THE GLOBAL FACE OF SSB’S AND ADDED SUGAR

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THE WORLD IS FAT “close to 2 billion people overweight”
Outline: Current Dynamics, but ever changing

• SUGAR in our US and global food supply
• Random controlled trials are coming: US, Mexico on adults; David Ludwig on kids to fill one last gap
• Major global push to shift markets and sales across the globe
• Globally: Mexico, Brazil, China vs. the US
• Europe, the UK and the US—the latest shift was to sugar-sweetened flavored milk, shifts constantly to new modes of delivering the same stuff.
• Global philanthropy and adding vitamins—expansion same models

“close to 2 billion people overweight”
Sweetness Preference was Essential to Survive: Huge Shift in Amounts, Energy Density

“close to 2 billion people overweight”
Remarkably Short History for Caloric Beverages:
Might the Absence of Compensation Relate to This Historical Evolution?

- Earliest possible date
- Definite date

**Pre-Homo Sapiens**

- Water, Breast Milk

**200,000 BCE - 10,000 BCE Origin of Humans**

- Homo Sapiens (200,000 BCE - 100,000 BCE)

**Modern Beverage Era 10,000 BCE - Present**

- US Coffee Intake 46 gal/capita (1946)
- Juice Concentrates (1945)
- US Milk Intake 45 gal/capita (1945)
- Coca Cola (1886)
- Pasteurization (1860-64)
- Carbonation (1760-70)
- Liquor (1700-1800)
- Lemonade (1500-1600)
- Coffee (1300-1500)
- Brandy Distilled (1000-1500)
- Tea (500 BCE) (206 AD)
- Wine (5400 BCE)
- Beer (4000 BCE)
- Milk (9000 BCE)

**Earliest Possible Date**

- Water
- Breast Milk

**Definite Date**

- 2000 BCE
- Milk (9000 BCE)
- Beer (4000 BCE)
- Wine (5400 BCE)
- Water, Breast Milk

**US Milk Intake 45 gal/capita (1945)**

- US Coffee Intake 46 gal/capita (1946)
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**US Soda Intake 52 gal/capita (2004)**

- US Coffee Intake 46 gal/capita (1946)
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**Juice Concentrates (1945)**

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**Liquor (1700-1800)**

- Lemonade (1500-1600)
- Coffee (1300-1500)
- Brandy Distilled (1000-1500)
- Tea (500 BCE) (206 AD)
- Wine (5400 BCE)
- Beer (4000 BCE)
- Milk (9000 BCE)

**Lemonade (1500-1600)**

- Coffee (1300-1500)
- Brandy Distilled (1000-1500)
- Tea (500 BCE) (206 AD)
- Wine (5400 BCE)
- Beer (4000 BCE)
- Milk (9000 BCE)

**Coffee (1300-1500)**

- Brandy Distilled (1000-1500)
- Tea (500 BCE) (206 AD)
- Wine (5400 BCE)
- Beer (4000 BCE)
- Milk (9000 BCE)

**Brandy Distilled (1000-1500)**

- Tea (500 BCE) (206 AD)
- Wine (5400 BCE)
- Beer (4000 BCE)
- Milk (9000 BCE)

**Tea (500 BCE) (206 AD)**

- Wine (5400 BCE)
- Beer (4000 BCE)
- Milk (9000 BCE)

**Wine (5400 BCE)**

- Beer (4000 BCE)
- Milk (9000 BCE)

**Beer (4000 BCE)**

- Milk (9000 BCE)

**Milk (9000 BCE)**

- Wine, Beer, Juice (8000 BCE)

**Wine, Beer, Juice (8000 BCE)**

- Water, Breast Milk

**Water, Breast Milk**

- Beginning of Time

**Beginning of Time**

- Homo Sapiens (20000 BCE - 10000 BCE)

**Homo Sapiens (20000 BCE - 10000 BCE)**

- Water, Breast Milk

**Water, Breast Milk**

- Beginning of Time

**Beginning of Time**
Responses to Basic Tastes
(Jacob Steiner, 1987)

<table>
<thead>
<tr>
<th>Rest</th>
<th>Water</th>
<th>Sweet</th>
<th>Sour</th>
<th>Bitter</th>
</tr>
</thead>
</table>

[Images of baby responses to different tastes]
What are the implications of eating food and drinking water on energy balance?

