



# THE HEALTH CONSEQUENCES OF SENIOR HUNGER IN THE UNITED STATES: Evidence from the 1999-2014 NHANES

Professor James P. Zilak  
*University of Kentucky*

Professor Craig Gundersen  
*University of Illinois*

AUGUST 2017



NATIONAL  
FOUNDATION  
TO END  
SENIOR  
HUNGER

---

# **The Health Consequences of Senior Hunger in the United States: Evidence from the 1999-2014 NHANES**

---

Prepared for Feeding America and the National Foundation to End Senior Hunger

August 16, 2017

Professor Craig Gundersen  
University of Illinois

Professor James P. Ziliak  
University of Kentucky

## **ACKNOWLEDGEMENTS**

This report was made possible by a generous grant from Feeding America. The conclusions and opinions expressed herein are our own and do not necessarily represent the views of any sponsoring agency.

## Executive Summary

Millions of seniors are food insecure in the United States, meaning that scores do not have access to enough food at all times for an active, healthy life. In this report we examine the health consequences of food insecurity among seniors. The report updates our earlier studies on this issue by examining how trends in health and nutrition outcomes among food secure and food insecure seniors have changed over the past decade before and after the Great Recession. Using data from the 1999-2014 National Health and Nutrition Examination Survey we considered the following outcomes related to nutrient intakes: energy intake, protein, vitamin A, vitamin C, thiamin, riboflavin, vitamin B6, calcium, phosphorous, magnesium, and iron. The set of health outcomes we analyzed were diabetes, general health, depression, diabetes, ADL limitations, high blood pressure, high cholesterol, congestive heart failure, coronary heart disease, cancer, reports of chest pain, gum disease, psoriasis, asthma, having had a heart attack, and a self-report of gum health. Here we summarize some of our principal findings.

*Food insecure seniors have lower nutrient intakes.* For each of the eleven nutrients, average intakes are statistically significantly lower by between 9 and 26 percent for food insecure seniors in comparison to food secure seniors. After controlling for other confounding factors, the effect of food insecurity is still negative for each of the nutrients albeit in some of the cases, the effect is statistically insignificant. These differences in nutrient intakes held across time as well.

*Food insecure seniors have worse health outcomes.* For a wide array of health outcomes, food insecure seniors are worse-off than food secure seniors. Namely, they are 65 percent more likely to be diabetic, twice as likely to report fair or poor general health, 2.3 times more likely to suffer from depression, over 30 percent more likely to report at least one ADL limitation, 19 percent more likely to have high blood pressure, 57 percent more likely to have congestive heart failure, 66 more likely to have experienced a heart attack, twice as likely to report having gum disease, and 91 percent more likely to have asthma. These differences were present in both the aggregate and for each four-year time period we examined. And, with the exception of gum disease, these worse outcomes hold even after controlling for other factors, though attenuated in magnitude.

*The effect of food insecurity holds even for a lower-income sample.* As shown in Ziliak and Gundersen (2017), food insecurity rates are substantially higher for those with incomes less than two times the poverty line. So, we investigated whether or not the negative association of food insecurity with nutrient intakes and health remain even when we limit our multivariate analyses to those with incomes below twice the poverty line. We find that, in the main, the substantive and statistical significance of the results are quite similar to those for the full sample. This further demonstrates the importance of looking at food insecurity as an independent predictor of negative health and nutrition outcomes, even among lower-income seniors.

## I. Introduction

Food insecurity has been associated with a wide array of negative health outcomes across all ages. (See Gundersen and Ziliak, 2015 for a review.) In particular, in Ziliak, et al. (2008), Ziliak and Gundersen (2011), and Ziliak and Gundersen (2013) we established that food insecurity has serious consequences for seniors, even controlling for other known health risks. These reports are consistent with other work that has found that food insecurity (or similar measures of food hardship) are associated with negative health outcomes (e.g., Afulani et al. (2015), Bengtson et al. (2010), Bhargava and Lee (2016a; 2016b) Bhargava et al. (2012), Champagne et al. (2007); Holben et al. (2006), Kim and Frongillo (2007), Klesges et al. (2001), Lee and Frongillo (2001), Sattler and Lee (2012), Sattler et al. (2014), Sharkey (2003)). In this report, we build on our previous reports on health consequences among seniors through the use of data spanning the period before and after the Great Recession when food insecurity spiked.

## II. Data

The data we use comes from the National Health and Nutrition Examination Survey (NHANES), conducted by the National Center for Health Statistics, Centers for Disease Control. NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the United States through interviews and focused physical examinations. The survey now examines a nationally representative sample of about 5,000 persons each year, about half of whom are adults. The interview includes demographic, socioeconomic, dietary, and health-related questions and health assessments consisting of medical and dental examinations, physiological measurements and laboratory tests. Vulnerable groups, including persons over 60, are oversampled in the NHANES to produce more reliable statistics. We use weights constructed by NHANES that are applicable for samples pooled across years. The data in the NHANES is constructed such that two years' worth of data are combined to form one wave. So, when we present the results in the tables and figures below, the results are combined into samples spanning from 1999-2000 through 2013-2014.

For the analyses here, we use data from multiple NHANES modules. Of particular importance is, of course, the presence of the full Food Security Supplement (FSS) on the food security supplement. In this study, to make things comparable to the central analytical framework in our report on food insecurity (Ziliak and Gundersen, 2017), we compare seniors in *food insecure* households with seniors in *food secure* households. Consistent with the official USDA definition, a senior is in the former category if the household responds affirmatively to three or more questions from the FSS and in the latter category if the household responds affirmatively to two or fewer questions.

For nutrient intakes we consider variables measuring energy intake, protein, vitamin A, vitamin C, thiamin, riboflavin, vitamin B6, calcium, phosphorous, magnesium, and iron. These are all based on individual's self-reports of their food consumption for two full days.

For health outcomes, we include individuals' self-reports of various outcomes. These are asked of all respondents over the age of 60. Some of the questions are based on whether or not a

medical health professional has ever told someone they have a certain medical condition. This is the case for diabetes, high blood pressure, high cholesterol, congestive heart failure, coronary heart disease, heart attack, cancer, asthma, gum disease, and psoriasis.<sup>1</sup> Other reports are from the respondent's own perception of current well-being including reports of chest pain, general health (excellent, very good, good, fair, or poor)<sup>2</sup>, depression<sup>3</sup>, and whether or not someone can do activities of daily living<sup>4</sup>. In addition, we include a variable for whether or not someone has ever had a heart attack and a self-report of gum health (from excellent to poor).<sup>5</sup> Most of these outcomes are available for each of the waves of the NHANES, but some are only available for a subset of later years. In all cases, though, at least 4 waves of data are available.

### III. Results

In this section we begin with descriptive associations between food insecurity and health outcomes for the full sample of all individuals using the updated NHANES dataset, and examine descriptive differences in nutrition and health outcomes across several demographic categories. We then more formally model the relationship between food insecurity and health with multivariate regression models.

#### III.A. Health Outcomes across Food Security Status

In Table 1A we display the mean values of our key nutrition outcomes broken down by food security status. All of the analyses, except for the multivariate models, use weights supplied in the NHANES to make the samples nationally representative.<sup>6</sup>

Intakes are lower for each nutrient for food insecure seniors in comparison to food secure seniors, and these differences can be quite large.<sup>7</sup> Consider four measures of nutrient intake for seniors that are especially important for seniors—energy, protein, calcium, and iron. Out of

---

<sup>1</sup> Some of these outcomes could have been far in the past (e.g., a cancer diagnosis) and/or no longer impairing someone's current well-being (e.g., a respondent whose blood cholesterol is now lower). In addition, there may be some persons who currently or in the past have had some of these conditions but because they did not see a health professional, they are unaware of the health issue.

<sup>2</sup> These questions weren't asked in the 1999/2000 module.

<sup>3</sup> In our previous work examining the association of food insecurity with depression, we used a measure of depression that was based on a question about whether or not "depression/anxiety/emotional problem" resulted in challenges in activities of daily living. We did so because the standard set of questions used to measure depression weren't asked of those over age 60 until 2007. We now measure depression using the PHQ-9 Questionnaire (<http://www.agencymeddirectors.wa.gov/files/AssessmentTools/14-PHQ-9%20overview.pdf>) which has been asked of seniors and other adults since 2007. Consistent with the recommended use of the PHQ-9, we define someone as depressed if they have a score of 10 or higher.

<sup>4</sup> Examples of ADL limitations include difficulty in walking up ten steps, getting in and out of bed, and preparing meals. We define persons as having an ADL limitation if they respond affirmatively to at least one ADL.

<sup>5</sup> For each question, the respondent has the choice to not respond or answer "don't know".

