Part 1: Databases

- Individual-level Databases
  - Continuing Survey of Food Intakes by Individuals (CSFII)
  - National Health and Nutrition Examination Survey (NHANES)
  - Medical Expenditure Survey (MEPS)
  - Behavior Risk Factor Surveillance System (BRFSS)
  - Youth Risk Behavior Surveillance (YRBS)
  - National Longitudinal Survey of Youth 1979 (NLSY 1979)
  - Panel Study of Income Dynamics (PSID)
  - Child Development Supplement to the Panel Study of Income Dynamics (CDS/PSID)
  - National Health Interview Survey (NHIS)
  - Monitoring the Future (MTF)
  - National Longitudinal Study of Adolescent Health (ADD Health)
  - Early Childhood Longitudinal Study (ECLS)
  - National Survey of Children’s Health (NSCH)
  - Pediatric Nutrition Surveillance System (PedNSS)
  - Pregnancy Nutrition Surveillance System (PNSS)
  - National Survey of America’s Families (NSAF)
  - Survey of Income Program and Participation (SIPP)
  - Survey of Program Dynamics (SPD)
  - Consumer Expenditure Survey (CE)
  - Nielsen Homescan Data
  - National Household Travel Survey (NHTS)
Part 1: Databases Con’t

- **Contextual Databases**
  - Outlet densities
  - Price data
  - Consumer Purchases data
  - Advertising data
  - Crime and Safety data
  - School-level characteristics
  - Socioeconomic and demographic data
  - State-level policy data

- **Food Program Resources**
Part 2: Economic Analysis

- Economic Rationales for Intervention
  - Imperfect Information
  - Externalities
  - Time Inconsistent Preferences

- Multi-level Factors and Models

- Consumer Demand Theory
  - Preferences
  - Income effects
  - Own-price and cross-price effects
  - Price elasticity
  - Contextual factors

- Empirical Specifications and Modeling
  - Behavioral Outcomes: Food Consumption and Physical Activity
  - Reduced Form Outcomes: Body Mass Index and Obesity Prevalence
  - Cross-sectional versus Longitudinal Estimation
  - Multivariate Estimation
  - Examples from Existing Empirical Studies
Dietary Information:

- A limited number of national databases have detailed dietary information such as 24-hour dietary intake and food frequency questionnaires (i.e., CSFII, NHANES, and ADD Health). Household food purchases based on scanner data are available from the Nielsen Homescan data and expenditure data are available from the CE.

- Dietary data on limited food consumption behaviors such as frequency of consumption of certain food items or food groups (i.e., fruit, vegetables, beverages, food away from home etc.) are available in a number of surveys (i.e., BRFSS, YRBS, NLSY 1997, CDS-PSID, NHIS, MTF, and ECLS).
Physical Activity Information:

- Most of the surveys contain limited self-reported physical activity measures such as frequency of participation in vigorous or moderate activity and some inactivity measures such as TV watching. Some surveys distinguish school-related physical activity (i.e., CDS-PSID, Add Health, and ECLS). Travel modes are available in the NHTS.
- Measured physical activity is rare in national surveys. NHANES has recently included measured (accelerometer) physical activity.

Height and Weight:

- Measured height and weight is available in a limited number of surveys (i.e., NHANES, CDS-PSID, ECLS, PedNSS).
- Self-reported height and weight is available in the CSFII, MEPS, BRFSS, YRBSS, NLSY79, NLSY97, PSID, NHIS, MTF, Add Health, and NSCH.
Cross-sectional versus Longitudinal:

The surveys with the most detailed dietary intake data such as the CSFII and NHANES are cross-sectional.

A few data sets with some detailed dietary data (i.e., Add Health) or measured height and weight (i.e., ECLS and PSID-CDS) are longitudinal. There are no national longitudinal data sets for adults with measured height and weight.

There are a number of longitudinal surveys that include either self-reported height and weight, limited dietary indicators and/or physical activity measures (i.e., NLSY 1979; NLSY 1997, PSID, SIPP, SPD, CE, and NHTS).
**Individual Databases (3)**

**Geocode:**

- Several data sets have geocode data available by special agreement associated with a secure data protection plan. These geocode identifiers allow researchers to link external data at the county level (i.e., NLSY 1979 and NLSY 1997) and the zip code level (i.e., PSID, CDC-PSID, ECLS, NHIS, NSCH, and NHTS).
- Other data sets provide geocode under special agreement but only at restricted sites (i.e., NHANES, Add Health, MEPS, MTF).
- A few data sets provide geocode information at the county or state level in the public use files (i.e., BRFSS, YRBSS, NSCH, NSAF, SPD, CE, Nielsen Homescan, and NHTS).

**School ID:**

- Under special agreement a few surveys have school identifiers available which allow researchers to link information from the National Center for Education Statistics (i.e., CDS-PSID, ECLS, ADD Health, and MTF).
Outlet densities
- Economic Census of Retail Trade
- Dun and Bradstreet (D&B)
- infoUSA

Price data
- American Chamber of Commerce Researchers Association (ACCRA)
- Nielsen Scanner Price Data

Consumer Purchases data
- BLS Consumer Expenditure Survey
- Nielsen Homescan Survey

Advertising data
- AC Nielsen
- Competitive Media Reporting (CMR)

Crime and Safety data
- Federal Bureau of Investigation Uniform Crime Reports (UCR)
- Fatality Analysis Reporting System (FARS)
School-level characteristics
- National Center for Education Statistics Common Core of Data (CCD)
- National Center for Education Statistics Private School Universe Survey (PSS)
- School Health Policies and Programs Study (SHPPS)
- School Nutrition Dietary Assessment Study (SNDA)
- Fast Response Survey System (FRSS)
- Youth, Education & Society (YES)
- ImpacTeen
- Food & Fitness

Socioeconomic and demographic data
- Census
- Census TIGER Files
- Current Population Survey (CPS)
- Local Area Unemployment Statistics (LAUS)

State-level policy data
- Physical Education and Recess State Policy Classification System (PERSPCS)
- School Nutrition Environment State Policy Classification System (SNESPCS)
- State Snack, Soda and Restaurant Sales Tax Data
- State Safe Routes to School Laws
Catalogue of Surveillance Systems

http://tools.nccor.org/css/

A Product of the National Collaborative on Childhood Obesity Research

This web tool provides a catalogue of existing surveillance systems that contain data relevant to childhood obesity research. It includes local, state, and national systems that provide data at multiple levels.

Surveillance systems for this Catalogue were identified by reviewing existing reports of available systems and soliciting expert review and suggestions. The systems were chosen because they provide access to publicly available raw data gathered in the United States. Some systems have been in operation for many years; others are relatively new. All, however, contain data pertaining to the past 10 years.

