

Hilary Seligman MD MAS

January 24, 2016

Lead Scientist and Senior Medical Advisor, Feeding America  
Associate Professor of Medicine and Epidemiology & Biostatistics,  
University of California San Francisco  
Director, Food Policy, Health, and Hunger Research Program,  
UCSF's Center for Vulnerable Populations at San Francisco General Hospital

## **Food Insecurity, Health, and Health Care**

### **Summary**

This paper summarizes research on the connections between food insecurity and health. Food insecurity experienced at any time across the lifespan has an adverse impact of health. This adverse impact is often apparent as a cycle of food insecurity, coping mechanisms to protect against the sensation of hunger, and chronic disease. A growing body of evidence suggests that the detrimental impact of food insecurity on health has important consequences for U.S. health care expenditures. These costs are borne substantially by Medicare and Medicaid. Over the long term, prevention of food insecurity is likely to be more cost-effective than treating the consequences of food insecurity.

### **Food Insecurity and Health Across the Lifespan**

Food insecurity is associated with poorer health outcomes across the lifespan, for both acute and chronic disease, and both physical and mental health. Some illustrative examples:

- *Children*—In addition to decreased intellectual and emotional development and poor academic performance, children living in food insecure households are at higher risk of poor physical and mental health. They are substantially more likely to be diagnosed with iron-deficiency anemia, asthma, mental health problems such as anxiety and depression, cognitive impairment, and behavioral disorders. They are also at higher risk of being hospitalized. These health problems, and the resulting time demands placed on caregivers, impact the ability of caregivers to maintain stable employment.
- *Pregnant women*—Among pregnant women, food insecurity is associated with iron deficiency anemia, depression, anxiety, and excess weight gain. Infants born to food insecure mothers are smaller, sicker, and have an increased risk of some birth defects.
- *Adults*—Food insecure adults are more likely to be diagnosed with diabetes, hypertension, and high blood pressure. They are also more likely to report mental health problems, including anxiety and depression, and poor general health. Seniors who are food insecure have a decreased capacity to maintain independence with aging.

A recent review article summarizes many of these studies.<sup>1</sup>

## **Coping Strategies Used in Response to Food Insecurity**

Individuals living in food insecure households engage a number of strategies in order to escape or prevent the physical sensation of hunger.<sup>2</sup> These coping strategies include:

- Shifting dietary intake toward very low-cost, highly-filling foods, which tend to have low nutrient content and increase risk for chronic disease. (During an episode of food inadequacy this dietary shift may be a rational economic decision necessary to meet daily caloric needs. See Adam Drewnowski's Issues Brief for more information.)
- Reducing dietary variety
- Skipping meals
- Putting off purchases of other essentials, including medications and personal hygiene supplies
- When a discrete episode of food inadequacy resolves, overeating or binge eating

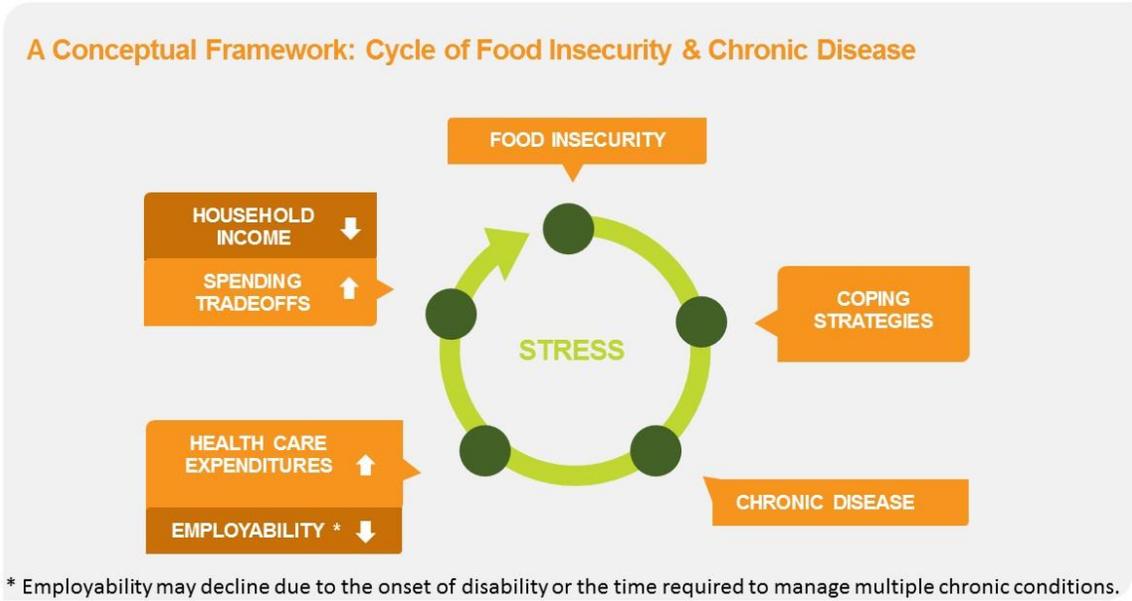
It is important to recognize that these coping strategies are adaptive in the short term. However, these same coping strategies can increase risk of chronic disease when sustained over the long-term.

