National Data to Inform Childhood Obesity Prevention Strategies: Beverage, Dietary, and Activity Practices at Home and School

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November 7, 2012
Background

- Childhood obesity associated with consumption of:
  - Sugar-sweetened beverages (SSBs)
  - Low-nutrient, energy-dense foods
  - Fruit/vegetable intake (inverse association)

- Portion sizes and proportion of children consuming SSBs have increased

- Higher consumption of SSBs among non-Hispanic blacks and children living in lower-income households
Goal: Create food and beverage environments that ensure that healthy food and beverage options are the routine, easy choice

Strategy 2-1: Adopt policies and implement practices to reduce overconsumption of sugar-sweetened beverages (SSBs):

- Improved access to healthful beverages in schools and other locations (home, child care)
- Reduced access to SSBs (e.g., competitive foods in schools)
- Reduced portion sizes of SSBs
Schools play important role—on average, school-age children consume 35% of daily calories at school (up to 51% for school meal participants)

Mixed evidence on role of school meals and obesity

Home food environment also important:
- Access to healthful and less healthful foods
- Eating behaviors established early in life
- Parents’ role in modeling healthful eating behaviors
Feeding Infants & Toddlers Study (FITS)

Why is FITS important?

- 2002 FITS - Groundbreaking dietary survey of 3,000 infants and toddlers—first of this magnitude
- Public health concerns about childhood obesity
- Improved knowledge of nutrient requirements
- Filled an important gap in information on the nutrient intakes and food patterns of infants and toddlers in the U.S.
- Shared widely: findings published in over 21 peer reviewed journal articles
- Influenced public health policy
2008 Feeding Infants and Toddlers Study

- Cross-sectional telephone survey of parents and caregivers of 3,273 children from birth to 4 years
- Conducted nationwide June 2008 – January 2009
- 24-hour dietary recall of all foods, beverages, and dietary supplements consumed
- Data are weighted to reflect the U.S. population
FITS 2008 Sample Sizes by Age

- Dietary interviews completed for 3,273 infants, toddlers, and preschoolers from birth to 4 years of age:
  - 0 to 5 months: 382 younger infants
  - 6 to 11 months: 505 older infants
  - 12 to 23 months: 925 toddlers
  - 24 to 35 months: 736 preschoolers
  - 36 to 47 months: 725 preschoolers
FITS 2008 Sample Characteristics

- 56% non-Hispanic white; 14% non-Hispanic black, 21% Hispanic, 8% other race/ethnicity
- 35% are first-born children
- 30% of children participate in WIC
- 51% of mothers work, 48% of children in child care
- 46% of mothers have a college degree or higher
- 15% have an annual household income <$20,000, 17% have an income ≥$100,000

Note: Weighted data, n=3,273 ages 0-47 months; excludes 11% with missing income.
Research Questions

- How do young children’s food consumption and activity patterns compare to recommendations:
  - 5 or more fruits or vegetables a day
  - 2 hours or less screen time a day
  - 1 hour or more physical activity a day
  - 0 sugar-sweetened beverages

- What factors affect children’s diet and weight?
  - Parents’ perceptions about child’s diet and weight
  - Participation in WIC or school meals
  - Home and school food environments (diet quality, competitive foods, school food practices)
Parents’ Perceptions of Child’s Weight
Parents Are Most Likely to Report Their Child’s Weight Is “About Right”

Age in Months

- Underweight
- About right
- Overweight

<table>
<thead>
<tr>
<th>Age in Months</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>96</td>
</tr>
<tr>
<td>6-11</td>
<td>94</td>
</tr>
<tr>
<td>12-23</td>
<td>90</td>
</tr>
<tr>
<td>24-35</td>
<td>89</td>
</tr>
<tr>
<td>36-47</td>
<td>89</td>
</tr>
</tbody>
</table>
Parents Don’t Recognize Overweight

Do you consider your child’s weight to be:

