



# PHYSICAL AND MENTAL HEALTH CONSEQUENCES OF FOOD INSECURITY



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Workshop: Food insecurity: Assessing Disparities,  
consequences, and policies

# Definitions

Food insecurity: "...whenever the availability of nutritionally adequate and safe foods or the ability to acquire foods in socially acceptable way is limited or uncertain.."

Hunger: The uneasy or painful sensation caused by a lack of food. The recurrent and involuntary lack of access to food.

<http://www.ers.usda.gov/briefing/foodsecurity/surveytools.htm>

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Food insecurity and hunger are global issues



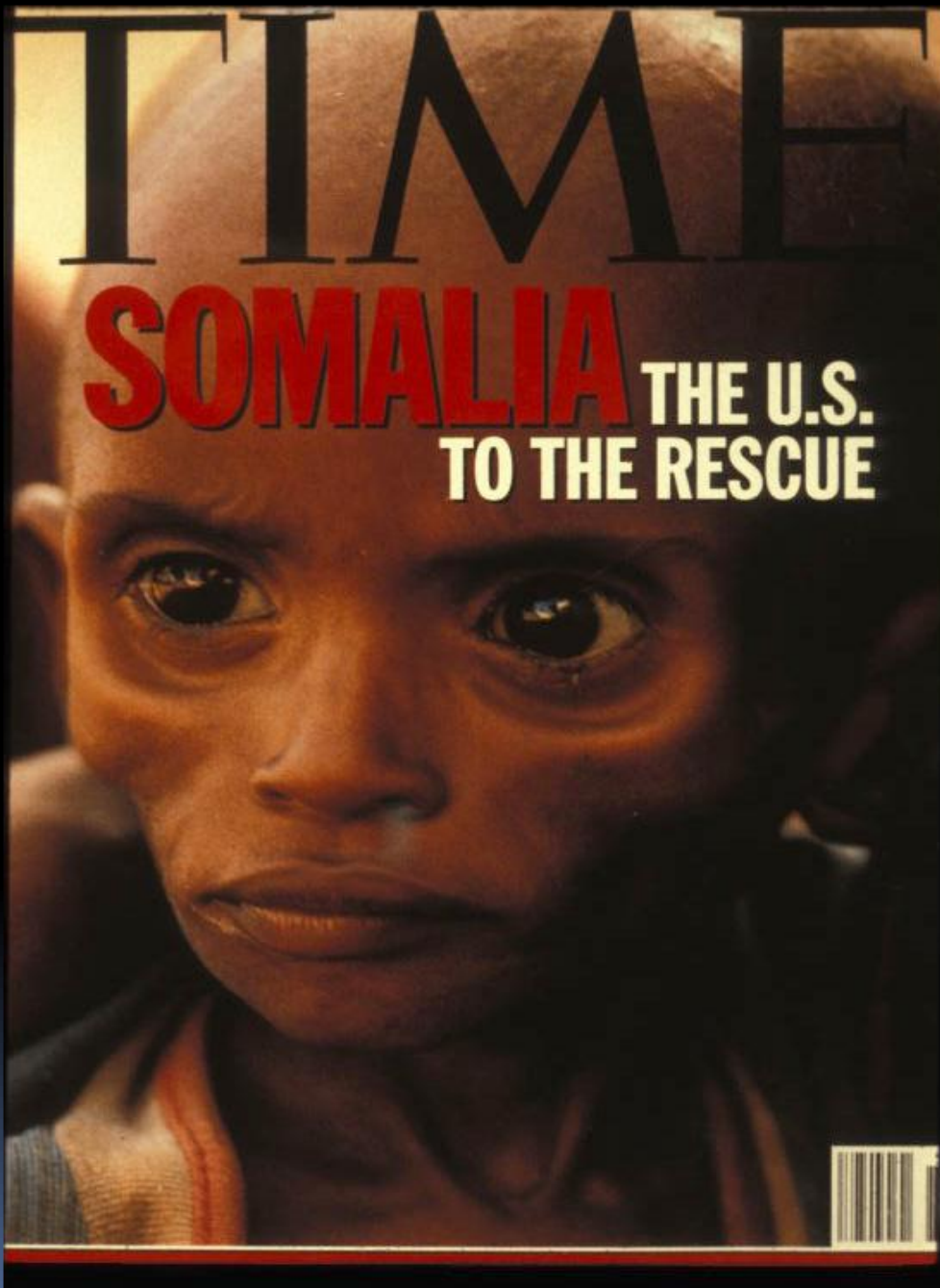


# In developing countries, food insecurity is generally associated with:

- Under-nutrition:
  - Kwashiorkor: protein deficiency
  - Marasmus: calorie deficiency



But in the last 2 decades, obesity has become more common





But in America, this is the face of food insecurity:



# Veterans:

- It is estimated that 130,000 to 200,000 veterans are homeless on any given night (this is about 20-25% of the homeless male population...placing them at risk for being food insecure)
- Obesity: 69 % of veterans are overweight or obese (Wang et al., 2005)
- Obesity: Mean BMI for our sample was  $30.5 \pm 6.7$  kg/m<sup>2</sup> (Smith et al., 2009)
- Only 12.5% of participants were classified as normal weight, while 37.5% were overweight, 46.9% were obese, and 3.1% were classified as excessively obese (Smith et al., 2009).
- Military changes eating behavior by forcing troops to eat fast boot camp, overeat at times, and endure food insecurity (Smith et al., 2009).



Hunger-obesity paradigm...the  
major physical problem among  
American's food insecure