The Catalogue provides one-stop access to a large number of systems, which provide a unique window on obesity-related policies and environmental factors as well as trends in relevant health behaviors, outcomes, and determinants.
Market Failure:

- Imperfect Information
  - Information is a public good and tends to be under-provided
  - Governments provide information about importance of nutrition and physical activity but may be distorted by large commercial advertising budgets
  - Processing information may be costly
  - Consumer protection – nutrition labels

- Externalities
  - Medical and disability
  - Productivity losses
  - May be partially offset by life and pension savings

- Time Inconsistent Preferences
Other Rationales for Intervention

- Obesity prevention

- Equity/Distributional considerations
  - Income
  - Racial
State and National

Annual collection of state policies and commercial data (UIC)

Local and Community

Planned annual community data collection and ongoing district wellness policy collection and coding (UIC)

School and Organizational

Annual YES (ISR-UM) and Food & Fitness surveys (UIC)

Individual and Household

Annual MTF surveys (ISR-UM) Commercial data (UIC)

State level policies addressing the built environment

State taxation of beverages, snack foods, and restaurant food

Availability and accessibility of healthy food and beverages in stores and restaurants

Comprehensiveness of school district wellness policies

Frequency and length of physical education and recess

Presence and content of vending machines at school

Information on healthy eating and physical activity opportunities from key informant interviews

Availability and accessibility of physical activity opportunities

Marketing of food/beverages at school

Marketing of food/beverages at school

Availability of various foods/beverages in the school environment

Self-reported height and weight, physical activity, and measures of healthy eating

Household food expenditures

Implemenation of school district wellness policies

Awareness and implementation of Alliance for a Healthier Generation Guidelines

State level policies related to Safe Routes to School

State policies related to school district wellness policies

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Local zoning codes, regulations, and ordinances that can impact on healthy eating and physical activity

Marketing of healthy/unhealthy foods and beverages in communities

State policies related to healthy eating and physical activity

State level policies and legislation around Safe Routes to School

Market-level PSAs related to healthy eating, physical activity, and obesity

State and National

National food and beverage television advertising

Characteristics of the built environment that impact on physical activity

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Economic Models

- The economic framework assumes that individuals maximize utility (i.e., happiness) subject to time and budget constraints.

- Prices and wages

- Constraints
  - Budget
  - Time
Economic Models

- Idea is that the policy instrument changes relative costs or benefits which, in turn, affect behavior choices related to diet and activity.

- Equity considerations: i.e., food taxes - who benefits versus who bears the costs.
  - Health benefits – progressive
  - Tax burden – regressive
  - Subsidies – progressive
Food Accessibility, Availability, and Affordability

**Access**: Total Cost based on Availability *and* Affordability

**Availability**: Number of available food-related outlets within a measured geographic area assessed on a per capita and/or per land area basis.

- Healthy foods associated with grocery store and supermarket availability.
- Less healthy foods associated with convenience store and fast food restaurant availability.

**Affordability**: Monetary cost → food prices.

- Affordability of healthy foods proxied by fruit and vegetable prices.
- Affordability of less healthy foods proxied by fast food and soda prices.
Price and Income Elasticity

- **Price Elasticity of Demand**: the percentage change in consumption resulting from a 1% change in price.
  - $e > 1 \rightarrow$ price elastic
  - $e < 1 \rightarrow$ price inelastic

- Own-price and cross-price effects

- Income effects
Cross-sectional estimation:

\[ \text{BMI}_{ist} = \beta_0 + \beta_1 X_{it} + \beta_2 D_{it} + \varepsilon_{ist} \]

- Time fixed effects
- Geographic fixed effects

Longitudinal estimation:

- Models to account for unobserved individual-level heterogeneity:

\[ \text{BMI}_{ist} = \beta_0 + \beta_1 X_{it} + \beta_2 D_{it} + \nu_i + \omega_{ist} \]

- Random Effects Models: Assumes \( \nu_i \) and independent variables are not correlated
- Individual Fixed Effects Models: Difference out the constant individual-specific residual \( \nu_i \) and provide within person effects
Some examples relevant for the following policy instruments:

- Taxes
- Subsidies
- Advertising Regulations
- Zoning
- Urban Planning

Note: Fruit and Vegetable Price Index includes: potatoes, bananas, iceberg tomatoes, sweet peas & peaches.
Dairy Prices and Meat Price Index, 1990-2007

Note: Meat Price Index includes: T-bone steak, ground beef, sausage, frying chicken, and chunk light tuna.
Fast Food Price Index, 1990-2007


Note: Fast Food Price Index includes: hamburger 1/4-pound with cheese, 11”-12” thin crust cheese pizza, and fried chicken-thigh and drumstick.
Zip Codes Without Grocery Stores or Supermarkets and Without Chain Supermarkets


- No Grocery Stores or Supermarkets (29%)
- No Chain Supermarkets (Grocery Stores or Independent Supermarkets Available) (45%)
Urban Zip Codes Without Grocery Stores or Supermarkets and Without Chain Supermarkets

Grocery store and Supermarket Availability by Zip Code per 10,000 Capita

Outlet Availability per 10,000 Capita (by zero availability and quartiles of non-zero outlet availability)

- Red: 0
- Yellow: 3.01 - 5.01
- Dark Red: 0.20 - 3.01
- Cyan: 5.01 - 7.01
- Blue: 7.01 or more

Grocer Store and Supermarket Availability by Zip Code per 10,000 Capita per 10 Square Miles

Outlet Availability per 10,000 Capita per 10 square miles (by zero availability and quartiles of non-zero outlet availability)

- Red: 0
- Yellow: 0.41 - 1.00
- Light Blue: 1.01 - 3.00
- Blue: 3.01 or more

Food Store and Restaurant Availability by Demographics and Socio-economic Status

Business List Data
• Dun & Bradstreet year 2000 data on food stores (grocery stores, chain supermarkets, non-chain supermarkets and convenience stores).

Linked across 28,050 zip codes to:

Census 2000 Data
• Census data on population characteristics
  • race, ethnicity, income, population, and urbanicity
Availability of Food Store Outlets, by Race

Source: Powell et al., Preventive Medicine, 2007.
Availability of Food Store Outlets, by Ethnicity

Incidence Rate Ratios

Chain Supermarkets
Non-chain Supermarkets
Grocery Stores
Convenience Stores

Non-Hispanic
Hispanic

Source: Powell et al., Preventive Medicine, 2007.
Availability of Food Store Outlets, by Income

Source: Powell et al., Preventive Medicine, 2007.
Availability of Fast Food Restaurants, by Race

Availability of Fast Food Restaurants, by Ethnicity

Incidence Rate Ratios

Fast-food Restaurants

Source: Powell et al., American Journal of Preventive Medicine, 2007
Availability of Fast Food Restaurants, by Income

Incidence Rate Ratios

Fast-food Restaurants

Source: Powell et al., American Journal of Preventive Medicine, 2007
Summary of Food Environment and Community Characteristics

- Fewer large chain supermarkets in lower income communities and substantially fewer in predominantly African American and Hispanic communities.