<sup>6</sup> We do not weight the regression models because our models control for the socioeconomic characteristics embedded within the weights.

<sup>7</sup> Unless otherwise noted, the differences discussed are statistically significant with p-values less than 0.05. For the results in Table 1, the p-values are all less than 0.01.

these nutrients, food insecure seniors have intakes that are 9.5 percent, 10.1 percent, 9.7 percent, and 13.2 percent lower than food secure seniors, respectively.

When we consider broader measures of health outcomes (Table 1B), a similar story emerges for most outcomes. In terms of self-reports of general health, individuals experiencing food insecurity are worse-off. For example, 39 percent of food secure individuals report excellent or very good health versus 13 percent of food insecure individuals, and 75 percent of food secure individuals report excellent, very good, or good health versus 45 percent for food insecure individuals. Rates of depression among food insecure seniors are markedly higher (233 percent) than among food secure seniors. Alongside these worse outcomes, food insecure seniors are 32 percent more likely to suffer from at least one ADL limitation, 57 percent more likely to report congestive heart failure, almost 90 percent more likely to report asthma, and more than 65 percent likely to have had a heart attack. Food insecure seniors also report worse gum health. The only dimension where food secure seniors are worse off than food insecure seniors is with respect to cancer where 23 percent of food secure seniors have had cancer versus 13 percent of food insecure seniors.<sup>8</sup>

### **III.B. Health Outcomes over Time and Food Security Status**

We now consider whether the relationship between food insecurity and nutrition and health outcomes change over time. This may be especially relevant if there were changes in the relative relationships over time due to the Great Recession when rates of food insecurity soared over 30 percent and remained at that level until 2015 (Ziliak and Gunderson 2017). For these figures, we concentrate on select nutrients and for health outcomes which show statistically significant differences when averaged over all the years.

In Figures 1 through 4 we present time series trends for four nutrient intake measures: total energy, protein, calcium, and iron. Consistent with the pooled cross-sectional averages in Table 1, food insecure seniors have lower intakes of each of these measures in every time period examined compared to food secure seniors but there are differences in patterns over time. For example, for energy, protein, and iron, the gap narrows sharply in 2011/2012. And, this gap also narrowed dramatically for iron in 2005/2006.

In Figures 5 through 13 we display results for some of the health outcomes in Table 1B. The outcomes we consider are diabetes, general health, depression, ADL limitations, high blood pressure, congestive heart failure, ever having a heart attack, chest pain, and asthma. For every measure except congestive heart failure, the health outcomes of food insecure seniors are worse than food secure seniors and, in general, the gaps are large, consistent with what is seen in Table 1B. Even though food insecurity rates increased dramatically after the Great Recession, for most of the health outcomes considered the gaps between food secure and food insecure did not worsen.

---

<sup>8</sup> The question regarding cancer is not regarding whether or not someone currently has cancer but, rather, whether someone has ever had cancer.

### III.C Demographic Differences in Health Outcomes across Food Security Status

In Tables 2 through 18 we present the results for demographic groups in the NHANES for which there were at least 500 observations. These tables are further broken down by nutrient intakes (A) and health outcomes (B), but not by year owing to small of sample sizes by demographic group.<sup>9</sup> The groups were selected on the basis of the results in Ziliak and Gundersen (2017) that showed that certain subpopulations of seniors were at greater risk of food insecurity (e.g., those with lower incomes). Each table shows the nutrient intakes or health outcomes for the food secure and the food insecure, along with the difference and whether the difference is statistically different from zero.

With respect to marital status, food secure and food insecure seniors who are married or widowed have significantly different nutrient intakes for each of the 11 measures with a few exceptions (Tables 2A and 3A). In contrast, in the unmarried category (not married; not widowed) food insecure seniors do not have statistically significantly different nutrient intakes for most nutrients, and the differences are generally smaller than the other marital groups (Table 4A). In general, like for the full population, food insecure seniors across marital status have worse health outcomes than food secure seniors, albeit in some cases, the differences are statistically insignificant.

Turning to income, for seniors with incomes below 200 percent of the poverty line, differences between food secure and food insecure seniors in terms of nutrient intakes are more muted and, in several cases, statistically insignificant (Table 5A). For health outcomes, the differences are similar in terms of statistically significant differences (with the exception of high cholesterol and coronary heart disease) but the differences are again more muted (Table 5B). Comparisons by food security status for those with incomes above 200 percent of the poverty line are similar to the full population for nutrient intakes (Tables 6A) but, in even more cases than for those with incomes below twice the poverty line, there are not statistically significant differences in health outcomes (Table 6B).

Tables 7A and 7B are for female seniors. The results are similar to the population as a whole for both nutrient intakes and health outcomes. A similar story holds for male seniors (Tables 8A and 8B).

For African-American seniors, the difference in nutrient intakes is only statistically significantly different for Vitamin B6 (Table 9A). For health outcomes, the patterns are similar to the full population but there are more statistically insignificant results (Table 9B). For Hispanics, with the exception of Vitamin C, there are no statistical differences in nutrient intakes by food insecurity status (Table 10A) and, like for African-Americans, the results for health outcomes are similar to the full population but with fewer statistically significant differences (Table 10B). As expected, when the sample is restricted to senior whites, the results are similar to the full population (Tables 11A and 11B).

---

<sup>9</sup> Information on gum disease, gum health, and psoriasis were only present in the 2009/2010 wave and forward so we do not include those measures due to small sample sizes.



Turning to education status, food insecure and food secure seniors with a high school degree or more have quantitatively and statistically significant differences in protein, Vitamin A, Vitamin C, Thiamin, and Magnesium (Table 12A). For health outcomes, food insecure seniors with a high school degree are worse-off with similar patterns as found for the full population results with the exception of high cholesterol and coronary heart disease which are now statistically insignificant (Table 12B). For seniors who did not graduate from high school, the results are similar to the full population with the exception of congestive heart failure and coronary heart disease which are statistically insignificant (Tables 13A and 13B).

Finally, we consider differences between food insecure and food secure seniors by age: 60-65 years old, 66-70, 71-75, 76-80, and 81 or more (Tables 14A, 14B, 15A, 15B, 16A, 16B, 17A, 17B, 18A, 18B). For younger seniors the results largely mimic those of the full population of seniors seen in Tables 1A and 1B. In addition, for the youngest seniors, there is one variable that is now statistically significantly different by food insecurity status that was not statistically significant when all seniors were examined - coronary heart disease. Moreover, the gaps between food insecure and food secure seniors in this age group are substantially larger for many of the outcomes. For the oldest seniors, the differences in health outcomes by food insecurity status remain but, in many cases, the differences are not statistically significant and, in general, the differences are more muted in comparison to all seniors, even when statistically significant.

### **III.D. The Association of Food Insecurity with Nutrition and Health Outcomes**

We now turn to our analysis of the effect of food insecurity on health outcomes when we control for other known risk factors which may also influence health outcomes. As with the previous tables and figures, we estimate these models using data from the 1999-2014 NHANES.

Formally, we estimate the following model for the determinants of nutrient intakes and health outcomes (OUT) as:

$$OUT_{ij} = f_j(FI_i, \mathbf{X}_i)$$

where  $i$  denotes a senior;  $j$  denotes either a nutrient intake or health condition;  $FI$  is equal to 1 if a senior is in a food insecure household, 0 otherwise; and  $X$  is a vector of household demographic and economic factors and wave fixed effects. For continuous measures such as energy intakes, we estimate this using OLS and, for binary measures such as whether the senior is a diabetic or not, a probit model. For the probit results we report the marginal effects evaluated at the means rather than the coefficients, which do not have a ready quantitative interpretation.

As seen in Table 19A, even after controlling for other factors, food insecurity has a substantive and statistically significant negative association with the intakes of every nutrient with the exception of calcium. For example, controlling for other confounding factors, energy intake among food insecure seniors is 69 kcal lower, which is about 4 percent lower than the average intake among food secure seniors. Overall, the effects are about one-half the size reported in the unadjusted means of Table 1A, indicating that the other half owes to differences in income,

education, race, marital status, and age between food secure and food insecure seniors. When significant, the other variables in our models have the expected association with health outcomes. For example, for energy, intakes are higher among seniors with more income<sup>10</sup>, males, non-Hispanics, whites, high school graduates, and younger seniors. The differences between the bivariate results in Table 1A, where all of the differences between food insecure and food secure seniors were statistically significant, and those here demonstrate the importance of controlling for other factors when estimating the impact of food insecurity.