# Obesity in the US

- 145 million American adults are overweight ( $BMI \geq 25 < 30$ ) or obese ( $BMI \geq 30$ )
- 78 million American adults are obese ( $BMI \geq 30$ )
- 6 million American adults are severely obese ( $BMI \geq 40$ )
- 12.5 million children/adolescents are obese ( $\geq 95^{\text{th}}$  percentile)

# Overweight/obesity in America

- Excess weight is greater in minority groups
- 77% Black women have BMI<sub>≥</sub>25
- 72% Mexican American women have BMI<sub>≥</sub>25
- 75% Mexican American men have BMI<sub>≥</sub>25
- 76% Native American women have BMI<sub>≥</sub>25<sup>a</sup>
- 57% White women have BMI<sub>≥</sub>25
- 61% Black men have BMI<sub>≥</sub>25
- 67% White men have BMI<sub>≥</sub>25

CDC, 2008;  
<sup>a</sup>Dammann & Smith,  
2010

# Eating/purchasing behavior among low-income urban women (n=445)

- Homelessness reduced the odds of purchasing most food group, and bought less fruits, veggies, lean meats and fish than home-based families
- Rates of less healthy food group purchases were higher compared to healthy food purchases
- Racial differences existed in types of meats purchased (African Americans preferred poultry, then fish; Native Americans preferred beef, then fish...all groups reported liking meat/fish

Dammann and Smith, 2009;2010)

# Survey with low-income women (n=448)

## Favorite Food Groups

1. Meat, poultry, fish, and eggs
2. Fruits
3. Cereal, bakery, bread, rice, pasta
4. Vegetables
5. Dairy products
6. Kool-Aid, juice, fruit punch, lemonade
7. Salty snacks
8. Pop
9. Sweets
10. Fats



## Food group women would buy more of if they had extra food dollars

1. Poultry
2. Vegetables
3. Fruit
4. Ground beef/  
pork
5. Dairy
6. Eggs
7. Sweet snack cakes
8. Kool-aid
9. Soda Pop
10. White bread
11. Chips/other salty snacks