- About right: 89.1%
- Underweight: 8.6%
- Overweight: 2.2%

Measured BMI in NHANES:

- Healthy weight: 75.8%
- Overweight: 10.8%
- Obese: 10.4%
- Underweight: 3.0%

Sources: FITS 2008; Ogden et al., JAMA 2010;303(3):242-249
Parents’ Perceptions of Child’s Diet
Parents’ Report a Decrease in the Healthfulness of Their Child’s Diet from Birth to Age 4 Years

<table>
<thead>
<tr>
<th>Age in Months</th>
<th>Very Healthy</th>
<th>Somewhat Healthy</th>
<th>Not too/not at all healthy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>97</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>6-11</td>
<td>80</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>12-23</td>
<td>58</td>
<td>42</td>
<td>1</td>
</tr>
<tr>
<td>24-35</td>
<td>43</td>
<td>55</td>
<td>2</td>
</tr>
<tr>
<td>36-47</td>
<td>34</td>
<td>63</td>
<td>3</td>
</tr>
</tbody>
</table>

Very healthy  Somewhat healthy  Not too/not at all healthy
Consumption of Low-Nutrient, Energy-Dense Foods is Common

Percentage of children consuming dessert, sweet, or snack chips at least once a day: FITS 2008

Age in Months

- Any dessert/candy
- Cakes, cookies, pastry
- Candy
- Snack chips

12-23: 58% (40% Any dessert/candy, 17% Cakes, cookies, pastry, 17% Candy, 0% Snack chips)
24-35: 68% (49% Any dessert/candy, 23% Cakes, cookies, pastry, 24% Candy, 0% Snack chips)
36-47: 74% (51% Any dessert/candy, 29% Cakes, cookies, pastry, 30% Candy, 0% Snack chips)
40% to 50% of Preschoolers Drink Sugar-Sweetened Beverages

Percentage of children consuming sweetened beverages at least once a day: FITS 2008

Age in Months

- 12-23 months: Any type (28%), Fruit drink (20%), Carbonated soda (5%)
- 24-35 months: Any type (44%), Fruit drink (33%), Carbonated soda (7%)
- 36-47 months: Any type (48%), Fruit drink (36%), Carbonated soda (9%)
Most Parents Think Their Child “Gets Enough Fruits and Vegetables in His/Her Diet”
Almost a Third of Toddlers and Preschoolers Eat No Fruits or Vegetables

Percentage not consuming any discrete fruit or vegetables on a given day: FITS 2008

Age in Months

- **12-23 months**: 23% Any fruit (excluding juice), 29% Any vegetable
- **24-35 months**: 27% Any fruit (excluding juice), 29% Any vegetable
- **36-47 months**: 28% Any fruit (excluding juice), 32% Any vegetable
About One Third of Preschoolers Eat 5 or More Fruits or Vegetables a Day

Percentage consuming 5 or more fruits or vegetables on a given day: FITS 2008

Based on MyPyramid cup equivalents of 2.5 or more; includes fruits, 100% juices, vegetables, and legumes.
Physical Activity and Screen Time
60% of Preschoolers Meet Recommended 1 or More Hours of Physical Activity a Day

Parental report of average time spent playing outdoors: FITS 2008

<table>
<thead>
<tr>
<th>Age in Months</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-23</td>
<td>50</td>
</tr>
<tr>
<td>24-35</td>
<td>58</td>
</tr>
<tr>
<td>36-47</td>
<td>62</td>
</tr>
</tbody>
</table>
3 of 4 Preschoolers Meet Recommended Screen-Time Limit of No More Than 2 Hours Per Day

Screen time includes TV, videos, and DVDs. Media quality was not measured.
Among Those Who Watch TV or Videos, 1 in 4 Do So in the Room Where They Sleep

Percentage watching TV or videos in the room where he/she sleeps: FITS 2008

<table>
<thead>
<tr>
<th>Age in Months</th>
<th>Percentage Watching</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-35</td>
<td>17</td>
</tr>
<tr>
<td>36-47</td>
<td>25</td>
</tr>
</tbody>
</table>
FITS 2008: Main Findings

- Parents may not accurately perceive overweight/obesity and healthfulness of children’s diets since reports are inconsistent with national survey data.