With respect to health outcomes, the association of food insecurity with health outcomes is also generally consistent with the results of Table 1B. As seen in the first page of Table 19B, for each of the health outcomes with the exception of diabetes and the narrowest general health comparison (excellent versus very good, good, fair, or poor health), food insecurity has a negative association with positive health outcomes and a positive association with negative health outcomes. And, in many cases, the effects are especially large when compared with other covariates. For example, being food insecure, in terms of its association with ADL limitations is roughly equivalent to being over 14 years older. In the second page of Table 19B, like in Table 1B, high blood pressure, congestive heart failure, coronary heart disease, and heart attack are all positively associated with food insecurity. Finally, in the third page of Table 19B, chest pain, gum health, and asthma are all directly associated with food insecurity. In contrast, the result in Table 1B that food insecure seniors have lower probabilities of cancer in comparison to food secure seniors disappears once we control for other factors.

As discussed in Gundersen and Ziliak (2015), unlike for nutrient intakes, the causality is not as clear with the relationships between food insecurity and health. For example, someone suffering from ADL limitations may be less able to get to the store to purchase food in comparison with someone who is readily able to perform such daily functions as bathing, eating, and dressing. Nevertheless, the associations in the tables discussed above are, in general, in the anticipated directions. These associations are further displayed in Figures 14 (for nutrient intakes) and 15 (for health outcomes). In those figures, the percent change in nutrient and health outcomes due to food insecurity, controlling for other factors, is displayed.

The rates of food insecurity among lower-income seniors are far higher than those with higher incomes. As seen in Table 1 in Ziliak and Gundersen (2017), 29.8 percent of seniors with incomes below the poverty line are food insecure and 18.0 percent of seniors with incomes between the poverty line and 200% of the poverty line are food insecure. In contrast, the food insecurity rate for seniors with incomes above 200% of the poverty line is 3.6 percent. We therefore now consider whether the associations of food insecurity with health outcomes are still present when we restrict the sample to those at greater risk of food insecurity.

---

<sup>10</sup> In the NHANES, income is only reported within bounds. (E.g., between \$5,001 and \$10,000.) NHANES then translates this information into a ratio of income to the poverty line. A small number of Seniors reported incomes of less than \$20,000 or more than \$20,000 rather than the more narrow bounds. In these cases, NHANES did not assign a ratio of income to the poverty line. Because we do not want to delete these observations from our samples, we assign these households an income-to-poverty level value of the averages within the groups reporting their incomes within the more narrow bounds.

Table 20A shows the results for the nutrient intakes covered above. The results are in the same direction as Table 19A and of similar statistical significance, albeit, the confidence levels are slightly lower in the low-income sample and for riboflavin, the coefficient on food insecurity is statistically insignificant. In Table 20B, we consider the associations of food insecurity with health outcomes for the lower-income sample. In comparison to Table 19B, the association of food insecurity with the health outcomes are, as expected, more muted. The patterns of statistical significance are the same as the full sample with the exception of excellent health versus very good, good, fair, or poor health which is now statistically insignificant. In the second and third pages of Table 20B, the association of food insecurity with coronary heart disease and gum disease are statistically insignificant, unlike for the population of all seniors.

#### **IV. Conclusions**

In these concluding remarks we emphasize four major findings from our analyses of the NHANES from 1999 through 2014. First, we find that food insecure seniors are on average worse off than food secure seniors for each nutritional outcome and most health measures we analyze. These gaps in well-being have remained generally constant over the entire time period, even though rates of food insecurity accelerated. Second, the general pattern that food insecure seniors are worse-off with respect to health and nutrition outcomes than food secure seniors holds even when we restrict our samples to distinct demographic categories. To put this a different way, there are no common demographic groups which are immune to the negative impacts of food insecurity. Third, we find that the disadvantage facing food insecure seniors with respect to health outcomes persists even controlling for other known risk factors for poor health. This further reinforces the need to look at food insecurity as a policy-relevant measure, independent of other measures of well-being (e.g., income). Fourth, further buttressing the previous point, even when the sample is restricted to those with lower incomes, food insecurity still is associated with worse nutrition and health outcomes.

## V. References

- Afulani P, Herman D, Coleman-Jensen A, Harrison G. Food insecurity and health outcomes among older adults: The role of cost-related medication underuse. *Journal of Nutrition in Gerontology and Geriatrics* 2015;34:319-342.
- Bengle R, Sinnott S, Johnson T, Johnson M, Brown A, Lee J. Food insecurity is associated with cost-related medication non-adherence in community-dwelling, low-income older adults in Georgia. *Journal of Nutrition for the Elderly* 2010;29:170-191.
- Bhargava V, Lee J. Food insecurity and health care utilization among older adults in the United States.” *Journal of Nutrition in Gerontology and Geriatrics* 2016;35(3):177-192.
- Bhargava V, Lee J. Food insecurity and health care utilization among older adults. *Journal of Applied Gerontology*. 2016. DOI: 10.1177/0733464815625835
- Bhargava V, J. Lee JS, Jain R, Johnson MA, Brown A. Food insecurity is negatively associated with home health and out-of-pocket expenditures in older adults. *Journal of Nutrition* 2012;142:1888–95.
- Champagne C, Casey P, Connell C, Stuff J, Gossett J, Harsha D, McCabe-Sellers B, Robbins J, Simpson P, Weber J, Bogle M. Poverty and food intake in rural America: Diet quality is lower in food insecure adults in the Mississippi delta. *Journal of the American Dietetic Association* 2007;107(11):1886-1894
- Gundersen C, Ziliak J. Food insecurity and health outcomes. *Health Affairs* 2015;34(11):1830-1839.
- Holben D, Barnett M, Holcomb J. Food insecurity is associated with health status of older adults participating in the Commodity Supplemental Food Program in a rural Appalachian Ohio county. *Journal of Hunger and Environmental Nutrition*, 2006;1(2):89-99.
- Kim K, Frongillo E. Participation in food assistance programs modifies the relation of food insecurity with weight and depression in elders. *Journal of Nutrition*, 2007;137: 1005-1010.
- Klesges L, Pahor M, Shorr R, Wan J, Williamson J, Guralnik J. Financial difficulties in acquiring food among elderly disabled women: Results from the Women’s Health, and Aging Study. *American Journal of Public Health* 2001;91:68-75.
- Lee J, Frongillo E. Nutritional and health consequences are associated with food insecurity among U.S. elderly persons. *Journal of Nutrition*, 2001;131:1503-1509.
- Sattler E, Lee J. Persistent food insecurity is associated with higher levels of cost-related medication non-adherence in low-income older adults. *Journal of Nutrition in Gerontology and Geriatrics* 2012;32(1):41-58.

Sattler E, Lee J, Bhargava V. “Food insecurity and medication adherence in low-income older Medicare beneficiaries with type 2 diabetes.” *Journal of Nutrition in Gerontology and Geriatrics* 2014;33(4):401-417.

Sharkey J. Risk and presence of food insufficiency are associated with low nutrient intakes and multimorbidity among homebound older women who receive home-delivered meals. *Journal of Nutrition* 2003;133(11):3485-3491.

Ziliak J, Gundersen C. *Food Insecurity among Older Adults*. Report submitted to AARP Foundation.

Ziliak J, Gundersen C. *The State of Senior Hunger in America 2015: An Annual Report. Supplement*. Report for Feeding America. 2017.

Ziliak J, Gundersen C. *The State of Senior Hunger in America 2011: An Annual Report. Supplement*. Special Report by the University of Kentucky Center for Poverty Research for the National Foundation to End Senior Hunger. 2013.

Ziliak J, Gundersen C, Haist M. *The Causes, Consequences, and Future of Senior Hunger in America*. Special Report by the University of Kentucky Center for Poverty Research for the Meals on Wheels Association of America Foundation. 2008.