- Smaller groceries, independent supermarkets more available in minority communities.

- Find greater availability of fast food restaurants in low-to middle income neighborhoods.

- Fewer restaurants of all types in predominantly minority communities.

- Of restaurants available, significantly higher proportion of fast food restaurants in African American communities.
Community Food Environment and Child/Youth Weight Outcomes: Data Linkage

Individual-level data examples

- Monitoring the Future Data
- Child Development Supplement of the PSID
- Children of the National Longitudinal Survey of Youth

Linked by geocodes to:

- Food prices from ACCRA
  - Fruit and vegetable price index
  - Fast food price index

- Outlet density data from D&B
  - Fast Food and Full-service Restaurants
  - Supermarkets, Grocery and Convenience Stores

- Census Data
Evidence from MTF: Community Food Environment and Youth Fruit and Vegetable Consumption and BMI

• Find that:

• Youth in communities with lower fruit and vegetable prices have more frequent fruit & vegetable consumption and lower BMI

• Youth in communities with lower fast food prices have less frequent fruit & vegetable consumption, higher BMI, and are more likely to be overweight
  • 10 percent rise in fast food prices would increase probability of frequent F&V consumption by 3%, reduce BMI by 0.4% and lower probability of being overweight by 5.9%

Source: Powell, et al., Advances in Health Economics and Health Services Research, 2007
Evidence from MTF: Community Food Environment and Youth BMI

• Find that:
  • Impact of both fast food and fruit & vegetable prices greatest among youth in top of BMI distribution (most at risk group)
    • Above 90th percentile, fast food price impact 4 times larger than average effect for full sample
    • Above 95th percentile, fruit & vegetable price impact 5 times larger than average effect
    • Little impact of prices at low/mid-ranges of BMI
    • Supermarket availability inversely associated with BMI at all levels, with greater impact on upper end

Evidence from MTF: Community Food Environment and Youth Physical Activity

• Find that:
  • Increased availability of commercial physical activity-related facilities is associated with a small increase in vigorous exercise
    • An additional facility per 10,000 capita associated with a 0.22 percentage point increase in frequent vigorous exercise.
    • Effects greatest among female and older youths.

Source: Powell et al., American Journal of Preventive Medicine, 2007
### Evidence from CDS-PSID: Contextual Factors on Child BMI Percentile by Family Income

<table>
<thead>
<tr>
<th>Dependent Variable: BMI Percentile</th>
<th>Low Income Families (Income Quintiles 1 &amp; 2)</th>
<th>High Income Families (Income Quintiles 4 &amp; 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of Fruit &amp; Veg.</td>
<td>24.0650*</td>
<td>50.9861**</td>
</tr>
<tr>
<td>Price of Fast Food</td>
<td>-18.2990***</td>
<td>-6.0993</td>
</tr>
<tr>
<td>Fast Food Rest.</td>
<td>-0.345</td>
<td>0.0242</td>
</tr>
<tr>
<td>Non-fast Food Rest.</td>
<td>0.0533</td>
<td>-0.0486</td>
</tr>
<tr>
<td>Supermarket Stores</td>
<td>-0.5748**</td>
<td>-0.4598**</td>
</tr>
<tr>
<td>Convenience Stores</td>
<td>-0.2212</td>
<td>0.7869*</td>
</tr>
<tr>
<td>Grocery Stores</td>
<td>-0.0024</td>
<td>-0.021</td>
</tr>
</tbody>
</table>

## Evidence from CDS-PSID: BMI Food Price Elasticities by SES

<table>
<thead>
<tr>
<th>Dependent Variable: BMI Percentile Among Children</th>
<th>Cross-sectional Estimates</th>
<th>Longitudinal Fixed Effects Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>Low Income</td>
</tr>
<tr>
<td>Price of Fruits &amp; Vegetables</td>
<td>0.24***</td>
<td>0.27*</td>
</tr>
<tr>
<td>Price of Fast Food</td>
<td>-0.16</td>
<td>-0.77***</td>
</tr>
</tbody>
</table>

Source: Powell and Chaloupka, *University of Chicago Press, 2011*
Evidence from NLSY79: Associations of Food Prices and Outlet Densities on Child BMI

<table>
<thead>
<tr>
<th></th>
<th>Model 1: Outlet Densities per 10,000 Capita</th>
<th>Model 2: Outlet Densities per 10 Square Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of Fruit and Vegetables</td>
<td>2.0143*</td>
<td>2.3823*</td>
</tr>
<tr>
<td>Price of Fast Food</td>
<td>-0.5068</td>
<td>-0.5033</td>
</tr>
<tr>
<td>Fast Food Restaurants</td>
<td>-0.1701</td>
<td>0.0190</td>
</tr>
<tr>
<td>Full-service Restaurants</td>
<td>-0.0084</td>
<td>-0.0002</td>
</tr>
<tr>
<td>Supermarkets</td>
<td>0.1329</td>
<td>-0.1928*</td>
</tr>
<tr>
<td>Convenience Stores</td>
<td>0.1349</td>
<td>-0.0656</td>
</tr>
<tr>
<td>Grocery Stores</td>
<td>-0.0678</td>
<td>0.0171</td>
</tr>
</tbody>
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Regression coefficients from random effects model. * Denotes statistical significance with p-value ≤ 0.05

Source: Powell and Bao, *Economics of Human Biology*, 2009
## Evidence from NLSY79: Price Elasticities of Child BMI by SES

<table>
<thead>
<tr>
<th></th>
<th>Fruit and Vegetable Price Elasticity of BMI</th>
<th>Fast Food Price Elasticity of BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Sample</strong></td>
<td>0.0725*</td>
<td>-0.0667</td>
</tr>
<tr>
<td><strong>By Family Income Quintile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Income</td>
<td>0.1357*</td>
<td>-0.2565*</td>
</tr>
<tr>
<td>Near-low Income</td>
<td>0.0273</td>
<td>-0.0434</td>
</tr>
<tr>
<td>Middle Income</td>
<td>0.0837</td>
<td>-0.1544</td>
</tr>
<tr>
<td>Near-high Income</td>
<td>0.0564</td>
<td>-0.0629</td>
</tr>
<tr>
<td>High Income</td>
<td>-0.0042</td>
<td>0.2036</td>
</tr>
<tr>
<td><strong>By Mother’s Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother At Most High School</td>
<td>0.0927*</td>
<td>-0.1325*</td>
</tr>
<tr>
<td>Mother College or Above</td>
<td>0.0436</td>
<td>0.0234</td>
</tr>
</tbody>
</table>