## **Food Insecurity Is Often Chronic in the US**

Food insecurity coping strategies are often sustained for years or even decades for two reasons. First, the pattern of food insecurity in the US is often chronic. Although episodes of food inadequacy in a food insecure household are generally brief (for example, a few days at the end of the month), these episodes tend to recur frequently and over long periods of time.<sup>3</sup> Second, coping strategies which develop in response to an acute episode of food insecurity, once learned, may not resolve when the food insecurity resolves (for example, overeating during times of food availability and preferences for highly caloric foods).<sup>4</sup>

## **The Cycle of Food Insecurity and Chronic Disease Risk**

Chronic exposure to these coping strategies (such as reliance on inexpensive, energy-dense but nutrient-poor foods) puts individuals in food insecure households at higher risk of chronic disease and poor chronic disease management. Once individuals develop chronic disease, health care expenditures increase. In addition, the time required for managing chronic disease (including medical visits) and the high risk of disability decrease employability and ultimately economic potential. Both of these factors put further strain on food budgets, exacerbating food insecurity. This is the cycle of food insecurity and chronic disease, illustrated graphically below.



**Figure: The Cycle of Food Insecurity and Chronic Disease<sup>2</sup>**

**Hospitalizations Increase when Benefits Run Low and Food Budgets Decline**

Diabetes is an ideal model in which to investigate the relationship of food insecurity and health outcomes among adults because fluctuations in dietary intake are immediately translated into fluctuations in blood sugar levels. We examined these fluctuations to investigate the burden on the health care system when money for food is exhausted in a food insecure household at the end of the month (Text Box).

In an individual with diabetes, a constant dose of diabetes medication coupled with reduced dietary intake increases risk of low blood sugar, a condition termed “hypoglycemia”. Hypoglycemia is generally treated at home by eating simple or complex sugars. However, if food is not available or if the hypoglycemia is particularly severe or sustained over time, a visit to the health care provider’s office or the Emergency Department may be required. In the most severe circumstances, admission to the hospital may ensue. In the short term hypoglycemia can cause traumatic accidents and death, and in the long term it can reduce quality of life and increase risk for dementia among seniors.

**Food Insecurity Increases At the End of the Month**

Decades of economics research and the experiences of hunger safety net providers (food pantries, soup kitchens, etc.) demonstrate that the highest risk for an episode of food insecurity is at the end of the month. Grocery store purchases go down at the end of the month, and women in food insecure households reduce their dietary intake at the end of the month in response to the lack of food availability. Approximately two-thirds of food pantry clients receiving SNAP benefits report their benefits do not last for the full four weeks of the month.

We looked at hospital admissions for a primary diagnosis of hypoglycemia for all adults admitted to an accredited California hospital between the years 2000 and 2008.<sup>5</sup> We tracked each of those hospital admissions by the day of the month in which they occurred and noticed an interesting pattern:

1. For the population of all Californians, there was no discernable pattern between a hospital admission for hypoglycemia and the day of the month. Admissions for hypoglycemia stayed relatively stable every day of the month at approximately 210 hypoglycemia admissions for every 1,000,000 total admissions.
2. For Californians who lived in the 10% of zip codes with the lowest mean household income, the number of hospital admissions for a hypoglycemic episode rose from a baseline of 230 per 1,000,000 total admissions in the first week of the month, to 260 in the second week of the month, 280 in the third week of the month (a 22% increase in risk), and 290 in the fourth week of the month (a 27% increase in risk).