**Table 1A.** Nutrition Outcomes by Food Insecurity Status for All Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1817.34	1645.58	-171.76**
Protein (gm)	70.78	63.62	-7.16**
Vitamin A (mcg)	723.34	546.89	-176.45**
Vitamin C (mg)	88.25	65.98	-22.27**
Thiamin (mg)	1.51	1.32	-0.19**
Riboflavin (mg)	2.05	1.79	-0.26**
Vitamin B6 (mg)	1.84	1.57	-0.27**
Calcium (mg)	827.56	747.7	-79.86**
Phosphorous (mg)	1195.08	1070.92	-124.16**
Magnesium (mg)	275.97	238.21	-37.76**
Iron (mg)	14.57	12.65	-1.92**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 1B. Health Outcomes by Food Insecurity Status for All Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.17	0.28	0.11**
Self-Reports of General Health			
Excellent	0.10	0.03	-0.07**
Excellent or very good	0.39	0.13	-0.26**
Excellent, very good, or good	0.75	0.45	-0.30**
Suffers from depression	0.06	0.20	0.14**
At least one ADL limitation	0.63	0.83	0.20**
High blood pressure	0.57	0.68	0.11**
High cholesterol	0.54	0.58	0.04
Congestive heart failure	0.07	0.11	0.04**
Coronary heart disease	0.10	0.11	0.01
Heart attack	0.09	0.15	0.06**
Cancer	0.23	0.13	-0.10**
Reports of chest pain	0.29	0.40	0.11**
Gum disease	0.14	0.27	0.13**
Gum health? (1-excellent 5-poor)	2.70	3.51	0.81**
Psoriasis	0.03	0.04	0.01
Asthma	0.11	0.21	0.10**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 2A.** Nutrition Outcomes by Food Insecurity Status for Married Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1893.17	1663.86	-229.31**
Protein (gm)	74.00	65.22	-8.78**
Vitamin A (mcg)	737.28	525.74	-211.54**
Vitamin C (mg)	90.90	66.05	-24.85**
Thiamin (mg)	1.56	1.36	-0.2**
Riboflavin (mg)	2.12	1.76	-0.36**
Vitamin B6 (mg)	1.91	1.56	-0.35**
Calcium (mg)	852.11	744.17	-107.94**
Phosphorous (mg)	1248.25	1085.75	-162.5**
Magnesium (mg)	287.31	243.61	-43.7**
Iron (mg)	15.15	12.85	-2.3**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .



**Table 2B. Health Outcomes by Food Insecurity Status for Married Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.17	0.30	0.13**
Self-Reports of General Health			
Excellent	0.10	0.03	-0.07**
Excellent or very good	0.42	0.12	-0.30**
Excellent, very good, or good	0.78	0.45	-0.33**
Suffers from depression	0.04	0.15	0.11**
At least one ADL limitation	0.59	0.80	0.21**
High blood pressure	0.55	0.66	0.11**
High cholesterol	0.55	0.56	0.01
Congestive heart failure	0.06	0.11	0.04**
Coronary heart disease	0.11	0.11	0.00
Heart attack	0.09	0.16	0.07**
Cancer	0.24	0.12	-0.12**
Reports of chest pain	0.29	0.41	0.12**
Asthma	0.11	0.17	0.06**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 3A.** Nutrition Outcomes by Food Insecurity Status for Widowed Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1613.68	1458.41	-155.27**
Protein (gm)	62.42	56.45	-5.97**
Vitamin A (mcg)	694.37	508.42	-185.95**
Vitamin C (mg)	83.54	68.04	-15.5**
Thiamin (mg)	1.37	1.20	-0.17**
Riboflavin (mg)	1.87	1.62	-0.25**
Vitamin B6 (mg)	1.67	1.49	-0.18
Calcium (mg)	758.30	695.80	-62.5
Phosphorous (mg)	1057.90	975.20	-82.7**
Magnesium (mg)	242.29	218.19	-24.1**
Iron (mg)	13.30	11.26	-2.04**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 3B. Health Outcomes by Food Insecurity Status for Widowed Seniors**

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Diabetic	0.18	0.27	0.09**
Self-Reports of General Health			
Excellent	0.06	0.03	-0.03**
Excellent or very good	0.32	0.12	-0.20**
Excellent, very good, or good	0.68	0.40	-0.28**
Suffers from depression	0.08	0.23	0.15**
At least one ADL limitation	0.75	0.87	0.12**
High blood pressure	0.63	0.73	0.10**
High cholesterol	0.54	0.59	0.05
Congestive heart failure	0.11	0.13	-0.02
Coronary heart disease	0.11	0.10	-0.01
Heart attack	0.11	0.16	0.05
Cancer	0.24	0.18	-0.06**
Reports of chest pain	0.31	0.39	0.08**
Asthma	0.11	0.22	0.11**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 4A.** Nutrition Outcomes by Food Insecurity Status for Unmarried Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1799.66	1780.44	-19.22
Protein (gm)	69.75	67.65	-2.10
Vitamin A (mcg)	680.47	602.56	-77.91
Vitamin C (mg)	83.07	64.20	-18.87**
Thiamin (mg)	1.48	1.38	-0.10
Riboflavin (mg)	2.01	1.98	-0.03
Vitamin B6 (mg)	1.78	1.63	-0.15
Calcium (mg)	824.73	797.59	-27.14
Phosphorous (mg)	1174.63	1133.74	-40.89
Magnesium (mg)	277.05	248.58	-28.47**
Iron (mg)	13.91	13.57	-0.34

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 4B. Health Outcomes by Food Insecurity Status for Unmarried Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.17	0.28	0.11**
Self-Reports of General Health			
Excellent	0.11	0.03	-0.08**
Excellent or very good	0.37	0.16	-0.21**
Excellent, very good, or good	0.71	0.49	-0.22**
Suffers from depression	0.08	0.22	0.14**
At least one ADL limitation	0.63	0.84	0.21**
High blood pressure	0.53	0.67	0.14**
High cholesterol	0.53	0.61	0.08*
Congestive heart failure	0.05	0.11	0.06*
Coronary heart disease	0.07	0.12	0.05**
Heart attack	0.09	0.14	0.05*
Cancer	0.20	0.11	-0.09**
Reports of chest pain	0.27	0.41	0.14**
Asthma	0.13	0.25	0.12**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 5A.** Nutrition Outcomes by Food Insecurity Status for Low-Income Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1677.27	1620.94	-56.33
Protein (gm)	64.61	62.39	-2.22
Vitamin A (mcg)	662.32	548.17	-114.15**
Vitamin C (mg)	77.48	68.47	-9.01**
Thiamin (mg)	1.39	1.31	-0.08*
Riboflavin (mg)	1.88	1.77	-0.11*
Vitamin B6 (mg)	1.65	1.55	-0.1
Calcium (mg)	755.51	734.37	-21.14
Phosphorous (mg)	1089.09	1050.25	-38.84
Magnesium (mg)	246.36	233.36	-13*
Iron (mg)	13.47	12.57	-0.9*

Notes: Low-income refers to seniors with household incomes less than 200% of the federal poverty line. Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 5B. Health Outcomes by Food Insecurity Status for Low-Income Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.21	0.29	0.08**
Self-Reports of General Health			
Excellent	0.05	0.03	-0.02**
Excellent or very good	0.26	0.12	-0.14**
Excellent, very good, or good	0.62	0.43	-0.19**
Suffers from depression	0.10	0.19	0.09**
At least one ADL limitation	0.72	0.83	0.11**
High blood pressure	0.60	0.70	0.10**
High cholesterol	0.54	0.58	0.04**
Congestive heart failure	0.10	0.12	0.02**
Coronary heart disease	0.11	0.12	0.01**
Heart attack	0.12	0.16	0.04*
Cancer	0.21	0.14	-0.07**
Reports of chest pain	0.33	0.41	0.08**
Asthma	0.12	0.22	0.10**

Notes: Low-income refers to seniors with household incomes less than 200% of the federal poverty line. Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 6A.** Nutrition Outcomes by Food Insecurity Status for High-Income Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1879.95	1737.00	-142.95*
Protein (gm)	73.54	68.15	-5.39
Vitamin A (mcg)	750.62	542.13	-208.49**
Vitamin C (mg)	93.07	56.74	-36.33**
Thiamin (mg)	1.56	1.36	-0.20**
Riboflavin (mg)	2.12	1.88	-0.24*
Vitamin B6 (mg)	1.93	1.64	-0.29*
Calcium (mg)	859.77	797.13	-62.64
Phosphorous (mg)	1242.45	1147.63	-94.82
Magnesium (mg)	289.21	256.23	-32.98**
Iron (mg)	15.06	12.95	-2.11**

Notes: High-income refers to seniors with household incomes greater than 200% of the federal poverty line. Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .



