Food security and obesity: A strategy for child obesity prevention in low-income communities.

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Marilyn Townsend PhD, RD
Food security and obesity: A strategy for child obesity prevention in low-income communities.

First, update on food security research. Status of food stamp research.
PREVALENCE of food insecurity

About 13.5 million US households food insecure ≥ 1 time.

Food secure 88%
Food insecure without hunger 8%
Food insecure with hunger 4%
Food insecure 12%

Source: ERS, M. Nord 2005

PREVALENCE of food insecurity

89% of US households were food secure throughout the entire year. This means they had access, at all times, to enough food for an active, healthy life for all HH members. 11% of households were food insecure at least once during the 12 month period.

Source: ERS, M. Nord 2005

## Severity Ranges on the Food Security Scale

<table>
<thead>
<tr>
<th>Worried food would run out</th>
<th>Food secure</th>
<th>Low food security</th>
<th>Very low food security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food bought didn't last</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couldn't afford to eat balanced meals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relied on a few kinds of low-cost food for children</td>
<td></td>
<td></td>
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<tr>
<td>Adult cut size of meals or skipped meals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couldn't feed the children a balanced meal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent ate less than felt they should</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult cut or skipped meals, 3 or more months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children were not eating enough</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent hungry but didn't eat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent lost weight</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cut size of child's meals</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Adult did not eat for whole day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child hungry but couldn't afford more food</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult did not eat for whole day, 3 or more months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child skipped meal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child skipped meals, 3 or more months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child did not eat for whole day</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Economic Research Service, M. Nord
Paradox of being poor, hungry and overweight

- Do obesity and food insecurity co-exist in the US?

- Are they related? Are obesity and food insecurity present in the same individuals?

- Do we have evidence that food insecurity causes obesity? Possible mechanisms.
# US Women: food insecurity & obesity

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Journal</th>
<th>N</th>
<th>Population</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olson</td>
<td>1999</td>
<td>JN</td>
<td>193</td>
<td>Low-income</td>
<td>+</td>
</tr>
<tr>
<td>Townsend et al.</td>
<td>2001</td>
<td>JN</td>
<td>4507</td>
<td>All US</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>386</td>
<td>On food stamps</td>
<td>+</td>
</tr>
<tr>
<td>Nelson, Harrison et al.</td>
<td>2001</td>
<td></td>
<td>1503</td>
<td>Diabetic adults</td>
<td>+</td>
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<tr>
<td>Adams et al.</td>
<td>2003</td>
<td>JN</td>
<td>8169</td>
<td>All California</td>
<td>+</td>
</tr>
<tr>
<td>Kaiser, Townsend, Crawford et al.</td>
<td>2004</td>
<td>AJCN</td>
<td>561</td>
<td>Low-income Latinas</td>
<td>+</td>
</tr>
<tr>
<td>Basiotis &amp; Lino</td>
<td>2003</td>
<td></td>
<td></td>
<td>All US</td>
<td>+</td>
</tr>
<tr>
<td>Wilde &amp; Peterman</td>
<td>2006</td>
<td></td>
<td></td>
<td>All US</td>
<td>+</td>
</tr>
</tbody>
</table>
Overweight by food insecurity in US Women

Townsend et al. 2001

N = 4507
CSFII 1994-96
P < 0.001
BMI > 27.3 kg/m²

In model with age, sex, ethnicity, region, urban/rural status, income, education, % fat, % saturated fat, total energy exercise, TV time, relationship was significant.
Overweight by food insecurity in food stamp recipients

BMI > 27.3 kg/m²

- none: 48%
- mild: 54%
- moderate: 69%

N = 461 women, p < 0.0001

In model with age, sex, ethnicity, region, urban/rural status, income, education, % fat, % saturated fat, total energy exercise, TV time, relationship was significant.
Does food insecurity contribute to obesity in women?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Cross-sectional</td>
<td>Many</td>
</tr>
<tr>
<td>Strength relationship</td>
<td>Yes</td>
</tr>
<tr>
<td>Randomized controlled trial</td>
<td>Never</td>
</tr>
<tr>
<td>Mechanism</td>
<td>One</td>
</tr>
<tr>
<td>Temporal relationship via longitudinal &amp; retrospective studies</td>
<td>One</td>
</tr>
<tr>
<td>Animal model</td>
<td>One</td>
</tr>
</tbody>
</table>
Examined food security status and weight gain over 1 year. Food insecure women more likely obese (OR 1.8). Marginally secure more likely to gain 10 lb.