* Denotes statistical significance with p-value ≤ 0.05

Source: Powell and Bao, *Economics of Human Biology*, 2009
Evidence for from NLSY97: Fast Food Prices and Youth BMI

<table>
<thead>
<tr>
<th></th>
<th>Cross-sectional OLS Model</th>
<th>Longitudinal Individual-level Fixed Effects Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of Fast Food</td>
<td>-0.7782*</td>
<td>-0.6455**</td>
</tr>
<tr>
<td>Number of Fast Food Restaurants</td>
<td>0.1215</td>
<td>0.0098</td>
</tr>
<tr>
<td>Price of Food at Home</td>
<td>-0.2187</td>
<td>-0.0807</td>
</tr>
<tr>
<td>Number of Full-service Restaurants</td>
<td>0.0318</td>
<td>-0.0323</td>
</tr>
<tr>
<td>Number of Grocery Stores</td>
<td>-0.0074</td>
<td>-0.0325</td>
</tr>
<tr>
<td>Number of Convenience Stores</td>
<td>0.0459</td>
<td>0.1480</td>
</tr>
<tr>
<td>Number of Supermarkets</td>
<td>0.1703</td>
<td>0.2447</td>
</tr>
<tr>
<td>Number of Physical Activity Facilities</td>
<td>-0.1596**</td>
<td>-0.1216</td>
</tr>
</tbody>
</table>

**Evidence from NLSY97: Fast Food Price BMI Elasticities: Individual-level Fixed Effects Model for Youths**

<table>
<thead>
<tr>
<th>Fast Food Price Elasticity of BMI</th>
<th>All</th>
<th>By Parental Income</th>
<th>By Mother’s Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price of Fast Food</td>
<td>-0.0782**</td>
<td>0.0658</td>
<td>-0.3130***</td>
</tr>
</tbody>
</table>

Summary of Associations with Child and Youth BMI

- Studies suggest that fiscal food pricing policies are likely to have modest but measurable effects, on average, on the weight outcomes of children and youths.

- Greater price sensitivity among:
  - Low-income children
  - Children with lower educated mothers
  - Youths who are in the upper tail of the BMI distribution

- The evidence suggests a multi-pronged approach of changing relative prices by simultaneously subsidizing fruits and vegetables and taxing fast food to improve weight outcomes among adolescents and low-SES children.

- Improving access to supermarkets found to be important among low-SES children.
Evidence on Soda Taxes, Consumption, and
Tax Data

- State level soda taxes from Bridging the Gap (BTG)
- Linked by state FIPS codes and year
- Measures used:
  - Disfavored tax rate (soda tax rate – general food tax rate)
  - Disfavored dichotomous indicator (indicator if disfavored tax rate >0)
  - Presence of additional state-level soda excise taxes/fees
Objective:
To examine the association of soda taxes with household soda purchases

Data Description:
• Cross-section of household purchase information based on scanner data from a variety of stores, 2nd Q 2007
• Household demographic data
• Final sample includes 66,211 non-military households
• **Outcome variable**: soda volume in ounces of carbonated beverages purchased per household over the sample period (m=566 ounces ~ 2 cases of 12 oz cans)
• **Control variables**: household income, size, race, educational attainment, presence of children/age, female head of household employment status, and census regions
## Preliminary OLS Regression Results: Soda Volume

<table>
<thead>
<tr>
<th></th>
<th>All Households</th>
<th>Households with Children</th>
<th>Households without Children</th>
</tr>
</thead>
</table>

Policy Simulation Example: Household Regular Soda Purchases

- Study results imply very small tax elasticities for purchases of -0.06.

- If all states increased sales taxes to the maximum tax rate of 7% (an increase of 60.6% from the current sample mean of 4.36%), household purchases of regular soda are estimated to be 3.6% lower.

- Consider the imposition of a **new 20% tax** → assuming constant elasticity, household regular soda purchases are estimated to be **27.5% lower**.
  - The extent to which this applies to all regular soda consumption depends on constant elasticity noted above, and whether regular soda consumed away-from-home is similarly price/tax responsive.
Soda Taxes Children’s Consumption and Weight  
Early Childhood Longitudinal Study Kindergarten Cohort

Objective:
• To examine association between soda taxes, consumption and weight of children

Data Description:
• Nationally representative panel of elementary school students.
• Food consumption 5th grade; measured height and weight
• Final sample: 7,414 children who reported their food consumption and 7,300 children for which height and weight information exists
• **Outcome variables**: soda consumption in last week (m=6), soda purchases at school (m=0.4), and weight change 3rd to 5th grade (m=1.9)
• **Control variables**: age in months, race/ethnicity, family income, mother’s education level, physical activity, TV watching, parent-child interactions.
## Associations for Full Sample and by Sub-Populations

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>Total Consumption</th>
<th>School Consumption</th>
<th>BMI Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Higher Soda Tax Amount</td>
<td>Higher Soda Tax Indicator</td>
<td>Higher Soda Tax Amount</td>
</tr>
<tr>
<td>Full Sample</td>
<td>-0.004</td>
<td>-0.006</td>
<td>-0.010</td>
</tr>
<tr>
<td>At Risk of Overweight</td>
<td>-0.026</td>
<td>-0.078</td>
<td>-0.011</td>
</tr>
<tr>
<td>Low-Income</td>
<td>-0.142*</td>
<td>-0.811</td>
<td>-0.039**</td>
</tr>
<tr>
<td>African American</td>
<td>-0.125</td>
<td>-0.767</td>
<td>-0.103**</td>
</tr>
<tr>
<td>9+ Hrs TV</td>
<td>-0.073</td>
<td>-0.376</td>
<td>-0.029**</td>
</tr>
</tbody>
</table>

Source: Sturm, Powell, Chriqui, and Chaloupka, *Health Affairs*, 2010
Policy Simulation Example: Children’s BMI

• Assuming a constant elasticity, an 18% differential soda tax would correspond to a -0.23 BMI units in the change in BMI between 3rd and 5th grade, or a 20% reduction in the excess BMI gain.
Objective:
• To examine association of soda taxes with youths’ BMI