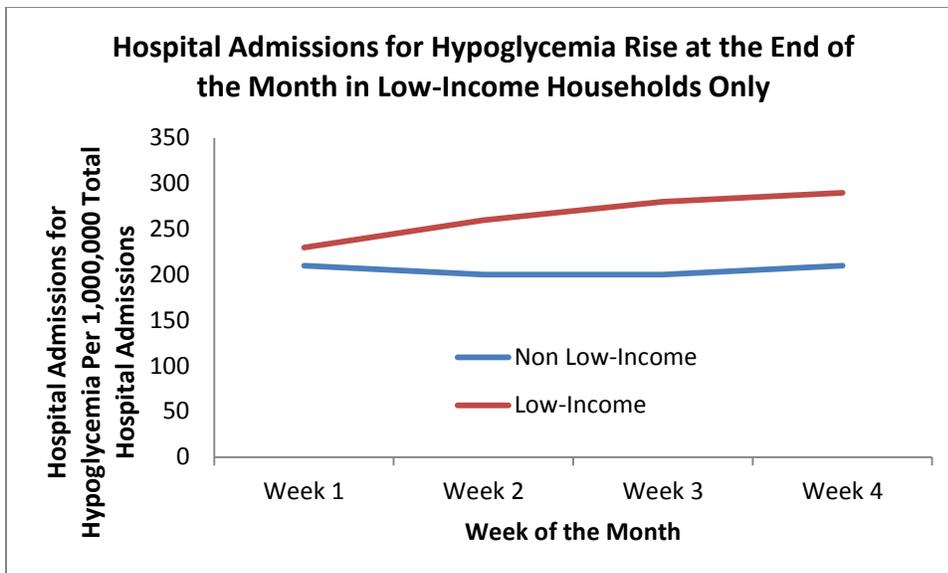
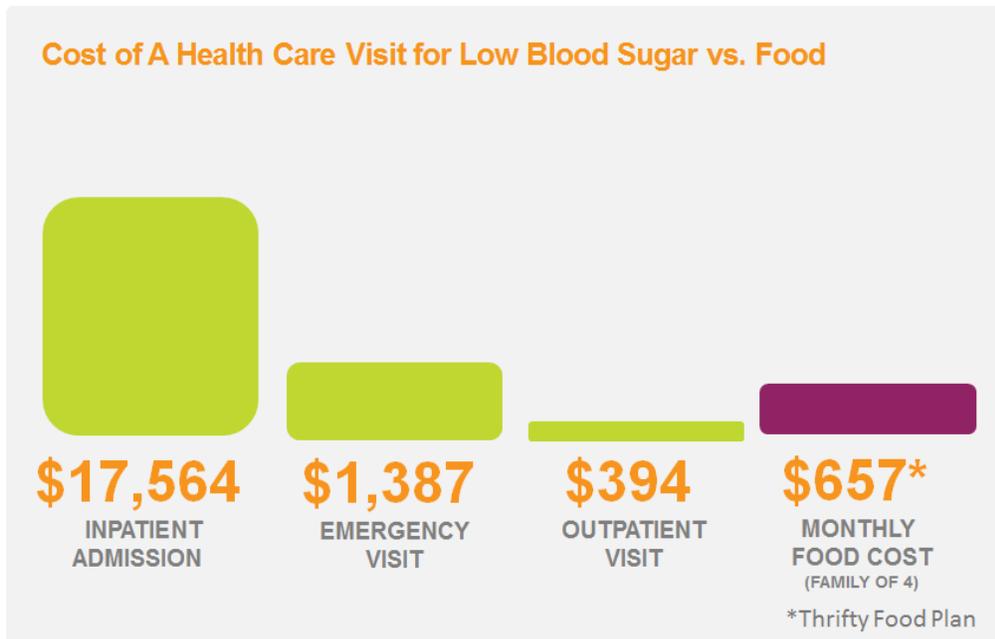


Figure: Data are from Seligman, et al. Health Affairs<sup>5</sup>

3. For other conditions that would not be expected to be related to fluctuating income availability, such as appendicitis, there was no pattern between the day of the month and hospital admissions in low-income populations or higher-income populations.

This study suggests that low-income households are at substantially higher risk of hypoglycemia at the end of the month when food budgets are exhausted, which results in inpatient hospitalizations. The difference in the cost of food and the cost of an inpatient hospitalization is substantial. According to one estimate:



**Figure:** Estimated direct medical costs of hypoglycemia requiring medical attention, compared to the price of food (estimated in 2011).<sup>6</sup>

### Frequency of Distribution of SNAP Benefits

Some policymakers have suggested increasing the frequency of distribution of SNAP benefits in order to allow households to more easily reach the end of the month without running out (for example, twice monthly rather than once monthly distribution). This potential solution deserves further study. However, such a solution will not be able to compensate for the inadequacy of SNAP benefits in many households. It may also make more challenging a typical shopping pattern seen in many low-income households (particularly rural ones) where a single monthly trip to a distant, inexpensive store (generally a big-box store) is made to cheaply stock up on staple food items.

### Food Insecurity and Health Care Costs

It is important to recognize that we examined cases of hypoglycemia as an illustrative example because it offers the tightest connection between food access and the need for immediate medical care. There are numerous other medical conditions that also are exacerbated by food insecurity that likely increase medical costs. Although it is clear that food insecurity is associated with high risk of medical illness and therefore makes sense that it would increase health care costs, data documenting this association and its magnitude are still limited (although a number of studies are in progress).