NHANES 1999-2000; measured hts. wts.; self-reported weight history retrospectively.

Wilde & Peterman, Weight change associated with food security, 2006
Animal model UCD

- Animal model: food insecurity and obesity with female Zucker rats.
- H₀: food insecurity, brought on by intermittent and random access to highly palatable food, would lead binge eating behavior leading to gradual weight gain and fat gain.
- During a pre-study, Fritos corn chips the preferred food.
- Mature female rats (n=13) were matched for body weight and divided into 2 groups.
- Results: Food insecure rats--aggressive behavior, hoarding, changes in sleep patterns. Change in body weight and % body fat for the food insecure animals marginally > (p=.10) (n=6).
- Results support pursuing this approach as a food insecurity/obesity model in female obese rats.

Townsend MS, Keim N, Stern JS. Food Insecurity and Obesity: A Pilot Study with Female Inbred Zucker Rats. FASEB J 2006; 20:649.
Hypothesis: Food Stamp Cycle

• When $ & food stamps are not available at the end of month, overeating occurs at the beginning of month when $ & stamps are replenished.

• Abundant food supplies available the first 3 weeks of month, followed by a week without food stamps or money when food selection is limited.

• Then, when money and food stamps are restored, the cycle repeats.
Hypothesis: Food Stamp Cycle

- Feast and famine. Chronic ups and downs in food availability can cause overeating when food is available.

- Overeating of highly palatable and rich foods (sugars & fats) at beginning of month.

- Synchronize with food stamp distribution.

- A pattern leading to gradual weight gain over time.
Human Deprivation studies support this $H_0$


Maybe a **Food Insecure** state is natural

Then
Throughout human evolution until the recent development of agriculture, people were *food insecure with severe hunger* by today’s definition. They frequently experienced hunger for the entire day. Hunger is a mechanism to ensure we eat when we find food and that we eat as much as we can (binge).

Now
Perhaps we should consider weight gain by the food insecure women as a *normal* process. After all, if people are hard wired to eat as much as they can when food is plentiful compared to times of relative scarcity, then we should expect this weight gain to occur in our food rich country.

*Source: The Economist, Dec. 2003*
What is the largest food intervention in the US? in the world?
Using national sample from CSFII, 29% of women have low household incomes (<185% of poverty).

- 22% of women report food insecurity.
- 9% receive food stamps.
- Among those on food stamps, about half are food insecure.
- Many low-income women, with and without food stamps, do not report food insecurity.
- Therefore, low-income/poverty ≠ food insecurity.

Low-income defined as 185% FPL.

Eligibility FSP is usually 130% FPL.
Food stamps & obesity in women

• Is the FSP contributing to obesity problem? Is the FSP causing obesity?

• 3 papers with women (large data sets):
  Townsend et al., 2001  XS  women  +
  Gibson, 2003           L   women  +
  Jones et al., 2006     L   women  +
Food stamps & obesity

- Obesity defined as BMI $\geq 30$ kg/m$^2$
- 1979 – 1996. >12,000.
- Current and long-term FSP participation variables.
- FSP participation sig related to obesity of low-income women. NS for men.
  - Current participation assoc with 9% incr in predicted probability of current obesity. Participation previous 5 years compared to no participation assoc w/ 20% incr in current obesity.
- Limitations: Self-report ht, wt unadjusted. Possible confounder food security.