**Table 6B.** Health Outcomes by Food Insecurity Status for High-Income Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Diabetic	0.15	0.27	0.12**
Self-Reports of General Health			
Excellent	0.12	0.03	-0.09**
Excellent or very good	0.45	0.18	-0.27**
Excellent, very good, or good	0.80	0.54	-0.26**
Suffers from depression	0.04	0.23	0.19**
At least one ADL limitation	0.59	0.83	0.24**
High blood pressure	0.55	0.61	0.06
High cholesterol	0.55	0.59	0.04
Congestive heart failure	0.06	0.10	0.04
Coronary heart disease	0.10	0.08	-0.02
Heart attack	0.08	0.14	0.02
Cancer	0.24	0.10	-0.14**
Reports of chest pain	0.27	0.36	0.09*
Asthma	0.11	0.19	0.08*

Notes: High-income refers to seniors with household incomes greater than 200% of the federal poverty line. Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 7A.** Nutrition Outcomes by Food Insecurity Status for Female Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1593.17	1487.27	-105.9**
Protein (gm)	61.40	57.53	-3.87**
Vitamin A (mcg)	666.97	542.83	-124.14**
Vitamin C (mg)	83.88	62.91	-20.97**
Thiamin (mg)	1.32	1.19	-0.13**
Riboflavin (mg)	1.81	1.61	-0.20**
Vitamin B6 (mg)	1.60	1.41	-0.19**
Calcium (mg)	762.50	690.21	-72.29**
Phosphorous (mg)	1055.76	975.31	-80.45**
Magnesium (mg)	247.55	218.67	-28.88**
Iron (mg)	12.80	11.45	-1.35**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 7B. Health Outcomes by Food Insecurity Status for Female Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.16	0.29	0.13**
Self-Reports of General Health			
Excellent	0.09	0.03	-0.06**
Excellent or very good	0.39	0.11	-0.28**
Excellent, very good, or good	0.74	0.42	-0.32**
Suffers from depression	0.07	0.22	0.15**
At least one ADL limitation	0.69	0.85	0.16**
High blood pressure	0.59	0.71	0.12**
High cholesterol	0.55	0.62	0.07**
Congestive heart failure	0.06	0.11	0.05**
Coronary heart disease	0.06	0.09	0.03
Heart attack	0.06	0.12	0.06**
Cancer	0.22	0.14	-0.08**
Reports of chest pain	0.29	0.41	0.12**
Asthma	0.13	0.26	0.13**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 8A.** Nutrition Outcomes by Food Insecurity Status for Male Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	2092.69	1887.33	-205.36**
Protein (gm)	82.30	72.90	-9.40**
Vitamin A (mcg)	792.59	553.09	-239.5**
Vitamin C (mg)	93.62	70.67	-22.95**
Thiamin (mg)	1.73	1.51	-0.22**
Riboflavin (mg)	2.34	2.08	-0.26**
Vitamin B6 (mg)	2.13	1.81	-0.32**
Calcium (mg)	907.49	835.49	-72.00
Phosphorous (mg)	1366.22	1216.93	-149.29**
Magnesium (mg)	310.88	268.06	-42.82**
Iron (mg)	16.75	14.49	-2.26**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 8B. Health Outcomes by Food Insecurity Status for Male Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.19	0.28	0.09**
Self-Reports of General Health			
Excellent	0.11	0.04	-0.07**
Excellent or very good	0.39	0.16	-0.23**
Excellent, very good, or good	0.76	0.50	-0.26**
Suffers from depression	0.04	0.16	0.12**
At least one ADL limitation	0.56	0.80	0.24**
High blood pressure	0.54	0.64	0.10**
High cholesterol	0.54	0.53	-0.01
Congestive heart failure	0.08	0.12	0.04
Coronary heart disease	0.15	0.15	0
Heart attack	0.13	0.21	0.08**
Cancer	0.25	0.12	-0.13**
Reports of chest pain	0.29	0.39	0.10**
Asthma	0.09	0.15	0.06

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 9A.** Nutrition Outcomes by Food Insecurity Status for African-American Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1638.62	1571.60	-67.02
Protein (gm)	64.64	61.17	-3.47
Vitamin A (mcg)	674.93	505.00	-169.93
Vitamin C (mg)	84.34	74.00	-10.34
Thiamin (mg)	1.27	1.00	-0.27
Riboflavin (mg)	1.55	1.40	-0.15
Vitamin B6 (mg)	1.59	1.41	-0.18**
Calcium (mg)	633.72	615.83	-17.89
Phosphorous (mg)	988.23	933.29	-54.94
Magnesium (mg)	227.45	210.00	-17.45
Iron (mg)	12.28	11.00	-1.28

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 9B. Health Outcomes by Food Insecurity Status for African-American Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.29	0.35	0.06**
Self-Reports of General Health			
Excellent	0.05	0.05	0.00
Excellent or very good	0.21	0.13	-0.08**
Excellent, very good, or good	0.60	0.45	-0.15**
Suffers from depression	0.07	0.14	0.07**
At least one ADL limitation	0.64	0.80	0.16**
High blood pressure	0.73	0.76	0.03
High cholesterol	0.52	0.59	0.07*
Congestive heart failure	0.08	0.10	0.02
Coronary heart disease	0.06	0.09	0.03
Heart attack	0.08	0.13	0.05**
Cancer	0.14	0.12	-0.02
Reports of chest pain	0.30	0.36	0.06*
Asthma	0.13	0.20	0.07**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 10A.** Nutrition Outcomes by Food Insecurity Status for Hispanic Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1694.81	1595.95	-98.86*
Protein (gm)	68.49	64.46	-4.03
Vitamin A (mcg)	620.65	562.00	-58.65
Vitamin C (mg)	82.98	69.32	-13.66**
Thiamin (mg)	1.34	1.26	-0.08
Riboflavin (mg)	1.75	1.60	-0.15
Vitamin B6 (mg)	1.66	1.55	-0.11
Calcium (mg)	765.69	726.52	-39.17
Phosphorous (mg)	1124.77	1067.21	-57.56
Magnesium (mg)	259.88	248.00	-11.88
Iron (mg)	13.00	12.42	-0.58

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .



**Table 10B. Health Outcomes by Food Insecurity Status for Hispanic Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.26	0.27	0.01
Self-Reports of General Health			
Excellent	0.06	0.04	-0.02*
Excellent or very good	0.19	0.09	-0.10**
Excellent, very good, or good	0.52	0.36	-0.16**
Suffers from depression	0.11	0.21	0.10**
At least one ADL limitation	0.63	0.80	0.17**
High blood pressure	0.54	0.60	0.06*
High cholesterol	0.52	0.51	-0.02
Congestive heart failure	0.06	0.08	0.02
Coronary heart disease	0.07	0.07	0.00
Heart attack	0.06	0.09	0.03*
Cancer	0.10	0.10	0.00
Reports of chest pain	0.25	0.38	0.13**
Asthma	0.11	0.16	0.05*

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 11A.** Nutrition Outcomes by Food Insecurity Status for White Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1849.08	1720.39	-128.69*
Protein (gm)	71.60	65.14	-6.46**
Vitamin A (mcg)	738.69	557.82	-180.87**
Vitamin C (mg)	88.40	62.20	-26.2**
Thiamin (mg)	1.54	1.40	-0.14**
Riboflavin (mg)	2.13	2.07	-0.06
Vitamin B6 (mg)	1.88	1.65	-0.23*
Calcium (mg)	856.37	823.64	-32.73
Phosphorous (mg)	1223.23	1147.82	-75.41**
Magnesium (mg)	281.05	244.60	-36.45**
Iron (mg)	14.93	13.31	-1.62**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 11B. Health Outcomes by Food Insecurity Status for White Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.15	0.26	0.11**
Self-Reports of General Health			
Excellent	0.11	0.02	-0.09**
Excellent or very good	0.43	0.16	-0.27**
Excellent, very good, or good	0.78	0.49	-0.29**
Suffers from depression	0.05	0.19	0.14**
At least one ADL limitation	0.63	0.86	0.23**
High blood pressure	0.55	0.69	0.14**
High cholesterol	0.55	0.61	0.06
Congestive heart failure	0.07	0.13	0.06**
Coronary heart disease	0.11	0.13	0.02
Heart attack	0.10	0.20	0.10**
Cancer	0.26	0.16	-0.10**
Reports of chest pain	0.29	0.42	0.13**
Asthma	0.11	0.23	0.12**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 12A.** Nutrition Outcomes by Food Insecurity Status for High-Education Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1864.32	1776.07	-88.25
Protein (gm)	72.60	67.72	-4.88*
Vitamin A (mcg)	745.47	598.70	-146.77**
Vitamin C (mg)	92.07	68.57	-23.50**
Thiamin (mg)	1.54	1.43	-0.11*
Riboflavin (mg)	2.10	1.97	-0.13
Vitamin B6 (mg)	1.90	1.78	-0.12
Calcium (mg)	856.88	819.91	-36.97
Phosphorous (mg)	1231.16	1166.36	-64.8
Magnesium (mg)	286.65	264.47	-22.18*
Iron (mg)	14.90	13.84	-1.06

Notes: High-education refers to seniors with a high school diploma or more. Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 12B. Health Outcomes by Food Insecurity Status for High-Education Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.15	0.23	0.08**
Self-Reports of General Health			
Excellent	0.11	0.04	-0.07**
Excellent or very good	0.44	0.15	-0.29**
Excellent, very good, or good	0.80	0.55	-0.25**
Suffers from depression	0.05	0.16	0.11**
At least one ADL limitation	0.60	0.82	0.22**
High blood pressure	0.55	0.69	0.14**
High cholesterol	0.55	0.58	0.03
Congestive heart failure	0.06	0.13	0.07**
Coronary heart disease	0.10	0.11	0.01
Heart attack	0.09	0.13	0.04*
Cancer	0.25	0.15	-0.10**
Reports of chest pain	0.28	0.40	0.12**
Asthma	0.12	0.23	0.11**