# Homeless Children

- 45% of boys; 50% of girls had BMIs > 85<sup>th</sup> percentile.
- Diets of homeless children were found to be high in fat and inadequate in calcium, vitamin D, and potassium.
- Most consumed less than the Estimated Average Requirements (EARs) for vitamins A, C, & E, phosphorus, folate, and zinc. Inadequate intakes of fruit, veggies, dairy
- Homeless children reported headaches, stomachaches, constipation, and dental problems.
- 55% reported not having enough food in their home
- 25% reported going to bed hungry at night.
- Children reported overeating, eating disliked foods, & eating at friends houses as strategies to cope with getting food
- (Smith and Richards, 2008; Richards and Smith, 2007)



# Among low-income children

- Pediatric obesity is common
- Strategies such as overeating protect children from feeling hungry but may contribute to their obesity
- Lack of dental care
- Among Hmong children we found 8% of the youth had hypertension and it was associated with obesity

Smith and Richards, 2008;  
Richards and Smith, 2006;  
Smith and Franzen-Castle, 2012

# Environment

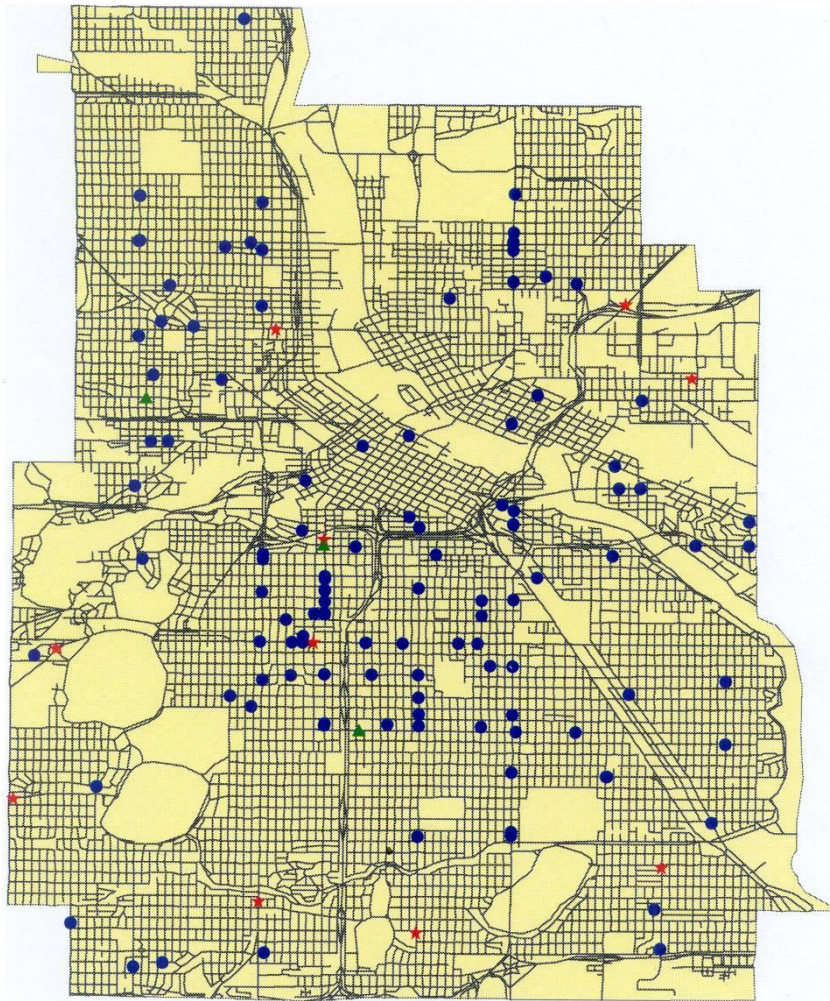
- Low-income populations have greater exposure to less healthy, energy-dense foods (Casey et al, 2001; Drewnowski, 2004; Henderickson et al, 2006; Siega-Riz & Popkin, 2001; Morton and Smith, 2008; Richards and Smith, 2006, 2007; Giskes et al, 2011)
- Low-income populations may have less access to healthy foods (Henderickson et al, 2006; Richards and Smith, 2006)
- Less healthy foods are cheaper and more affordable (Drewnowski, 2004; Henderickson et al., 2006; Richards and Smith, 2006)