Data Description:
• Cross-section individual-level data for 8th, 10th, and 12th grade students, 1997-2006
• Estimation sample includes 153,673 observations
• **Outcome variable**: body mass index (BMI)
• **Control variables**: gender, age, grade, race, ethnicity, student’s hours work and income, parents’ education, work, marital status
• **Neighborhood controls**: Food store and restaurant availability and per capita income
## Association Between Taxes and BMI - Full Sample and by Sub-Populations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Full Model</strong></td>
<td>0.0131</td>
<td>0.0638</td>
<td>0.0735</td>
<td>0.0124</td>
<td>0.0110</td>
<td>0.0514</td>
</tr>
<tr>
<td><strong>By Weight Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At Risk of Overweight</td>
<td>-0.0058</td>
<td>-0.0252</td>
<td>-0.0337</td>
<td>-0.0054</td>
<td>-0.0060*</td>
<td>-0.0210</td>
</tr>
<tr>
<td>Not at Risk</td>
<td>0.0165</td>
<td>0.0809</td>
<td>0.0993</td>
<td>0.0166</td>
<td>0.0142</td>
<td>0.0665</td>
</tr>
<tr>
<td><strong>By Grade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th Grade</td>
<td>0.0031</td>
<td>0.0429</td>
<td>0.0373</td>
<td>0.0043</td>
<td>0.0070</td>
<td>0.0590</td>
</tr>
<tr>
<td>10th Grade</td>
<td>0.0241</td>
<td>0.0997</td>
<td>0.1117</td>
<td>0.0212</td>
<td>0.0216</td>
<td>0.0873</td>
</tr>
<tr>
<td>12th Grade</td>
<td>0.0075</td>
<td>0.0400</td>
<td>0.0342</td>
<td>0.0043</td>
<td>-0.0101</td>
<td>-0.0478</td>
</tr>
<tr>
<td><strong>By Parents’ Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>0.0160</td>
<td>0.0948</td>
<td>0.0985</td>
<td>0.0156</td>
<td>0.0146</td>
<td>0.0845</td>
</tr>
<tr>
<td>Less than College</td>
<td>0.0067</td>
<td>-0.0134</td>
<td>0.0003</td>
<td>0.0033</td>
<td>0.0017</td>
<td>-0.0354</td>
</tr>
</tbody>
</table>

Soda Taxes and Adolescents’ Weight:
Nationally Longitudinal Survey of Youth 97

Objective:
• To examine association of soda taxes with youths’ BMI using longitudinal models

Data Description:
• Nationally representative longitudinal data on youth aged 12 to 17 in 1997; 4 waves of including 1997, 1998, 1999 and 2000
• Estimation sample includes 18,029 person-year observations living at home
• Information on parental characteristics available from parental questionnaire and annual household roster data
• Outcome variable: BMI
• Control variables: age, gender, race, ethnicity, income, mother’s education, mother’s employment status
• Neighborhood controls: median household income
Longitudinal BMI Regression Results
NLSY 97

| Continuous state-level disfavored tax rate Elasticity | -0.220**  
|                                                     |  -0.029  
| Presence of additional state-level soda taxes/fees | -0.230*** |
Policy Simulation Example: Adolescents’ BMI

- Disfavored soda tax rate elasticity of BMI is -0.029.

- Doubling the amount of the disfavored tax from about 3% → 6% is estimated to reduce BMI by 2.9%.

- For a 5’5” tall youth at the average BMI of 22.68, who would be 136 lbs, a 2.9% reduction in BMI units corresponds to an approximate reduction in weight of 3.9 lbs.
Overall Policy Implications of Results

- Generally very small associations between soda taxes and consumption or weight outcomes based on the existing low tax rates which range up to just 7%. Consistent with previous findings by other researchers such as Fletcher, Frisvold and Tefft.

- Larger associations for populations at greater risk for obesity.

- *Substantial* increases in soda tax rates may have some measureable effects on outcomes and even greater effects at the population level.
Advertising Data

- Targeted Ratings Points (TRPs) data on exposure to ads seen on TV obtained from Nielsen Media Research
- Ratings cover all programming seen by children
- Ratings points measure the reach and frequency of advertising. For example, a commercial with 80 TRPs for 2-5 year olds per month is estimated to have been seen an average of one time by 80% of children 2-5 over the defined period
- Ratings by:
  - Age Groups: 2-5y, 6-11y, and 12-17y
  - Race: All children, separately by white and black. Study does not include separate ratings for Hispanic children nor does it cover Spanish Language TV
- Food-related advertising categorized as:
  - Cereal, Sweets, Snacks, Beverages, Fast Food Restaurants, Full-service Restaurants, and Other
Evidence: Food Product Advertising: 2-11

Cereal, 27.6%
Fast Food, 12.0%
Snacks, 8.3%
Candy, 7.0%
Yogurt, 5.8%
Restaurant, 5.4%
Fruit Drinks, 4.9%
Frozen Waffles, 3.5%
Cookies, 3.2%
Chewing Gum, 2.2%
Candy Bar, 2.1%
Other, 18.0%

Source: Powell et al., *Archives of Pediatrics and Adolescent Medicine*, 2007
Food Product Advertising: 12-17

Exposure to Food Advertisements per Day for Children by Year

Children Ages 2-5 Years

Source: Powell et al., *Archives of Pediatrics & Adolescent Medicine*, in press
Exposure to Food Advertisements per Day for Children by Year

Children Ages 6-11 Years

Source: Powell et al., Archives of Pediatrics & Adolescent Medicine, in press
Exposure to Food Advertisements per Day for Adolescents by Year

Adolescents Ages 12-17 Years

Source: Powell et al., Archives of Pediatrics & Adolescent Medicine, in press
Nutritional Content Analysis

• Food and beverage advertisements were assessed on the basis of:
  ➢ **Saturated Fat** (% Kcal): High >10% Kcal from saturated fat
  ➢ **Sugar** (%Kcal): High >25% Kcal from sugar
  ➢ **Sodium** (mg per 50g portion): High >200mg of sodium per 50g portion
  ➢ **Fiber** (g per 50g portion): Low <1.15g of fiber per 50g portion

• Nutritional Content was weighted by the ratings data to provide estimates of exposure to nutritional content
Nutritional Content: Mean of Selected Measures
All Food Ads Seen by Children and Adolescents

<table>
<thead>
<tr>
<th></th>
<th>% Kcal Saturated Fat</th>
<th>% Kcal Sugar</th>
<th>Sodium (mg) per 50 g</th>
<th>Fiber (g) per 50 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 2-5</td>
<td>7.3 2003</td>
<td>6.8 2009</td>
<td>43.4 2003</td>
<td>36.7 2009</td>
</tr>
<tr>
<td>Ages 6-11</td>
<td>7.3 2003</td>
<td>6.9 2009</td>
<td>44.1 2003</td>
<td>36.7 2009</td>
</tr>
<tr>
<td>Ages 12-17</td>
<td>7.7 2003</td>
<td>7.9 2009</td>
<td>44.2 2003</td>
<td>34.3 2009</td>
</tr>
</tbody>
</table>

Source: Powell et al., Archives of Pediatrics & Adolescent Medicine, in press
Food Ads High in Saturated Fat

Children Ages 6-11 Years Old

Cereal  Sweets  Snacks  Beverages  Other

Percent

2003  2009
Food Ads High in Sugar
Children Ages 6-11 Years Old

Percent

<table>
<thead>
<tr>
<th>Category</th>
<th>2003</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snacks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beverages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2003 vs 2009 comparison highlighted.
Food Ads High in Sodium
Children Ages 6-11 Years Old