Notes: High-education refers to seniors with a high school diploma or more. Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 13A.** Nutrition Outcomes by Food Insecurity Status for Low-Education Seniors

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1656.44	1532.48	-123.96**
Protein (gm)	64.54	60.10	-4.44**
Vitamin A (mcg)	645.99	489.31	-156.68**
Vitamin C (mg)	75.06	63.47	-11.59**
Thiamin (mg)	1.40	1.22	-0.18**
Riboflavin (mg)	1.85	1.64	-0.21**
Vitamin B6 (mg)	1.65	1.38	-0.27**
Calcium (mg)	727.28	684.30	-42.98
Phosphorous (mg)	1071.58	987.84	-83.74**
Magnesium (mg)	239.17	215.15	-24.02**
Iron (mg)	13.42	11.61	-1.81**

Notes: Low-education refers to seniors with less than a high school diploma. Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 13B. Health Outcomes by Food Insecurity Status for Low-Education Seniors**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.23	0.33	0.10**
Self-Reports of General Health			
Excellent	0.05	0.03	-0.02**
Excellent or very good	0.21	0.12	-0.09**
Excellent, very good, or good	0.57	0.36	-0.21**
Suffers from depression	0.09	0.24	0.15**
At least one ADL limitation	0.72	0.84	0.12**
High blood pressure	0.60	0.68	0.08**
High cholesterol	0.53	0.59	0.06*
Congestive heart failure	0.11	0.10	-0.01
Coronary heart disease	0.12	0.12	0.00
Heart attack	0.11	0.18	0.07**
Cancer	0.19	0.11	-0.08**
Reports of chest pain	0.32	0.40	0.08**
Asthma	0.11	0.19	0.08**

Notes: Low-education refers to seniors with less than a high school diploma. Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 14A.** Nutrition Outcomes by Food Insecurity Status for Seniors, Ages 60-65

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1966.38	1744.91	-221.47**
Protein (gm)	76.65	68.10	-8.55**
Vitamin A (mcg)	694.35	574.93	-119.42*
Vitamin C (mg)	87.82	62.99	-24.83**
Thiamin (mg)	1.56	1.37	-0.19**
Riboflavin (mg)	2.12	1.89	-0.23**
Vitamin B6 (mg)	1.88	1.72	-0.16
Calcium (mg)	879.04	747.67	-131.37**
Phosphorous (mg)	1282.24	1119.48	-162.76**
Magnesium (mg)	294.48	247.64	-46.84**
Iron (mg)	14.84	13.10	-1.74**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .



**Table 14B.** Health Outcomes by Food Insecurity Status for Seniors, Ages 60-65

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.16	0.27	0.11**
Self-Reports of General Health			
Excellent	0.12	0.02	-0.10**
Excellent or very good	0.44	0.12	-0.32**
Excellent, very good, or good	0.79	0.48	-0.31**
Suffers from depression	0.07	0.26	0.19**
At least one ADL limitation	0.53	0.80	0.27**
High blood pressure	0.49	0.65	0.16**
High cholesterol	0.53	0.59	0.06
Congestive heart failure	0.03	0.09	0.06**
Coronary heart disease	0.07	0.13	0.06**
Heart attack	0.06	0.15	0.09*
Cancer	0.16	0.07	-0.09**
Reports of chest pain	0.27	0.43	0.16**
Asthma	0.14	0.23	0.09**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 15A.** Nutrition Outcomes by Food Insecurity Status for Seniors, Ages 66-70

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1874.62	1621.84	-252.78**
Protein (gm)	73.44	62.76	-10.68**
Vitamin A (mcg)	694.35	574.93	-119.42**
Vitamin C (mg)	91.30	64.93	-26.37**
Thiamin (mg)	1.54	1.28	-0.26**
Riboflavin (mg)	2.07	1.78	-0.29**
Vitamin B6 (mg)	1.86	1.49	-0.37**
Calcium (mg)	815.89	754.21	-61.68
Phosphorous (mg)	1220.88	1066.61	-154.27**
Magnesium (mg)	285.37	234.15	-51.22**
Iron (mg)	14.88	12.43	-2.45**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 15B.** Health Outcomes by Food Insecurity Status for Seniors, Ages 66-70

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.18	0.33	0.15**
Self-Reports of General Health			
Excellent	0.11	0.04	-0.07**
Excellent or very good	0.41	0.12	-0.29**
Excellent, very good, or good	0.76	0.41	-0.35**
Suffers from depression	0.06	0.16	0.10**
At least one ADL limitation	0.59	0.82	0.23**
High blood pressure	0.57	0.67	0.10**
High cholesterol	0.59	0.57	-0.02
Congestive heart failure	0.07	0.10	0.03
Coronary heart disease	0.10	0.11	0.01
Heart attack	0.09	0.11	0.02
Cancer	0.22	0.16	-0.06**
Reports of chest pain	0.29	0.37	0.08*
Asthma	0.11	0.20	0.09**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 16A.** Nutrition Outcomes by Food Insecurity Status for Seniors, Ages 71-75

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1744.90	1567.93	-176.97*
Protein (gm)	68.89	60.13	-8.76**
Vitamin A (mcg)	717.22	493.69	-223.53**
Vitamin C (mg)	86.52	71.66	-14.86
Thiamin (mg)	1.48	1.27	-0.21**
Riboflavin (mg)	2.02	1.64	-0.38**
Vitamin B6 (mg)	1.84	1.42	-0.42**
Calcium (mg)	808.73	736.74	-71.99
Phosphorous (mg)	1160.92	1022.94	-137.98*
Magnesium (mg)	269.94	224.36	-45.58**
Iron (mg)	14.39	12.35	-2.04**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 16B.** Health Outcomes by Food Insecurity Status for Seniors, Ages 71-75

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.19	0.28	0.09*
Self-Reports of General Health			
Excellent	0.09	0.03	-0.06**
Excellent or very good	0.36	0.15	-0.21**
Excellent, very good, or good	0.74	0.42	-0.32**
Suffers from depression	0.04	0.21	0.17**
At least one ADL limitation	0.65	0.87	0.22**
High blood pressure	0.61	0.75	0.14**
High cholesterol	0.57	0.64	0.07
Congestive heart failure	0.07	0.17	0.10**
Coronary heart disease	0.11	0.09	-0.02
Heart attack	0.10	0.15	0.05*
Cancer	0.26	0.23	-0.03
Reports of chest pain	0.30	0.39	0.09
Asthma	0.11	0.25	0.14**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 17A.** Nutrition Outcomes by Food Insecurity Status for Seniors, Ages 76-80

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1646.92	1508.07	-138.85**
Protein (gm)	63.17	57.13	-6.04**
Vitamin A (mcg)	729.55	604.12	-125.43**
Vitamin C (mg)	87.54	69.33	-18.21**
Thiamin (mg)	1.44	1.30	-0.14*
Riboflavin (mg)	1.96	1.70	-0.26**
Vitamin B6 (mg)	1.78	1.41	-0.37**
Calcium (mg)	788.46	749.54	-38.92
Phosphorous (mg)	1096.10	1003.67	-92.43*
Magnesium (mg)	251.25	233.17	-18.08
Iron (mg)	14.14	12.14	-2.00**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 17B. Health Outcomes by Food Insecurity Status for Seniors, Ages 76-80**

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.16	0.26	0.10**
Self-Reports of General Health			
Excellent	0.07	0.03	-0.04**
Excellent or very good	0.33	0.14	-0.19**
Excellent, very good, or good	0.69	0.46	-0.23**
Suffers from depression	0.05	0.09	0.04
At least one ADL limitation	0.77	0.89	0.12**
High blood pressure	0.62	0.71	0.09**
High cholesterol	0.51	0.53	0.02
Congestive heart failure	0.11	0.15	0.04
Coronary heart disease	0.14	0.10	-0.04
Heart attack	0.13	0.21	0.08**
Cancer	0.31	0.16	-0.15**
Reports of chest pain	0.30	0.40	0.10*
Asthma	0.09	0.16	0.07*

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 18A.** Nutrition Outcomes by Food Insecurity Status for Seniors, Ages 80+

	Food Secure	Food Insecure	Difference
	(1)	(2)	(3)
Energy Intake (kcal)	1633.36	1410.18	-223.18**
Protein (gm)	62.15	55.97	-6.18
Vitamin A (mcg)	757.60	586.35	-171.25**
Vitamin C (mg)	89.56	79.85	-9.71
Thiamin (mg)	1.43	1.18	-0.25**
Riboflavin (mg)	1.93	1.56	-0.37**
Vitamin B6 (mg)	1.80	1.33	-0.47**
Calcium (mg)	796.69	702.67	-94.02
Phosphorous (mg)	1089.85	965.21	-124.64*
Magnesium (mg)	250.04	222.69	-27.35*
Iron (mg)	14.03	10.68	-3.35**

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .



