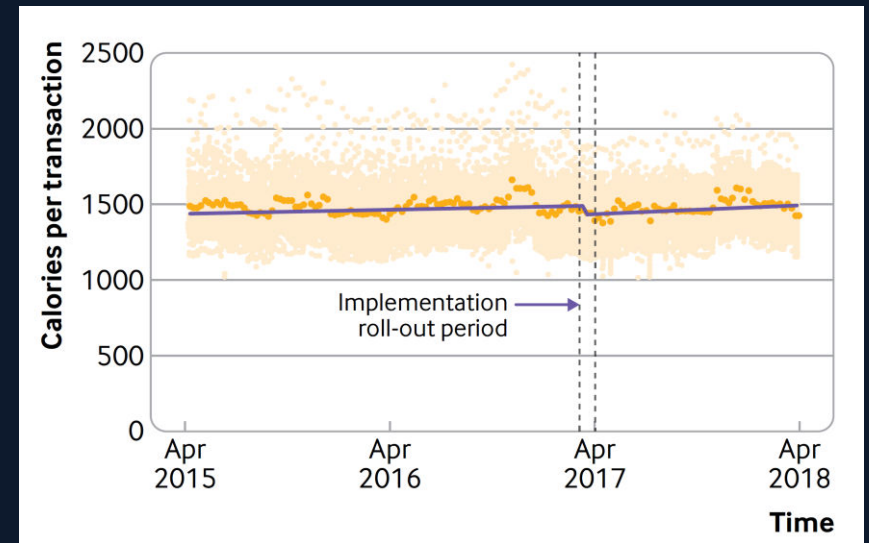
- **Healthy Hunger-Free Kids Act of 2010**
 - Implemented in 2012 to improve nutrition standards for school lunches
- **Improved children's diet quality**
 - 11-point increase in diet quality score for NSLP vs. 1-point decrease for non-NSLP
- **Reduced childhood obesity**
 - Equalizing BMI trajectories between low-income (NSLP) and higher income (non-NSLP) children
 - Reduction in obesity rates among children in poverty
- No increase in plate waste or decrease in school lunch revenues

Figure 2. Body Mass Index Difference (BMID) From Obesity by Free or Reduced-Price National School Lunch Program (NSLP) Participation and Early Childhood Longitudinal Study (ECLS) Cohort



Food policy—private sector/tax incentives

- Restaurant menu labeling of calories
 - Small reduction in ordered calories that rebounded
 - Some evidence for longer-term changes in menu offerings (lower calorie)
- SSB taxes
 - Reduction of SSB purchasing (sustained)
 - Some tax avoidance/purchasing elsewhere; Concern about regressive taxation
- Tax incentives for supermarkets in food deserts
 - Some evidence for reductions in food insecurity, improved access to healthy foods
 - Also improved access to unhealthy foods



Are changes to food policy cost-effective?

- Estimates of dollars spent per BMI unit reduced or cases of childhood obesity avoided
 - 3 deemed to be cost-effective, based on calculations→
 - 4 deemed not to be cost effective:
 - Restaurant menu calorie labeling*
 - Strong nutrition standards for school meals*
 - Improved early childhood education and practices
 - 4-fold increase in bariatric surgery

*Caveats: Conducted in 2015, when HHFKA had just been implemented, and restaurant calorie labeling had not yet been implemented. SSB excise tax implemented only in 8 US localities.

** Validated in 2021 cost-effectiveness analysis

Gortmaker et al, *Health Affairs* 2015; Kenney et al, *Childhood Obesity* 2021

Three interventions that pay for themselves

Sugar-sweetened beverage excise tax, implemented at state level *	Outcome: 576,000 cases of childhood obesity prevented by 2025	\$31 saved on health care costs per dollar invested
Net costs: -\$14,169,000,000		

Strong nutrition standards for food and beverages sold in schools, outside of school meals *	Outcome: 345,000 cases of childhood obesity prevented by 2025	\$4.60 saved on health care costs per dollar invested
Net costs: -\$792,000,000		

Elimination of corporate tax subsidy for advertising unhealthy food to children **	Outcome: 129,100 cases of childhood obesity prevented by 2025	\$33 saved on health care costs per dollar invested
Net costs: -\$260,000,000		

How is the physical environment impacting childhood obesity?

- Access to:
 - Public transportation: Mostly null findings with PA or weight status
 - **Neighborhood sidewalks**: Positive association with PA, reductions in weight status
 - **Bike lanes**: Positive association with PA (57% increase), inconclusive re: weight status
 - **Street interconnectivity**: Positive association with PA, inconclusive re: weight status
 - **Residential density**: Generally positive association with PA, inconclusive re: weight status
 - **Neighborhood speed limit**: Lower speed limit associated with greater PA/active transport (biking/walking), inconclusive re: weight status
 - **Access to green space**: Mixed association with PA, lower overweight/obesity
 - **Neighborhood land use diversity**: Positive association with PA, inconclusive re: weight status

Mitigation strategies: Physical Activity

- DOT Safe Routes to School
 - Community-level projects to increase active transport (walking, biking) to school
 - Small increases in walking (up 4.4%) and biking (up 0.5%)
 - Limited to local-level, projects differ widely, less common in low-income areas
- Systems-based efforts targeting physical activity may be more difficult to accomplish due to:
 - Need for multiple organizations to be involved (community administration, transportation offices, parks, schools, churches, recreational facilities)
 - Differences by community re: existing infrastructure—difficult to have a generalizable strategy
 - Need for significant financial investment (e.g., adding bike lanes, refurbishing parks, redesigning city streets)

Not everyplace can be Times Square!

- Conversion of a section of Broadway to pedestrian-/ bicycle-friendly area
- \$55 million cost and 5 years to construct



Summary

- The obesogenic environment is a systems-level issue
 - More concentrated in low-income and rural locations
 - Association of obesity (and obesogenic environments?) with poverty is relatively recent
- Several specific interventions and policies appear to have an impact on improving health behaviors, including healthy eating and physical activity
- A few may have a real or anticipated impact on childhood obesity rates or obesity development, and be cost effective at the societal level
 - WIC 2009 Food Package changes, Healthy Hunger-Free Kids Act
 - Tax on sugar-sweetened beverages, reduce unhealthy food advertising to kids
- Modifications of food environment may be easier than physical activity environment



Thank you!