Cereal

Sweets

Snacks

Beverages

Other

Percent

2003

2009

0

20

40

60

80

100
Food Ads Low in Fiber
Children Ages 6-11 Years Old

Cereal
Sweets
Snacks
Beverages
Other

Percent

2003
2009

0 20 40 60 80 100
Food Ads High in Saturated Fat, Sugar or Sodium

Children Ages 2-5 Years

Percent

- All Foods
- Cereal
- Sweets
- Snacks
- Beverages
- Other

2003 2009
Food Ads High in Saturated Fat, Sugar or Sodium

Children Ages 6-11 Years

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Foods</td>
<td>95</td>
<td>88</td>
</tr>
<tr>
<td>Cereal</td>
<td>97</td>
<td>91</td>
</tr>
<tr>
<td>Sweets</td>
<td>91</td>
<td>89</td>
</tr>
<tr>
<td>Snacks</td>
<td>94</td>
<td>91</td>
</tr>
<tr>
<td>Beverages</td>
<td>68</td>
<td>59</td>
</tr>
<tr>
<td>Other</td>
<td>96</td>
<td>89</td>
</tr>
</tbody>
</table>

Percent
Food Ads High in Saturated Fat, Sugar or Sodium

Adolescents Ages 12-17 Years

Percent

2003 2009

All Foods
Cereal
Sweets
Snacks
Beverages
Other
## Exposure to Beverage Advertisements, by Type and Year
### Children Ages 2-5 Years

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2009</th>
<th>% Change 07-09</th>
<th>% Change 03-09</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Sugar Beverage Ads</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular Soft Drinks</td>
<td>0.28</td>
<td>0.09</td>
<td>4.5%</td>
<td>-67.2%</td>
</tr>
<tr>
<td>Fruit Drinks</td>
<td>0.39</td>
<td>0.19</td>
<td>100.7%</td>
<td>-51.9%</td>
</tr>
<tr>
<td>Bottled Water (Sugar Added)</td>
<td>0.01</td>
<td>0.06</td>
<td>-49.7%</td>
<td>425.8%</td>
</tr>
<tr>
<td>Drinks - Isotonic</td>
<td>0.13</td>
<td>0.05</td>
<td>-51.7%</td>
<td>-62.7%</td>
</tr>
<tr>
<td>Other High Sugar Beverage</td>
<td>0.36</td>
<td>0.13</td>
<td>-62.1%</td>
<td>-62.7%</td>
</tr>
<tr>
<td><strong>Low Sugar Beverage Ads</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet Soft Drinks</td>
<td>0.03</td>
<td>0.03</td>
<td>-37.1%</td>
<td>8.1%</td>
</tr>
<tr>
<td>Fruit Juices (100%)</td>
<td>0.10</td>
<td>0.11</td>
<td>8.3%</td>
<td>12.7%</td>
</tr>
<tr>
<td>Bottled Water</td>
<td>0.02</td>
<td>0.02</td>
<td>19.4%</td>
<td>15.2%</td>
</tr>
<tr>
<td>Milk (Unflavored)</td>
<td>0.00</td>
<td>0.03</td>
<td>127.2%</td>
<td>1425.5%</td>
</tr>
<tr>
<td>Other Low Sugar Beverage</td>
<td>0.05</td>
<td>0.11</td>
<td>51.8%</td>
<td>135.9%</td>
</tr>
</tbody>
</table>

Source: Powell et al., *Archives of Pediatrics & Adolescent Medicine*, in press
## Exposure to Beverage Advertisements, by Type and Year
### Children Ages 6-11 Years

<table>
<thead>
<tr>
<th>Category</th>
<th>2003</th>
<th>2009</th>
<th>% Change 07-09</th>
<th>% Change 03-09</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Sugar Beverage Ads</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular Soft Drinks</td>
<td>0.37</td>
<td>0.12</td>
<td>3.5%</td>
<td>-68.5%</td>
</tr>
<tr>
<td>Fruit Drinks</td>
<td>0.42</td>
<td>0.24</td>
<td>108.9%</td>
<td>-43.5%</td>
</tr>
<tr>
<td>Bottled Water (Sugar Added)</td>
<td>0.01</td>
<td>0.07</td>
<td>-54.4%</td>
<td>369.7%</td>
</tr>
<tr>
<td>Drinks - Isotonic</td>
<td>0.15</td>
<td>0.06</td>
<td>-54.0%</td>
<td>-59.8%</td>
</tr>
<tr>
<td>Other High Sugar Beverage</td>
<td>0.38</td>
<td>0.15</td>
<td>-60.3%</td>
<td>-61.0%</td>
</tr>
<tr>
<td><strong>Low Sugar Beverage Ads</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet Soft Drinks</td>
<td>0.03</td>
<td>0.04</td>
<td>-33.9%</td>
<td>20.8%</td>
</tr>
<tr>
<td>Fruit Juices (100%)</td>
<td>0.12</td>
<td>0.12</td>
<td>18.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Bottled Water</td>
<td>0.02</td>
<td>0.02</td>
<td>36.2%</td>
<td>15.7%</td>
</tr>
<tr>
<td>Milk (Unflavored)</td>
<td>0.00</td>
<td>0.04</td>
<td>161.5%</td>
<td>1318.9%</td>
</tr>
<tr>
<td>Other Low Sugar Beverage</td>
<td>0.05</td>
<td>0.13</td>
<td>59.8%</td>
<td>151.0%</td>
</tr>
</tbody>
</table>

Source: Powell et al., *Archives of Pediatrics & Adolescent Medicine*, in press
# Exposure to Beverage Advertisements, by Type and Year

Adolescents Ages 12-17 Years

<table>
<thead>
<tr>
<th>Beverage Type</th>
<th>2003</th>
<th>2009</th>
<th>% Change 07-09</th>
<th>% Change 03-09</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Sugar Beverage Ads</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular Soft Drinks</td>
<td>0.67</td>
<td>0.24</td>
<td>8.2%</td>
<td>-63.8%</td>
</tr>
<tr>
<td>Fruit Drinks</td>
<td>0.32</td>
<td>0.18</td>
<td>38.7%</td>
<td>-45.3%</td>
</tr>
<tr>
<td>Bottled Water (Sugar Added)</td>
<td>0.03</td>
<td>0.09</td>
<td>-47.0%</td>
<td>242.0%</td>
</tr>
<tr>
<td>Drinks - Isotonic</td>
<td>0.22</td>
<td>0.15</td>
<td>-35.9%</td>
<td>-33.1%</td>
</tr>
<tr>
<td>Other High Sugar Beverage</td>
<td>0.36</td>
<td>0.18</td>
<td>-46.5%</td>
<td>-50.9%</td>
</tr>
<tr>
<td><strong>Low Sugar Beverage Ads</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet Soft Drinks</td>
<td>0.06</td>
<td>0.07</td>
<td>-39.8%</td>
<td>24.2%</td>
</tr>
<tr>
<td>Fruit Juices (100%)</td>
<td>0.16</td>
<td>0.17</td>
<td>31.0%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Bottled Water</td>
<td>0.04</td>
<td>0.03</td>
<td>11.7%</td>
<td>-16.1%</td>
</tr>
<tr>
<td>Milk (Unflavored)</td>
<td>0.00</td>
<td>0.04</td>
<td>65.9%</td>
<td>817.4%</td>
</tr>
<tr>
<td>Other Low Sugar Beverage</td>
<td>0.07</td>
<td>0.24</td>
<td>123.0%</td>
<td>234.0%</td>
</tr>
</tbody>
</table>