- Improvements are needed in diet and activity behaviors to reduce childhood obesity based on current recommendations:

<table>
<thead>
<tr>
<th>Daily Recommendation</th>
<th>% Meeting Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 or more fruits or vegetables</td>
<td>TBD</td>
</tr>
<tr>
<td>2 hours or less screen time</td>
<td>2% meet ‘0 time’</td>
</tr>
<tr>
<td>1 hour or more physical activity</td>
<td>50%</td>
</tr>
<tr>
<td>0 sugar-sweetened beverages</td>
<td>70%</td>
</tr>
</tbody>
</table>
School Food Environment
Third School Nutrition Dietary Assessment Study (SNDA-III)

- Nationally representative sample of public schools and students participating in USDA school meal programs in Spring 2005
  - 287 schools
  - 2,314 students in grades 1-12 (2,228 with BMI)

- Multi-level data collection
  - Surveys of principals, school foodservice managers, parents, & students
  - On-site observations
  - Students’ diets (24-hr recall), measured heights and weights
Conceptual Framework

School food environment

• Wellness policies and nutrition promotion practices
• Competitive food practices
• Characteristics of school meals

Access to LNED foods, beverages, and school meals

Obtained and consumed on school campuses

• Sugar-sweetened beverages
• Low-nutrient, energy-dense (LNED) foods
• Fruits and vegetables

Body mass index, obesity status

Other influences:
Age & Sex
Race/ethnicity
School meal participation
Socioeconomic status
Family meals (home)
Weight loss practices
Physical activity level
Daily Consumption of SSBs is Similar Among NSLP Participants and Nonparticipants

Percentage of children consuming sweetened beverages at least once a day: SNDA-III

Elementary School
- NSLP-ppt: 60%
- Non-ppt: 65%

Secondary School
- NSLP-ppt: 72%
- Non-ppt: 78%
Consumption of SSBs at School is Lower Among NSLP Participants Compared with Nonparticipants

Percentage of children consuming sweetened beverages at least once a day at school

Source: SNDA-III (2005), n=2,314
**p<0.01
Identify differences in beverage intake consumed to help tailor diet-related childhood obesity interventions
- Race/ethnicity
- Weight status

Estimate the average daily calories that could be saved if children switched to healthier beverages, and assess how this would vary by age, race/ethnicity, weight status, and location
### Methods

- Descriptive analyses of the percent of school-aged children consuming varied beverages by age and location consumed (paper 1, *JNEB*, submitted)
  - Race/ethnicity
  - Obesity status
- Simulations of changing beverage types (SSBs, flavored milks (FMs)) to healthier options and estimating the calories saved by beverage type and location provided across subgroups (paper 2, *JAND, in press*)
Beverage Categories

- **Sugar-sweetened beverages (SSBs)**
  - Soda
  - Other SSBs (e.g. – lemonade, fruit punch, etc.)

- **100% fruit juice**

- **Milk**
  - Flavored milk (most 1%/skim)
  - Unflavored whole/2% milk
  - Unflavored 1%/skim milk

- **Diet drinks**

- **Bottled water**
Percentage Consuming Beverage on a Given School Day

**Sugar-sweetened Beverages**

- **School**: Elementary - 17%, Middle - 32%, High - 35%
- **Home**: Elementary - 47%, Middle - 59%, High - 50%
- **Away**: Elementary - 12%, Middle - 12%, High - 22%

**Flavored Milks**

- **School**: Elementary - 47%, Middle - 30%, High - 20%
Replacement Methodology

- Two categories:
  - Obtained and consumed at school (school policies)
  - Obtained from home or away from home (non-school) (non-school behaviors)