**Table 18B.** Health Outcomes by Food Insecurity Status for Seniors, Ages 80+

	Food Secure (1)	Food Insecure (2)	Difference (3)
Diabetic	0.16	0.25	0.09
Self-Reports of General Health			
Excellent	0.08	0.03	-0.05*
Excellent or very good	0.33	0.14	-0.19**
Excellent, very good, or good	0.67	0.43	-0.24**
Suffers from depression	0.05	0.09	0.04
At least one ADL limitation	0.80	0.92	0.12**
High blood pressure	0.65	0.72	0.07
High cholesterol	0.49	0.53	0.04
Congestive heart failure	0.12	0.12	0.00
Coronary heart disease	0.14	0.08	-0.06*
Heart attack	0.13	0.19	0.06
Cancer	0.31	0.11	-0.20**
Reports of chest pain	0.30	0.40	0.10
Asthma	0.09	0.14	0.05

Notes: Food secure is defined as 2 or fewer affirmative responses in the Food Security Supplement; food insecure is defined as 3 or more affirmative responses. Column (3) = column (2) – column (1). \*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ .

**Table 19A:** Effect of Food Insecurity on Nutrient Intakes, All Seniors

	Energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin
	(1)	(2)	(3)	(4)	(5)	(6)
Food insecure	-69.434** (22.826)	-3.606** (1.018)	-82.943** (31.589)	-6.875* (2.823)	-0.080** (0.024)	-0.080* (0.033)
Not married or widowed	43.441* (17.716)	0.971 (0.790)	47.453 (24.518)	1.960 (2.191)	0.017 (0.019)	0.077** (0.025)
Widowed	45.968** (17.774)	1.372 (0.793)	32.510 (24.598)	0.480 (2.198)	0.038* (0.019)	0.081** (0.025)
Income/Poverty line	32.390** (4.908)	1.524** (0.219)	28.267** (6.792)	4.515** (0.607)	0.029** (0.005)	0.045** (0.007)
Female	-444.857** (13.622)	-18.250** (0.608)	-83.339** (18.852)	-7.129** (1.685)	-0.350** (0.014)	-0.458** (0.020)
Black	-162.005** (18.164)	-4.942** (0.810)	-22.118 (25.136)	3.305 (2.246)	-0.233** (0.019)	-0.538** (0.026)
Hispanic	-80.069** (18.640)	0.256 (0.832)	-47.787 (25.796)	8.369** (2.305)	-0.123** (0.020)	-0.250** (0.027)
Other	-202.360** (33.131)	-2.815 (1.478)	-26.522 (45.850)	19.010** (4.097)	-0.072* (0.035)	-0.466** (0.047)
High school graduate	111.487** (15.559)	3.755** (0.694)	87.349** (21.532)	13.700** (1.924)	0.076** (0.016)	0.134** (0.022)
Age	-16.152** (1.053)	-0.651** (0.047)	2.841 (1.458)	0.333* (0.130)	-0.006** (0.001)	-0.009** (0.002)
Constant	2,953.214** (82.930)	116.930** (3.700)	790.997** (114.766)	60.924** (10.255)	1.971** (0.087)	2.555** (0.119)

Notes: Number of observations is 11,705. Standard errors are in parentheses. \* significant at 5% level; \*\* significant at 1% level.

**Table 19A(cont):** Effect of Food Insecurity on Nutrient Intakes, All Seniors

	VitaminB6	Calcium	Phosphorous	Magnesium	Iron
	(7)	(8)	(9)	(10)	(11)
Food insecure	-0.122** (0.037)	-15.764 (15.368)	-48.645** (16.397)	-10.557** (4.031)	-0.631* (0.255)
Not married or widowed	0.047 (0.029)	38.078** (11.928)	19.283 (12.726)	7.927* (3.129)	-0.055 (0.198)
Widowed	0.069* (0.029)	24.788* (11.967)	20.667 (12.768)	3.032 (3.139)	0.302 (0.198)
Income/Poverty line	0.063** (0.008)	21.504** (3.304)	26.042** (3.525)	8.982** (0.867)	0.338** (0.055)
Female	-0.453** (0.022)	-111.469** (9.171)	-266.054** (9.786)	-52.328** (2.406)	-3.280** (0.152)
Black	-0.227** (0.030)	-201.234** (12.229)	-203.553** (13.048)	-41.435** (3.207)	-2.217** (0.203)
Hispanic	-0.082** (0.031)	-27.940* (12.550)	-15.459 (13.390)	3.710 (3.292)	-0.944** (0.208)
Other	-0.071 (0.054)	-166.152** (22.306)	-128.958** (23.799)	12.502* (5.851)	-0.936* (0.370)
High school graduate	0.154** (0.026)	59.478** (10.475)	73.332** (11.177)	26.743** (2.748)	0.886** (0.174)
Age	-0.003 (0.002)	-2.644** (0.709)	-8.409** (0.757)	-1.478** (0.186)	-0.031** (0.012)
Constant	1.931** (0.136)	878.255** (55.833)	1,746.392** (59.573)	356.557** (14.644)	17.348** (0.925)

Notes: Number of observations is 11,705. Standard errors are in parentheses. \* significant at 5% level; \*\* significant at 1% level.

**Table 19B: Effect of Food Insecurity on Health Outcomes, All Seniors**

	Diabetic	Excellent	Excellent or very good	Excellent, very good, or good	Depression	ADL limitations
	(1)	(2)	(3)	(4)	(5)	(6)
Food insecure	0.017 (0.012)	-0.008 (0.009)	-0.086** (0.015)	-0.100** (0.016)	0.051** (0.012)	0.143** (0.013)
Not married or widowed	-0.031** (0.009)	0.006 (0.006)	0.002 (0.012)	-0.026* (0.013)	0.029** (0.009)	0.021 (0.011)
Widowed	0.004 (0.010)	-0.010 (0.006)	-0.028* (0.011)	-0.042** (0.012)	0.025** (0.010)	0.030** (0.011)
Income/Poverty line	-0.020** (0.003)	0.015** (0.002)	0.044** (0.003)	0.050** (0.003)	-0.018** (0.002)	-0.034** (0.003)
Female	-0.018* (0.007)	-0.011* (0.005)	-0.002 (0.009)	0.001 (0.010)	0.023** (0.006)	0.095** (0.009)
Black	0.120** (0.011)	-0.025** (0.005)	-0.114** (0.010)	-0.105** (0.013)	-0.024** (0.007)	-0.038** (0.012)
Hispanic	0.080** (0.011)	-0.016** (0.006)	-0.137** (0.010)	-0.158** (0.014)	0.005 (0.008)	-0.047** (0.012)
Other	0.057** (0.019)	-0.024** (0.008)	-0.103** (0.016)	-0.092** (0.022)	-0.024* (0.010)	-0.069** (0.021)
High school graduate	-0.036** (0.008)	0.022** (0.005)	0.110** (0.010)	0.145** (0.011)	-0.023** (0.008)	-0.041** (0.010)
Age	-0.001* (0.001)	-0.000 (0.000)	-0.001 (0.001)	-0.003** (0.001)	-0.003** (0.000)	0.011** (0.001)
N	13,247	11,781	11,781	11,781	6,154	13,247

Notes: Standard errors are in parentheses. \* significant at 5% level; \*\* significant at 1% level.