Source: Powell et al., *Archives of Pediatrics & Adolescent Medicine*, in press
## Number of Ads Seen and Nutritional Content (%) of Ads for Companies in the CFBAI

**Children Ages 2-5 Years**

<table>
<thead>
<tr>
<th></th>
<th># of Ads per Day</th>
<th>% of Ads High in SFSUSO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2009</td>
</tr>
<tr>
<td><strong>Burger King</strong></td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Cadbury</strong></td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Campbell</strong></td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Coca-Cola</strong></td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>ConAgra</strong></td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Dannon</strong></td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>General Mills</strong></td>
<td>2.4</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Hershey</strong></td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Kellogg</strong></td>
<td>1.5</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Kraft</strong></td>
<td>1.3</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Mars</strong></td>
<td>0.7</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>McDonalds</strong></td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Nestle</strong></td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Pepsi</strong></td>
<td>0.6</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Post</strong></td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Unilever</strong></td>
<td>0.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Source: Powell et al., *Archives of Pediatrics & Adolescent Medicine*, in press
## Number of Ads Seen and Nutritional Content (%) of Ads for Companies in the CFBAI

**Children Ages 6-11 Years**

<table>
<thead>
<tr>
<th>Company</th>
<th># of Ads per Day</th>
<th>% Change 03-09</th>
<th>% of Ads High in SFSUSO</th>
<th>% Change 03-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burger King</td>
<td>0.4</td>
<td>24.5%</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Cadbury</td>
<td>0.1</td>
<td>40.8%</td>
<td>0.0%</td>
<td>24.3%</td>
</tr>
<tr>
<td>Campbell</td>
<td>0.3</td>
<td>17.1%</td>
<td>88.5%</td>
<td>69.6%</td>
</tr>
<tr>
<td>Coca-Cola</td>
<td>0.2</td>
<td>-57.3%</td>
<td>94.5%</td>
<td>44.8%</td>
</tr>
<tr>
<td>ConAgra</td>
<td>0.2</td>
<td>22.8%</td>
<td>66.2%</td>
<td>62.8%</td>
</tr>
<tr>
<td>Dannon</td>
<td>0.2</td>
<td>29.2%</td>
<td>100.0%</td>
<td>99.9%</td>
</tr>
<tr>
<td>General Mills</td>
<td>2.2</td>
<td>6.4%</td>
<td>96.6%</td>
<td>97.3%</td>
</tr>
<tr>
<td>Hershey</td>
<td>0.3</td>
<td>-18.3%</td>
<td>79.6%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Kellogg</td>
<td>1.4</td>
<td>-37.1%</td>
<td>98.7%</td>
<td>88.7%</td>
</tr>
<tr>
<td>Kraft</td>
<td>1.3</td>
<td>-41.0%</td>
<td>97.5%</td>
<td>94.9%</td>
</tr>
<tr>
<td>Mars</td>
<td>0.7</td>
<td>-56.5%</td>
<td>95.3%</td>
<td>74.0%</td>
</tr>
<tr>
<td>McDonalds</td>
<td>0.8</td>
<td>29.7%</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Nestle</td>
<td>0.4</td>
<td>-33.8%</td>
<td>92.6%</td>
<td>73.7%</td>
</tr>
<tr>
<td>Pepsi</td>
<td>0.6</td>
<td>-67.6%</td>
<td>90.8%</td>
<td>82.4%</td>
</tr>
<tr>
<td>Post</td>
<td>0.4</td>
<td>-33.0%</td>
<td>94.7%</td>
<td>96.9%</td>
</tr>
<tr>
<td>Unilever</td>
<td>0.2</td>
<td>-57.7%</td>
<td>96.8%</td>
<td>91.7%</td>
</tr>
</tbody>
</table>

Source: Powell et al., *Archives of Pediatrics & Adolescent Medicine*, in press
# Number of Ads Seen and Nutritional Content (%) of Ads for CFBAI vs. Non CFBAI Companies

<table>
<thead>
<tr>
<th></th>
<th># of Ads per Day</th>
<th>% of Ads High in SFSUSO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age 2-5</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFBAI Companies Food and Beverage Products Subtotal</td>
<td>8.7</td>
<td>5.4</td>
</tr>
<tr>
<td>Non CFBAI Companies Food and Beverage Products Subtotal</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>CFBAI Fast Food Companies Subtotal</td>
<td>1.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Non CFBAI Fast Food Companies Subtotals</td>
<td>1.1</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Age 6-11</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFBAI Companies Food and Beverage Products Subtotal</td>
<td>8.6</td>
<td>6.4</td>
</tr>
<tr>
<td>Non CFBAI Companies Food and Beverage Products Subtotal</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td>CFBAI Fast Food Companies Subtotal</td>
<td>1.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Non CFBAI Fast Food Companies Subtotals</td>
<td>1.5</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Source: Powell et al., *Archives of Pediatrics & Adolescent Medicine*, in press
Exposure to Food and Beverage Advertisements by High Saturated Fat, Sugar, or Sodium Status, by CFBAI Membership, by Age, and by Year

Source: Powell et al., Archives of Pediatrics & Adolescent Medicine, in press
Summary: Results of CFBAI Companies

- General Mills remains the largest advertiser; moderate reduction in ads seen by 2-5y (-16%) and an increase for 6-11y (6%). 97% of ads seen are for unhealthy products.
- Kellogg and Kraft ads are both down by about 40-50% for children, but about 9/10 ads still seen are for unhealthy products.
- Coke ads are down substantially (-57%), only company other than Cadbury with less than 50% of ads for unhealthy products.
- Pepsi ads down substantially (-70%), although 82% remain for unhealthy products.
- Overall, there were significantly fewer food and beverage product ads seen by children from CFBAI companies (-38%) compared to the 1% reduction in non-CFBAI food companies. But that the vast majority of the CFBAI company ads (88%) seen, in 2009, continued to be for products that were high in either saturated fat, sugar or sodium.
Examples of Potential Obesity-related Policy Instruments

- Taxes
- Subsidies
- Advertising Regulations
- Zoning
- Urban Planning
- Education
- School Food and Fitness Policies
- Safety-related Policies
- Transportation Policies
Policy Landscape - Subsidies

• Food in the U.S. is subsidized for low-income individuals and families through a number of programs such as Food Stamps, the Women, Infant and Children Nutrition Program, the Child and Adult Care Food Program, and the National School Lunch and Breakfast Programs.