- SSBs at meals → unflavored skim/1% milk
- SSBs at snacks (non-meal times) → water
- Flavored milk → unflavored skim/1% milk
- Total = sum of changes over day
Daily Calories Saved in Simulations

ES | MS | HS | All

Non-school SSBs  | School SSBs  | School Flav. Milks  | Non-school Flav. Milks

- ES: 180 kcal
- MS: 200 kcal
- HS: 220 kcal
- All: 210 kcal
# Mean Calories Saved by Beverage Type and Location

<table>
<thead>
<tr>
<th>Mean calories saved from:</th>
<th>All children</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSBs obtained at school</td>
<td>8</td>
</tr>
<tr>
<td>SSBs away from school/brought from home</td>
<td>145</td>
</tr>
<tr>
<td>Total daily all SSBs</td>
<td>153</td>
</tr>
<tr>
<td>Flavored milks at school</td>
<td>33</td>
</tr>
<tr>
<td>Flavored milks away from school</td>
<td>18</td>
</tr>
<tr>
<td>Total daily all flavored milks</td>
<td>52</td>
</tr>
<tr>
<td><strong>Total daily, all changes</strong></td>
<td><strong>205</strong></td>
</tr>
</tbody>
</table>

Numbers may not add due to rounding.
## Mean Calories Saved in Simulations of Healthier Beverage Choices

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>ES</th>
<th>MS</th>
<th>HS</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weight</td>
<td>161</td>
<td>236</td>
<td>262</td>
<td>206</td>
</tr>
<tr>
<td>Overweight</td>
<td>186</td>
<td>192</td>
<td>221</td>
<td>196</td>
</tr>
<tr>
<td>Obese</td>
<td>187</td>
<td>213</td>
<td>232</td>
<td>207</td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>176</td>
<td>234</td>
<td>244</td>
<td>209</td>
</tr>
<tr>
<td>Non-Hispanic black</td>
<td>184</td>
<td>217</td>
<td>273</td>
<td>214</td>
</tr>
<tr>
<td>Hispanic</td>
<td>171</td>
<td>184</td>
<td>244</td>
<td>192</td>
</tr>
<tr>
<td>Total daily calories</td>
<td>173</td>
<td>222</td>
<td>248</td>
<td>205</td>
</tr>
<tr>
<td>Mean % daily calories</td>
<td>8.4</td>
<td>11.0</td>
<td>11.0</td>
<td>9.7</td>
</tr>
</tbody>
</table>
Simulation Results

- On average, 205/2109 calories—or 9.7% of daily calories—could be saved from healthier beverage choices on an average school day.

- SSBs accounted for 75% of the calorie savings, most from changing away-from-school choices.

- Changing from FMs to unflavored skim milk could save 52 calories on an average school day.

- Calorie savings from potential improvements in children’s beverage consumption are similar across age, sex, racial/ethnic, and weight status subgroups.
The toddler and preschool period is a critical time for helping parents instill healthful, long-term dietary and activity behaviors in their family.

Messages to parents

- AAP Initiative
- Health care providers
- WIC
- Toddler gap in dietary guidance (B-24 Working Group)

Social norms related to child obesity

Child care guidelines

Access to healthful, lower cost foods
Policy & Research Implications: School-Age (5-18 Y)

- Environmental and behavioral approaches to improve school-age children’s beverage patterns.
  - Maintain school and wellness policies to restrict access to SSBs at school.
  - Reduce calories and added sugars from SSBs in the home and child care environments.
  - Encourage water as a beverage

- SSBs contribute the greatest share of excess calories from added sugars and should remain a focus of childhood obesity prevention efforts.

- FMs may also be important, especially among ES and MS children. Changes could reduce added-sugar calories while maintaining calcium intake.
For More Information

- **SNDA-III** - *Journal of the American Dietetics Association*, Supplement on The School Food Environment, Children’s Diets, and Obesity, February 2009

- **FITS** - *Journal of the American Dietetics Association*, FITS Supplements; January 2004 and 2006, December 2010

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