<table>
<thead>
<tr>
<th>General Properties</th>
<th>Food</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunger – Feeding</td>
<td>Sensations that promote attainment of minimal food energy needs</td>
<td>Thirst – Drinking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sensations that promote attainment of minimal hydration needs</td>
</tr>
<tr>
<td>Energy Excess</td>
<td>Stored</td>
<td>Water Excess</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excreted</td>
</tr>
<tr>
<td>Energy Deficit:</td>
<td>Die in 1-2 months</td>
<td>Water Deficit : Die in 3-7 days</td>
</tr>
</tbody>
</table>

“close to 2 billion people overweight”
Comparison of consumption of a beverage and a solid food on total Energy Intake shows beverage consumption in any macronutrient form significantly increases dairy energy intake.

Carbohydrate (Watermelon)  
Fat (Coconut)  
Protein (Dairy)

<table>
<thead>
<tr>
<th>Kcals per day consumed</th>
<th>Liquid</th>
<th>Solid</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td><img src="#" alt="Liquid" /></td>
<td><img src="#" alt="Solid" /></td>
</tr>
<tr>
<td>2500</td>
<td><img src="#" alt="Liquid" /></td>
<td><img src="#" alt="Solid" /></td>
</tr>
<tr>
<td>3000</td>
<td><img src="#" alt="Liquid" /></td>
<td><img src="#" alt="Solid" /></td>
</tr>
<tr>
<td>3500</td>
<td><img src="#" alt="Liquid" /></td>
<td><img src="#" alt="Solid" /></td>
</tr>
<tr>
<td>4000</td>
<td><img src="#" alt="Liquid" /></td>
<td><img src="#" alt="Solid" /></td>
</tr>
</tbody>
</table>

* indicates a significant increase in energy intake.

Total Calories and Volume of all consumer packaged Food and Beverages Purchased in the United States Containing Nutritive Sweeteners (NS) and Non-nutritive Sweeteners (NNS), 2005-2009

a. Containing any Nutritive Sweeteners (NS)

- % total calories purchased containing any NS (including FJC)
- % total volume purchased containing any NS (including FJC)

b. Containing any Non-Nutritive Sweeteners (NNS)

- % total calories purchased containing any NNS
- % total volume purchased containing any NNS

Ng, Slining, Popkin, draft not for use or citation yet
Percentage of calories sold in the US in 2008 that contain various types of sweeteners by select food groups

- **Added sweetener – any FJC**
- **Added sweetener – Other natural sweeteners only**
- **Added sweetener – other natural + nonnutritive sweeteners**
- **Added sweetener – nonnutritive sweeteners only**
- **No added sweetener**

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Added Sweetener – any FJC</th>
<th>Added sweetener – Other natural sweeteners only</th>
<th>Added sweetener – other natural + nonnutritive sweeteners</th>
<th>Added sweetener – nonnutritive sweeteners only</th>
<th>No added sweetener</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Food Groups</td>
<td>6%</td>
<td>64%</td>
<td>28%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar Sweetened Bev</td>
<td>31%</td>
<td></td>
<td>68%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet-Sweetened Bev *</td>
<td>29%</td>
<td></td>
<td>36%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby Food, formula</td>
<td>27%</td>
<td>30%</td>
<td>44%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salad dressings and dips</td>
<td>27%</td>
<td></td>
<td>69%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Fruit, fresh, frozen, canned or dried</td>
<td>22%</td>
<td></td>
<td>50%</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>Yogurt</td>
<td>17%</td>
<td>55%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bars</td>
<td>9%</td>
<td></td>
<td>88%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


- diet-sweetened beverage includes sodas and fruit drinks with <20 calories per 100g
- Ng, Slining, Popkin, draft not for use or citation yet
North Carolina 3-Arm RCT

- Overweight adults randomized into diet beverage substitution, water substitution, or control for 6 months
- Beverage Replacement (Water and Diet arms combined) 2x greater likelihood of 5% weight loss at 6 months
- Exploratory analyses: significantly greater reduction in WA group for change in fasting glucose, urine osmolality and a trend toward greater reductions in diastolic blood pressure compared to AC
- Tate, Deborah et al, (2012) AJCN

“close to 2 billion people overweight”
Global Shifts: Remarkable Increases for Major Beverage Company Sales