Gibson, Diane. Food Stamp Program participation is positively related to obesity in low-income women. J Nutr 2003; 133:2225-2231.
Food stamps & obesity

Panel Study of Income Dynamics (PSID)
1999 & 2001. >5,000 families. 18-item FFS. Oversampling of some groups.
4 groups: persistently secure, became secure, became insecure, persistently insecure.
Lagged (control for baseline) and dynamic (control for baseline and changes) effects models.
Among persistently insecure, $2000 incr in food stamps assoc w/ increased wt change of >7kg (p < .05). NS other groups.
Limitations: Self-report ht, wt, wt change unadjusted.

Do food stamps contribute to obesity in women?

<table>
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<td>No</td>
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Food stamps & obesity

Proposed mechanisms for weight gain

• Increase purchase of & intake of food
  Each add’l FS$, .20 - .60 spent on food.
  Each add’l $, .05 - .13 spent on food.

• Types of foods more E dense w/ food stamps.

• Variation in food intake over month. Binging beginning of month.
Currently, purpose FSP - calories. Largest food intervention in US, world; $30,000,000.

Began during Depression as a pilot. Primary purpose: stabilize ag prices by distributing farm surplus.

2\textsuperscript{nd}ary purpose: nutrition (adding calories for the hungry). Food \textit{ingredients} used for meal prep at home.

Today, stated purpose is providing calories for the hungry. Remains an \textit{ag/kcal} intervention.
High & rising social and economic costs of obesity calls for policy action. Determining that action is not easy. Many political entities have a stake.

The US intervention with greatest opportunity for impacting child obesity is Food Stamp Program. The status quo is not good enough.

## Food stamps for health

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Existing/current</th>
<th>Proposed /Redesigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition purpose</td>
<td>Increased calories</td>
<td>Improved diet quality. Support US Dietary Guidelines (fruit, vegetables, foods low in saturated fat, high fiber foods)</td>
</tr>
<tr>
<td>Allowable foods</td>
<td>All food items sold in markets/food outlets participating in the FSP. No restrictions. Examples: energy-dense, low-nutrient foods such as potato chips, candy, donuts, etc.</td>
<td>The emphasis is on fresh fruits and vegetables, low fat dairy products, high-fiber (low sugar) cereals, and whole grain products--foods emphasized in the US Dietary Guidelines.</td>
</tr>
<tr>
<td>Allowable beverages</td>
<td>All non-alcoholic beverages including softdrinks, fruit punch, etc.</td>
<td>Only non-alcoholic beverages meeting a pre-determined nutrition standard. These would be beverages emphasized by the US Dietary Guidelines. Examples: nonfat, 1%, 2% milks; 100% orange juice.</td>
</tr>
</tbody>
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</thead>
<tbody>
<tr>
<td>Exclusions</td>
<td>Alcohol</td>
<td>Alcohol and energy-dense (high-fat or high-sugar) foods/beverages not meeting the US Dietary Guidelines. Examples excluded foods: soft drinks, cookies, cakes, candy, French fries.</td>
</tr>
<tr>
<td></td>
<td>Tobacco</td>
<td></td>
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<tr>
<td></td>
<td>Foods eaten in the store</td>
<td></td>
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<tr>
<td></td>
<td>Ready-to-eat hot meals</td>
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<td></td>
<td>Vitamin supplements</td>
<td></td>
</tr>
<tr>
<td>Proximal program goal</td>
<td>Support farmers, stabilize commodity prices</td>
<td>Improve diet quality of children</td>
</tr>
<tr>
<td></td>
<td>Provide calories to food insecure households</td>
<td></td>
</tr>
<tr>
<td>Distal program goal</td>
<td></td>
<td>Ultimately improve child health and reduce risk of obesity</td>
</tr>
</tbody>
</table>
Food stamps for health

- A redesign of Food Stamp Program could be considered an environmental intervention for low-income communities.
- Change original purpose (increase calories & support ag) to improving diet quality. A nutrition intervention, not an ag/kcal intervention.
- Pattern WIC with food inclusion list.
- New IOM report on WIC food packages /food inclusion lists. Do similar for FSP.

