Workshop on Understanding the Relationship Between Food Insecurity and Obesity Sentinel Populations
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Rural Populations

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Definitions of Rural

- **Rural** – open country and settlements with fewer than 2,500 residents
  - US Census Bureau
  - 21% of US population rural in 2000

- **Non-metropolitan** – counties outside the boundaries of metro areas
  - **Metro** – central counties with 1 or more urbanized areas and outlying counties tied to core counties by commuting
  - Office of Management and Budget (OMB)
  - 17% of US population lives in non-metropolitan counties in 2003

- Both made some definition changes in 2003
Nonmetropolitan and metropolitan counties, 2003

Source: Prepared by ERS using data from the Census Bureau.
Characteristics of Non-metropolitan Counties

- Low population density
  - Fewer services and lower quality services
  - Long travel distances to services

- Population has a different socio-demographic composition than urban areas
  - Older population and a higher proportion of persons with disabilities
    - Residents more likely to rate health as poor
  - Lower proportion of residents with a 4-year college degree
    - 15.5% in non-metro vs. 26.6% in metro counties in 2000

- Under and unemployment is common
  - Farming is not the primary occupation of rural residents
    - Nonfarm employment accounts for 61 percent of total income.
  - Earnings per job are 69% of metro earning per job.

- Higher poverty rates than non-metro counties
Poverty rates by residence, 1959-2009
Nonmetro poverty has been higher than metro in every year since 1959

Food Insecurity and Obesity in Non-metro Counties

- **Food Insecurity in 2009**
  - 14.8% of metro households experienced low or very low food security
  - 14.2% of non-metro households experienced low or very low food security
  - Among households with children
    - Metro = 21.4%
    - Non-metro = 20.5%

- **Adult Obesity in 2000-2001**
  - Urban = 20.5% (95% CI 20.2-20.7%)
  - Rural = 23% (95% CI 22.6-23.4%)

- **Adolescent Overweight (BMI≥95th percentile) in 2003**
  - Urban = 14.3%
  - Rural = 16.5%


1 Jackson JE et al. J Rural Health 21(2):140-148, 2005

Relationships between Food Insecurity and Obesity in Rural Adults
Relationship between Food Insecurity and Obesity in Adults

- Numerous cross-sectional studies find a positive association in women, but not in men.
- Few studies have explored (in-depth) any mediating mechanisms.
- Suspected mediators:
  - Over consumption of energy-dense, low-nutrient foods
  - Decreased consumption of fruits and vegetables and associated nutrients
  - Disrupted eating patterns
Eating Patterns of Rural Mothers in Food Insecure Households (N = 28 women followed for 3 y)

- Adults restrain their eating and divert food to children.
  - “I don’t like to waste food, so sometimes I’ll find myself eating what the kids left over on their plates … when things are low you don’t think about sitting down and having that complete meal …” Eliza

- Adults eat little on some days with large meals on subsequent days.
  - “I go hungry for like two days and then I’ll eat …’Cause I normally don’t eat, I let the kids eat, and then I go for two days without eating and then when I do eat, it’s big meals that I eat.” Therica

- Adults consume sugar-sweetened beverages to cope with eating little solid food.
  - Sodas and coffee with 2 sugars and cream

Eating Patterns of Rural Mothers in Food Insecure Households (N = 28 women followed for 3 y)

- When food becomes available, adults increased their consumption of preferred foods that had been missed.
  - “Well, like last night I was just walking around the kitchen like it was Christmastime because there was, we had cookies. And I took 3 and finally had to put the bag away ’cause I think I could’ve eaten half a bag of cookies, because it had been so long.” Bevin

- Emotional eating in response to stress, including food insecurity, was common. Described as bingeing.
  - 74% of overweight and obese reported doing so
  - 44% or normal weight women reported doing so
  - One underweight woman reported the opposite reaction to stress.

Bove CF, Olson CM. Women & Health 44(1):57-78, 2006
## Odds of Obesity, Food Insecurity, Becoming Food Insecure and Major Weight Gain at 2 Years Postpartum (Adjusted)  N = 303

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Obese at 2 y</th>
<th>FI at 2 y</th>
<th>Became FI @ 2 y</th>
<th>Major Weight Gain&lt;sup&gt;1&lt;/sup&gt;</th>
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</thead>
<tbody>
<tr>
<td>IF @ Early Pregnancy</td>
<td>1.97</td>
<td>4.57</td>
<td>Omitted</td>
<td>1.19 (0.47-2.96)</td>
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<td>(0.44-8.86)</td>
<td>(2.16-9.65)</td>
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<tr>
<td>Obese @ Early Pregnancy</td>
<td>515.7</td>
<td>2.45</td>
<td>2.56 (1.14-5.78)</td>
<td>1.61 (0.77-3.36)</td>
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<tr>
<td></td>
<td>(118.8-&gt;999)</td>
<td>(1.21-4.95)</td>
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<td></td>
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<tr>
<td>Obese + IF @ Early Pregnancy</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>7.26 (1.28-41.15)</td>
</tr>
</tbody>
</table>

Model adjusted for GWG, Income, Marital status, Age, Parity, and Education

<sup>1</sup> Major weight gain is 4.55 kg or 10 pounds

The Long-Term Effects of Growing up Poor

% Overweight or Obese as Adults

Childhood food insecurity influenced adult eating patterns

- Motivated some to avoid food insecurity in adulthood.
- Influenced adult food preferences and eating patterns.
- Overeating became a generalized response to negative emotions.
  - Among those for whom food met emotional needs as children.

Dynamics of Food Insecurity in Rural Populations

- Hard to lose weight and keep it off, so weight does not change much.

- How easy is to move out of food insecurity?
  - Food insecurity is fairly persistent among low income families in rural areas.
  - 61.6% with low/very low food security remained so one year later.

- What factors constrain or support leaving food insecurity?
  - Constrain Leaving
    - 3 or more chronic health conditions
    - Depressive symptoms (> 16 on CES-D)
  - Support Leaving
    - Education > high school
    - 2 years of employment

Hanson K, Olson C. Paper in preparation.
Summary and Conclusions

- A life history of poverty and food insecurity make it challenging to achieve food security and a healthy body weight in adulthood.
- Common coping strategies for dealing with family food insecurity as adults likely increase obesity risk for women.
- Mental health of rural women is a central element in addressing both food insecurity and obesity in rural areas.
- Lack of quality health care services and health promotion programs are barriers to fixing the problems of food insecurity and obesity.
- Characteristics of the rural environment may support the persistence of food insecurity for poor rural families.
Research Needs and Gaps

- Identifying the mediators and moderators of the established positive association between food insecurity and obesity in adult women.
- Clarification of the direction of any potential causal relationship between food insecurity and obesity and the proportion of the variance in each outcome explained by the other variable.
- Increased understanding of the role of life history of poverty and food insecurity on body weight.
- Better understanding of the dynamics of food insecurity.