- China and Brazil: see examples global company dynamics
- Mexico: fastest growth seen to date but others emerging now
- US, Europe, UK: remarkable shift toward sweetened whole milk at same time

“close to 2 billion people overweight”
Chinese Trends 2000-2010 in Daily Calories

Per Capita Daily Calories Sold (kcal)
The Coca-Cola Company - China

Per Capita Daily Calories Sold (kcal)
PepsiCo - China

Source: Kleiman, Ng, Popkin, 2012
Chinese Planning National Beverage Guidelines and Concern Rising

- National meeting set the stage for huge promotion of water, rules and regulations to control SSB’s, juices
- Major delays always before regulations emerge so for now seeing vast increase in marketing, promotion, sales of SSB’s
- When China first opened to the West one of the first products one would see was coke in dollar stores, at banquets. Sold as high prestige item
Brazilian Trends 2000-2010 in Daily Calories

Per Capita Daily Calories Sold (kcal)
The Coca-Cola Company - Brazil

Per Capita Daily Calories Sold (kcal)
PepsiCo - Brazil

Source: Kleiman, Ng, Popkin, Obesity Reviews (10 NOV 2011)
Trends 2000-2010 in Calories Per Ounce Sold: Global, the US, Brazil, and China

A. Calories Per Ounce Sold
The Coca-Cola Company - Carbonates

B. Calories Per Ounce Sold
PepsiCo - Carbonates

Source: Kleiman et al (2011) Obesity Reviews
Mexico Uniquely Affects Us

- Major per capita Coca Cola sales globally
- Push natural sugar, more kcal/ml than US colas
- Mexico sodas sold increasingly in the US to Hispanics.
- Mexican government: beverage guidelines panel, major push to fight SSB’s. Removed from schools, two years running legislature just missed passed punitive taxes, remains a major battleground

“Close to 2 billion people overweight”
Children aged 1-4

Children aged 5-11

Note: Sweetened juice drinks include 100% fruit juice with sugar added and agua fresca (water, juice, sugar). Sodas include carbonated and noncarbonated sugar bottled beverages.

Beverage Consumption Trends among Mexican Adolescents and Adult Women, 1999 and 2006

<table>
<thead>
<tr>
<th>Year</th>
<th>High Sugar</th>
<th>High Calorie Low Benefit</th>
<th>Low Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>100</td>
<td>47</td>
<td>100</td>
</tr>
<tr>
<td>2006</td>
<td>225</td>
<td>120</td>
<td>81</td>
</tr>
</tbody>
</table>

Note: High sugar is composed of mainly soft drinks, sweetened juices, agua frescas and alcohol. High calorie and low benefit is mainly whole milk. Low calories are slightly sweetened coffee and skim milk.

3528 Adolescents from 7 Different European Cities: Project Helena

- In-depth 24-hour recall with a strong focus on water and all beverages with or without calories
- Duffey, Huybrechts, Moreno, others, Popkin (in process)

“Over 1.6 billion people in the world are overweight”
Helena: Total Beverage Consumption Patterns (kcal/person/day) European Adolescents 13-16.9 Years

** Other beverages include vegetable juice, other sweet beverages, other beverages
Source: Helena 24-hour recalls for Austria, Belgium, France, Germany, Greece, Italy, Spain, Sweden,
United States

- Nationally representative 24-hour recalls. Minor shifts in methods but no ability to understand method shifts
- Based on 2 days. Day 1 24-hour recall and Day 2 recall plus record

“Over 1.6 billion people in the world are overweight”
Total Kcal Per Capita from Milk Groups for Children 6-11

Comparing with 1989: * P<0.05 **P<0.001
Comparing with 2005: † P<0.05 ††P<0.001

Latest global push

- Coke—introducing coca cola classic with vitamins added in Chile and many other countries.
- Amazing arrays of attempts to sell sugary waters vary by country.
- Juices are be the next frontier in many.
Global Philanthropy

• The US and Europe represent a tiny piece of the emerging push of the global and local beverage companies. For both regions, diet beverages are being pushed along with juices more and more. For the world sugar, sugar, sugar

• Very aggressive marketing

• All types of events, product placement, web presence

• Across the globe at major meetings of public health, nutrition, medical societies: Hydration sessions organized by Coca Cola—be active, be hydrated, drink something all the time

“Over 1.6 billion people in the world are overweight”
“Close to 2 billion people overweight”
“Over 1.6 billion people in the world are overweight”