# FOOD DESERTS...CREATE PROBLEMS WITH FOOD ACCESS...BOTH URBAN AND RURAL AREAS



Smith and Miller, 2011; Smith et. al., 2010; Dammann and Smith, 2010; Smith and Morton, 2009; Richards and Smith, 2006 ; Henderickson, Smith, and Eikenberry, 2006; Morton and Smith, 2008; Eikenberry and Smith, 2005; Eikenberry and Smith, 2004







Eikenberry and Smith,  
2005; Henderickson and  
Smith, 2006

- ★ Large Grocery Stores
- Small Grocery Stores
- ▲ Food Shelf
- City Streets
- Minneapolis

## Food Access in Minneapolis



We need to remember that these low-income environments contain a population of people of varying sizes...lean, normal weight, overweight, and obese...




So why are some low-income, food insecure women lean/normal weight and others overweight/obese even though they live in the same neighborhoods?????





To answer this, we conducted focus groups with lean/normal weight women and overweight and obese women

- 83 participants; 58% were African American
  - Differences in personal and behavioral factors were apparent
  - Overweight/obese women were more inclined to overeat, stash food, and be emotional eaters.
  - Lean/normal weight women communicated more nutrition knowledge and exercised more
  - Both groups were food insecure, living in same low-income environments (Dressler & Smith, in press-Am J Health Promotion)
  - Overweight and obese women were most influenced by cost of food and buy what is cheap (Dressler & Smith, under review)
  - Overweight and obese women have greater “liking” of all food groups (Dressler & Smith, under review).
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# Food Liking\* Ratings

Food	L/N	Ow/Ob	<i>p</i> - value
Unsalted butter	82	107	.032
Salted butter	82	109	.021
Healthy spread	84	110	.027
Spreadable fats category	84	106	.033
Whole wheat bread	102	128	.008
"Brown" bread	103	127	.019
Bread category	102	123	.005
Baked chips	93	118	.006
Trail mix	95	121	.027
Real turkey	115	139	.005
Healthy	102	111	.014
Unhealthy	104	115	.024

\*Values are mean LAM scale liking responses in millimeters


## Surveys (n=330 low-income women)

- Using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff)...  
depression symptoms for past 7 days as measured through 20 questions
- We found women with highest depression scores also had high food insecurity scores
- Depression was not associated with BMI
- Both lean/normal and overweight/obese women consumed less than the recommended MyPlate servings for fruits, vegetables and dairy



# So can we change eating behavior?? We think we can...

- In short-term intervention, we found that we can move women from feeling financially defeated to being budget savvy (Rustad and Smith, 2012)
  - We also found that short-term, 3 one hour sessions of education, improved nutrition knowledge (Rustad and Smith, under review)
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- Furthermore, we found increased knowledge to be associated with behavior change. For instance: Teaching about vegetable intake with a cooking demo, resulted in improved vegetable intake; Teaching about herbs and spices, how to grow and how to use, resulted in reduced salt intake and increased herb/spice intake....(Rustad and Smith, under review)...may need to be activity based.



## What we've learned over time:

- ◎ Poor dietary habits and food poor environments can lead to poor nutritional status
- ◎ Limited access to affordable, healthy food choices can lead to overeating and obesity
- ◎ A history of food deprivation can lead to overeating and obesity
- ◎ Current hunger can lead to overeating when tasty food is available
- ◎ Children have a difficult time concentrating in school, when they are food insecure

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# Selected References<sup>(21/60)</sup>