Food stamps for health

- Why children?
  
  50% of FS recipients are children.

  Greatest potential for impact on health.

Food stamps for health

• UC Davis and UW food cost study currently underway.
• Russet potato micro 69c x 6 = $4.14 (washed and individually wrapped for the microwave)
• Compare to a 5 lb. bag of russet potatoes @ $1.89 (Safeway online).
Food stamps for health

- Godiva ice cream, 3 pints, $15.
- Soda, candy, chips on most purchases.
- With original FSP legislation, no Godiva, soda, candy, or chips.
Food stamps for health

• FSP: the land of unintended consequences. Never planned, but evolved.
• FSP supports the soda industry and energy dense, processed foods. Today too much at stake—difficult to change.
• Dietitians say “No bad foods. All foods have a place in the diet.”
Jetter & Cassady, 2006

- Standard Thrifty Food Plan vs. healthier basket of foods.
- WW bread, lean beef, skinless chicken.
- Sacramento & Los Angeles
  - 4 small markets
  - 19 chain supermarkets
  - 5 bulk supermarkets
- 3 neighborhood types by income: 30-34K, 42-46K, 57-64K

- Healthier basket cost 18% more.
- Low availability for many foods in healthier basket.
Food stamps for health

If access to healthy foods is a problem, how can we persuade …

• food manufacturers to produce healthier foods?
• retailers to stock healthier foods given their shorter shelf life?

Remember, expenditures for the FSP = $30,000,000 annually. Politically, that is worth power for change in the US food supply in low-income communities.
Food stamps for health

How would food stamp recipients benefit?

• Food manufacturers would step up to the table to produce the foods meeting US Dietary Guidelines.
  
  e.g. white whole wheat flour, ¼ cup contains 3 gm fiber.

• Retailers would be willing and anxious to sell foods on the inclusion list.

Why would manufacturers and retailers respond?
Food stamps for health

How would food stamp recipients be harmed?

• Some might say that a healthier food supply would not be preferred.
• Complaints of paternalism.
# Food stamps for health

## Table 7  
*Sample of possible guidelines for food inclusion list for a redesigned FSP*

<table>
<thead>
<tr>
<th>Food type</th>
<th>Examples</th>
<th>Sample nutrition guidelines</th>
</tr>
</thead>
</table>
| **FRUIT** | • All fresh fruit  
• All canned fruit with only water added.  
• Frozen fruit with no sugar added.  
• Dried fruit with no sugar added.  
• 100% juice. | Juice products to be 100% juice, low sodium ($\leq 70$ mg sodium per 4 oz. serving), and contain no added fat, sugar or other sweetener. |
| Grains | Wholegrain products  
• bread, muffins, bagels  
• flours  
• rice  
• pasta  
• hot & cold cereals | Grain products to contain $\geq 3$ gm fiber per serving. |

*Adapted from National Fruit & Vegetable Program Guidebook, January 2007, pp7-8.*
# Food stamps for health

## Table 7  
Sample of possible guidelines for food inclusion list for a redesigned FSP*

<table>
<thead>
<tr>
<th>Food type</th>
<th>Examples</th>
<th>Sample nutrition guidelines</th>
</tr>
</thead>
</table>
| Fats               | Each serving of food product must contain limited amounts of total fat, saturated fat and trans fat. | • Total fat ≤35% of calories.  
• Saturated fat ≤10% of calories.  
• Trans fat ≤0.5g per serving.  
• Fat found naturally in fruits and vegetables does not contribute to the limits above. |
| Sugars and sweeteners | Each serving of food product must contain limited amounts of added sugars or caloric sweeteners. | • Added sugars cannot exceed 15% of total calories.  
• Concentrated fruit juice sweeteners, jams, jellies count as added sugars. |

*Adapted from National Fruit & Vegetable Program Guidebook, January 2007, pp7-8.
Food stamps for health

Harness the power of $30,000,000 /year to improve access to healthier foods for children in low-income communities and potentially impact child obesity.