Recently, a study examining medical costs associated with food insecurity was conducted in Canada.<sup>7</sup> While the data may not be perfectly applicable to the US, it is important because all residents of Canada are insured. Therefore any differences observed in medical costs between food insecure and food secure populations are not related to the increased likelihood that food insecure households are

uninsured, but more likely to the food insecurity itself. The authors found that, compared to food secure households, odds of health care expenditures are 13% greater in marginally food insecure households, 33% greater in moderately food insecure households, and 71% greater in severely food insecure households after holding other socioeconomic factors constant. These increases were even more pronounced when the costs of medications were included (23% greater in marginally food insecure households, 49% greater in marginally food insecure households, and 121% higher in severely food insecure households). Adjusted annual costs (in Canadian dollars) are shown below:

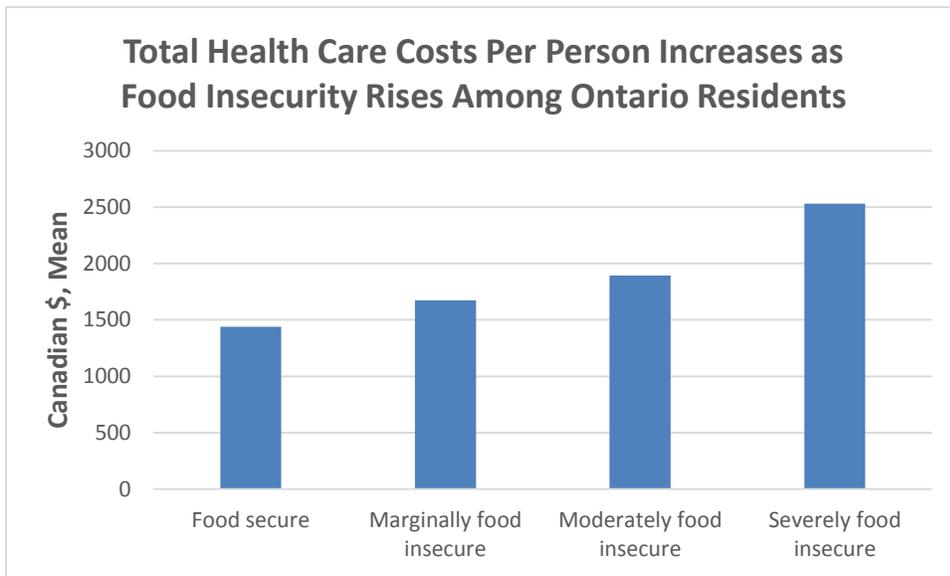


Figure: Data are from Tarasuk, CMAJ, 2015.<sup>7</sup>

## Conclusions

Food insecurity in the US has important consequences not only for health but also for health care expenditures. The costs of these health care expenditures are borne substantially by Medicare and Medicaid. Over the long-term, prevention of food insecurity, particularly among children who have many years of life ahead of them, is likely to cost less than treating the health consequences of food insecurity.

## Articles Referenced

1. Craig Gundersen and James P. Ziliak. Food Insecurity and Health Outcomes. *Health Affairs*. 2015; 34(11): 1830-1839.
2. Hilary K. Seligman and Dean Schillinger. Hunger and Socioeconomic Disparities in Chronic Disease. *New England Journal of Medicine*. 2010; 363(1): 6.
3. Alisha Coleman-Jensen, Matthew P. Rabbitt, Christian Gregory, and Anita Singh. Household Food Security in the United States in 2014, ERR-194, U.S. Department of Agriculture, Economic Research Service, September 2015.
4. Christine M. Olson, Caron F. Bove, and Emily O. Miller. Growing Up Poor: Long-Term Implications for Eating Patterns and Body Weight. *Appetite*. 2007; 49(1): 198.
5. Hilary K. Seligman, Ann F. Bolger, David Guzman, Andrea Lopez, and Kirsten Bibbins-Domingo. Exhaustion of Food Budgets At Month's End and Hospital Admissions for Hypoglycemia. *Health Affairs*. 2014; 33(1): 116-123.
6. Medical cost estimates are from Brian J. Quilliam, Jason C. Simeone, A. Burak Ozbay, and Stephen J. Kogut. The incidence and costs of Hypoglycemia in Type 2 Diabetes. 2011;17(10):673-680.
7. Valerie Tarasuk, Joyce Cheng, Claire de Oliveira, Naomi Dachner, Craig Gundersen, and Paul Kurdyak. Association Between Household Food Insecurity and Annual Health Care Costs. *CMAJ: Canadian Medical Association Journal*. 2015; 187(14):E429.

**For further information, please contact Hilary Seligman at [hilary.seligman@ucsf.edu](mailto:hilary.seligman@ucsf.edu).**