1. Damman KW, **Smith C**. Food-related Environmental, Behavioral, and Personal Factors Associated with Body Mass Index among Urban, Low-income, African American, American Indian, and Caucasian Women. *Am J Health Promotion*, 2011;25(6):e1-10.
2. Dammann KW, **Smith C**. Food-related attitudes and behaviors at home, school, and restaurants: Perspectives from urban, multi-ethnic, low-income children in Minnesota. *J Nutr Ed Behav*, 2010; Nov/Dec issue: in press.
3. Richards R, **Smith C**. Investigation of the hunger-obesity paradigm among shelter-based homeless women living in Minnesota. *J Hunger Environmental Nutrition*, 2010, 5(3):339-359.
4. Dammann KW, **Smith C**. Race, homelessness, and other environmental factors associated with the food purchasing behavior of low-income women in Minnesota. *J Am Diet Assoc*, 2010;110(9):1351-1356.
5. Dammann KW, **Smith C**, Richards R. Low-income, racially diverse mothers' perceptions of their 9-13 year-old children's weight status, diet, and health. *Maternal Child Health Journal*, 2011, 15(1):106-114.
6. **Smith C**, Butterfass J, Rickelle R. Environment influences food access and resulting shopping and dietary behaviors among homeless Minnesotans. *Ag and Human Values*, 2010, 27(2):141-161.
7. Wiig K, **Smith C**. The art of grocery shopping on a food stamp budget: Factors influencing the food choices of low-income women as they try to make ends meet. *Pub Health Nutrition*, 2009, 12 (10):1726-1734.
8. Dammann K, **Smith C**. Factors affecting low-income women's food choices and the perceived impact of dietary intake and socioeconomic status on their health and weight. *J Nutr Edu Behav*. 2009, 41 (4):242-253.
9. **Smith C**, Klosterbuer A, Levine A. Military experience strongly influences post service eating behavior and BMI status in American veterans. *Appetite*. 2009, 52:280-289.
10. **Smith C**, Richards R. Dietary intake, overweight status, and perceptions of food insecurity among homeless Minnesotan youth. *Am J Hum Bio*. 2008, 20:550-563.
11. Richards R, **Smith C**. Environmental, parental, and personal influences on food choice, access, and overweight status among homeless children. *Soc Sci Med*. 2007;65:1572-83.
12. Henderickson D, **Smith C**, Eikenberry N. Low-income individuals face limited fruit and vegetable access in four Minnesotan communities designated as food deserts. *Ag and Human Values*. 2006; 23(3):371-383.
13. Richards R, **Smith C**. Shelter environment and placement in community affects lifestyle factors among homeless families in Minnesota. *Am J Health Promotion*, 2006; 21(1):36-44.
14. Eikenberry N, **Smith C**. Attitudes, beliefs and prevalence of dumpster diving as a means to obtain food by Midwestern, low-income, urban dwellers. *Ag and Hum Values*, 2005; 22(2): 187-202.
15. Harala K, **Smith C**, Hassel C, Galfus P. New Moccasins: Articulating Research Agendas through Interviews with Faculty and Staff at Native and Non-Native Academic Institutions. *J Nutr Ed Behav*, 2005; 37(2):67-76.
16. Eikenberry N, **Smith C**. Healthy eating: Perceptions, motivations, barriers, and promoters in low-income Minnesota communities. *J Am Diet Assoc*. 2004;104 (7):1158-1161.
17. Verpi H, **Smith C**, Reicks M. A qualitative study comparing the needs of food shelf/pantry clients with behaviors and attitudes of food donors. *J Nutr Ed Behav*, 2003; 35:6-16.
18. Lautenschlager L, **Smith C**. Beliefs, knowledge, and values held by inner-city youth about gardening, nutrition, and cooking. *Ag and Hum Values*. 2007;24 (2):245-258.
19. Franzen L, **Smith C**. Differences in Stature, BMI, and Dietary Practices between US born and Newly Immigrated Hmong Children. *Soc Sci Med*, 2009, 69:442-450.
20. Bell M, Wilbur L, **Smith C**. Nutritional status of persons using a local emergency food system program in middle America. *J Am Diet Assoc*, 1998;98 (9): 1031-1033.
21. Smith C, Miller H. Food Systems in Urban and Rural Minnesotan Communities. *J Nutr Edu Behav*, 2011;43:492-504.