• Recently, food subsidies are directed at the consumer for fruits and vegetables through the WIC program.

• California “Healthy Purchase” pilot program where for each dollar of food stamps spent on fresh produce, participants are subsidized a portion of the cost.
• Existing food taxes have not generally been introduced with the aim of modifying consumption behavior as they have been used in other public health areas such as tobacco.

• Food taxes are currently imposed on selected categories of food such as soft drinks, candy and snacks in grocery stores and vending machines but at quite low tax rates.
Sales Taxes on Selected Beverages, All States
(as of July 1, 2010)

<table>
<thead>
<tr>
<th>Beverage Type</th>
<th>Sales Tax Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soda</td>
<td>7.25</td>
</tr>
<tr>
<td>Diet Soda</td>
<td>7.25</td>
</tr>
<tr>
<td>&lt;50% Juice</td>
<td>7.00</td>
</tr>
<tr>
<td>Isotonic Bevs.</td>
<td>7.00</td>
</tr>
<tr>
<td>Sweetened Tea</td>
<td>7.00</td>
</tr>
<tr>
<td>Water</td>
<td>7.00</td>
</tr>
<tr>
<td>51-99% Juice</td>
<td>7.00</td>
</tr>
<tr>
<td>100% Juice</td>
<td>7.00</td>
</tr>
<tr>
<td>Mean State Food Tax (All States=1.02%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Mean State Sales Tax (All States=5.04%)</td>
<td>5.04</td>
</tr>
</tbody>
</table>

Note: Three states also impose a mandatory statewide local tax that is not reflected in the above data: CA (1%), UT (1.25%), VA (1%).
Sales Taxes on Selected Beverages, Taxing States
(as of July 1, 2010)

Note: Three states also impose a mandatory statewide local tax that is not reflected in the above data: CA (1%), UT (1.25%), VA (1%).
Sales taxes applied to vending machines sales, selected beverages (as of July 1, 2010)

<table>
<thead>
<tr>
<th>Beverage Type</th>
<th>Mean all states (%)</th>
<th>Max (%)</th>
<th>N</th>
<th>Mean taxing states (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soda</td>
<td>4.14</td>
<td>8.00</td>
<td>40</td>
<td>5.28</td>
</tr>
<tr>
<td>Diet Soda</td>
<td>4.14</td>
<td>8.00</td>
<td>40</td>
<td>5.28</td>
</tr>
<tr>
<td>≤ 50% fruit juice</td>
<td>4.02</td>
<td>8.00</td>
<td>39</td>
<td>5.26</td>
</tr>
<tr>
<td>Isotonic beverages</td>
<td>4.02</td>
<td>8.00</td>
<td>39</td>
<td>5.26</td>
</tr>
<tr>
<td>Sweetened teas (bottle/can)</td>
<td>3.90</td>
<td>8.00</td>
<td>38</td>
<td>5.24</td>
</tr>
<tr>
<td>Bottled water</td>
<td>3.38</td>
<td>8.00</td>
<td>34</td>
<td>5.07</td>
</tr>
<tr>
<td>&gt;51% fruit juice, but &lt; 100% fruit juice</td>
<td>3.30</td>
<td>8.00</td>
<td>33</td>
<td>5.10</td>
</tr>
<tr>
<td>100% fruit juice</td>
<td>3.30</td>
<td>8.00</td>
<td>33</td>
<td>5.10</td>
</tr>
</tbody>
</table>
State Sales Taxes on Regular and Diet Soda as of July 1, 2010

Note: Three states also impose a mandatory statewide local tax that is not reflected in the above data: CA (1%), UT (1.25%), VA (1%).

Source: Bridging the Gap Program, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago based on data compiled by The MayaTech Corporation. All data reflect tax rates effective as of January 1 of each year and include all 50 states and the District of Columbia.
Mean state sales tax rates on food products, regular soda, restaurant sales, and snacks, 1997-2009

Source: Bridging the Gap Program, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago based on data compiled by The MayaTech Corporation. All data reflect tax rates effective as of January 1 of each year and include all 50 states and the District of Columbia.
States with Non-Sales* Taxes on Selected Beverages (as of 7/1/10) or SSB-related Legislative Proposals in 2010

*Additional excise/ad valorem (non-sales) taxes may be applied at the manufacturer, distributor, wholesaler, and/or retailer levels and are applied to bottles, syrup, powders and/or mixes. Taxes apply to regular and diet soda, isotonics, and sweetened tea in AL, AR, RI, TN, and WV. Taxes only apply to regular and diet soda in VA and WA.
Policy Landscape - Advertising

- No formal regulations in place
- CFBAI – self-regulation by the industry
  - No uniform nutritional standards
  - No uniform definition of child audiences
  - Does not apply to children age 12 and over
  - By end of 2010, only 17 members, including just 2 fast food companies
- Recent (2011) Interagency Guidelines in development
Policy Landscape - Taxation

• Tax Policy Design: Implications for Potential Impact on Health Outcomes
  
  ▶ Issues of applicability to SNAP purchases
  ▶ Excise tax rather than a sales tax
    ➢ Incorporated at shelf price
    ➢ Applicable regardless of where items are sold
    ➢ Applied on a per unit basis rather than a function of price so that quantity discounts are still taxed.
  
  ▶ Dedication of tax revenue to nutrition and physical activity programs
Future Research needed …

• The evidence base is still thin; need further research using longitudinal data; need better price measures.

• Recent evidence shows limited associations between soda taxes and weight outcomes. But, should not expect to find large effects based on low tax rates.

• Need evaluations of pilot projects that subsidize healthful foods – link to weight outcomes.

• Evidence as we go … jurisdictions that adopt higher taxes on unhealthy energy dense foods will provide natural experiments for on the effectiveness of these efforts in promoting healthy eating and curbing the obesity epidemic.

• In terms of food advertising, emerging body of evidence by researchers points to reductions in exposure based on industry self-regulation but that ads seen continue to be predominantly for low-nutritional products. Need more evidence on link to weight outcomes.
ImpacTeen
http://www.impacteen.org

Bridging the Gap
http://www.bridgingthegapresearch.org

Contact me at:
powelll@uic.edu

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