**Table 19B(cont):** Effect of Food Insecurity on Health Outcomes, All Seniors

	High Blood Pressure	High Cholesterol	Congestive Heart Failure	Coronary Heart Disease	Heart Attack
	(7)	(8)	(9)	(10)	(11)
Food insecure	0.059** (0.015)	0.016 (0.017)	0.029** (0.009)	0.023* (0.010)	0.051** (0.011)
Not married or widowed	-0.032** (0.012)	-0.021 (0.013)	-0.005 (0.006)	-0.017* (0.007)	0.008 (0.007)
Widowed	0.007 (0.012)	-0.021 (0.013)	0.023** (0.006)	0.008 (0.007)	0.021** (0.007)
Income/Poverty line	-0.011** (0.003)	-0.004 (0.003)	-0.012** (0.002)	-0.005* (0.002)	-0.012** (0.002)
Female	0.060** (0.009)	0.036** (0.010)	-0.027** (0.005)	-0.072** (0.005)	-0.077** (0.005)
Black	0.166** (0.011)	-0.027* (0.013)	-0.002 (0.006)	-0.051** (0.006)	-0.030** (0.006)
Hispanic	-0.023 (0.012)	-0.019 (0.014)	-0.031** (0.005)	-0.047** (0.006)	-0.051** (0.006)
Other	-0.029 (0.021)	-0.047* (0.022)	-0.025** (0.009)	-0.023* (0.010)	-0.042** (0.009)
High school graduate	-0.001 (0.010)	0.006 (0.011)	-0.010 (0.005)	-0.004 (0.006)	-0.004 (0.006)
Age	0.005** (0.001)	-0.003** (0.001)	0.003** (0.000)	0.003** (0.000)	0.003** (0.000)
N	13,203	11,837	13,147	13,110	13,204

Notes: Standard errors are in parentheses. \* significant at 5% level; \*\* significant at 1% level.

**Table 19B(cont):** Effect of Food Insecurity on Health Outcomes, All Seniors

	Cancer	Chest Pain	Gum Disease	Gum Health (1- excellent 5-poor)	Psoriasis	Asthma
	(12)	(13)	(14)	(15)	(16)	(17)
Food insecure	-0.003 (0.013)	0.116** (0.015)	0.041* (0.017)	0.217** (0.051)	0.004 (0.008)	0.059** (0.011)
Not married or widowed	-0.011 (0.009)	0.003 (0.011)	0.043** (0.014)	0.086* (0.041)	0.005 (0.007)	0.009 (0.008)
Widowed	-0.020* (0.009)	-0.002 (0.011)	0.024 (0.016)	0.025 (0.044)	0.005 (0.007)	-0.001 (0.007)
Income/Poverty line	0.013** (0.003)	-0.016** (0.003)	-0.009* (0.004)	-0.134** (0.011)	-0.001 (0.002)	-0.004* (0.002)
Female	-0.026** (0.007)	0.009 (0.008)	-0.014 (0.011)	-0.128** (0.032)	-0.005 (0.005)	0.040** (0.006)
Black	-0.073** (0.008)	-0.027* (0.011)	0.005 (0.014)	0.308** (0.042)	-0.022** (0.005)	0.003 (0.008)
Hispanic	-0.118** (0.008)	-0.075** (0.011)	0.029 (0.016)	0.386** (0.046)	-0.010 (0.006)	-0.033** (0.007)
Other	-0.121** (0.010)	-0.035 (0.019)	0.037 (0.021)	0.231** (0.059)	-0.006 (0.008)	-0.006 (0.012)
High school graduate	0.022** (0.008)	-0.002 (0.010)	-0.003 (0.013)	-0.211** (0.038)	0.003 (0.006)	0.003 (0.006)
Age	0.008** (0.001)	-0.001 (0.001)	-0.007** (0.001)	-0.011** (0.003)	-0.000 (0.000)	-0.002** (0.000)
Constant				4.127** (0.195)		
N	13,230	13,224	4,830	4,880	5,110	13,233

Notes: Standard errors are in parentheses. \* significant at 5% level; \*\* significant at 1% level.

**Table 20A: Effect of Food Insecurity on Nutrient Intakes, Low-Income Seniors**

	Energy	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin
	(1)	(2)	(3)	(4)	(5)	(6)
Food insecure	-61.012*	-3.722**	-91.332**	-7.916*	-0.078**	-0.068
	(25.912)	(1.136)	(34.602)	(3.107)	(0.025)	(0.035)
Not married or widowed	76.836**	1.768	66.633*	3.013	0.013	0.129**
	(24.948)	(1.094)	(33.315)	(2.991)	(0.024)	(0.034)
Widowed	47.456	1.357	33.776	1.737	0.046	0.100**
	(25.282)	(1.108)	(33.761)	(3.031)	(0.025)	(0.034)
Income/Poverty line	67.737**	1.429	-15.101	2.809	0.050*	0.082**
	(22.500)	(0.986)	(30.046)	(2.698)	(0.022)	(0.031)
Female	-413.360**	-16.735**	-59.828*	-7.521**	-0.304**	-0.391**
	(20.452)	(0.897)	(27.311)	(2.452)	(0.020)	(0.028)
Black	-148.967**	-4.297**	-33.743	6.126	-0.196**	-0.528**
	(26.556)	(1.164)	(35.461)	(3.184)	(0.026)	(0.036)
Hispanic	-56.676*	2.218*	-31.261	11.455**	-0.086**	-0.231**
	(25.764)	(1.129)	(34.404)	(3.089)	(0.025)	(0.035)
Other	-167.804**	-0.216	50.897	28.098**	-0.004	-0.397**
	(51.490)	(2.257)	(68.757)	(6.173)	(0.050)	(0.070)
High school graduate	117.077**	4.212**	90.231**	11.766**	0.091**	0.150**
	(20.797)	(0.912)	(27.771)	(2.493)	(0.020)	(0.028)
Age	-13.415**	-0.548**	3.823	0.227	-0.005**	-0.009**
	(1.585)	(0.069)	(2.116)	(0.190)	(0.002)	(0.002)
Constant	2,678.076**	107.385**	721.389**	66.122**	1.806**	2.429**
	(124.273)	(5.448)	(165.949)	(14.899)	(0.121)	(0.168)

Notes: Number of observations is 5,617. Standard errors are in parentheses. \* significant at 5% level; \*\* significant at 1% level.

**Table 20A(cont):** Effect of Food Insecurity on Nutrient Intakes, Low-Income Seniors

	VitaminB6	Calcium	Phosphorous	Magnesium	Iron
	(7)	(8)	(9)	(10)	(11)
Food insecure	-0.128** (0.038)	-18.221 (16.800)	-50.291** (18.268)	-12.716** (4.381)	-0.551* (0.271)
Not married or widowed	0.052 (0.037)	66.784** (16.175)	50.326** (17.588)	8.885* (4.218)	-0.005 (0.261)
Widowed	0.081* (0.037)	31.352 (16.391)	27.377 (17.823)	2.481 (4.275)	0.347 (0.264)
Income/Poverty line	0.063 (0.033)	30.376* (14.588)	32.584* (15.862)	8.962* (3.804)	0.638** (0.235)
Female	-0.387** (0.030)	-94.080** (13.260)	-241.375** (14.419)	-46.932** (3.458)	-2.871** (0.214)
Black	-0.218** (0.039)	-182.775** (17.217)	-187.766** (18.721)	-33.072** (4.490)	-1.761** (0.278)
Hispanic	-0.049 (0.038)	16.298 (16.703)	27.293 (18.163)	13.115** (4.356)	-0.661* (0.269)
Other	-0.010 (0.076)	-143.958** (33.382)	-97.679** (36.299)	18.813* (8.706)	-0.370 (0.539)
High school graduate	0.134** (0.031)	76.870** (13.483)	84.334** (14.661)	27.695** (3.516)	0.912** (0.218)
Age	-0.005 (0.002)	-0.657 (1.027)	-6.797** (1.117)	-1.251** (0.268)	-0.024 (0.017)
Constant	2.018** (0.184)	693.596** (80.569)	1,586.019** (87.610)	333.826** (21.012)	15.920** (1.300)

Notes: Number of observations is 5,617. Standard errors are in parentheses. \* significant at 5% level; \*\* significant at 1% level.



**Table 20B: Effect of Food Insecurity on Health Outcomes, Low-Income Seniors**

	Diabetic	Excellent	Excellent or very good	Excellent, very good, or good	Depression	ADL limitations
	(1)	(2)	(3)	(4)	(5)	(6)
Food insecure	0.028 (0.015)	-0.002 (0.007)	-0.059** (0.013)	-0.089** (0.018)	0.062** (0.016)	0.113** (0.013)
Not married or widowed	-0.034* (0.014)	0.003 (0.007)	0.016 (0.014)	0.002 (0.018)	0.042** (0.015)	0.022 (0.014)
Widowed	-0.003 (0.014)	-0.014* (0.006)	-0.015 (0.013)	-0.007 (0.018)	0.031 (0.017)	0.028 (0.014)
Income/Poverty line	-0.001 (0.013)	0.007 (0.006)	0.034** (0.012)	0.101** (0.016)	-0.043** (0.013)	-0.062** (0.013)
Female	0.009 (0.011)	-0.006 (0.006)	-0.014 (0.011)	-0.014 (0.014)	0.050** (0.012)	0.076** (0.012)
Black	0.107** (0.016)	-0.003 (0.007)	-0.056** (0.012)	-0.059** (0.019)	-0.053** (0.013)	-0.048** (0.016)
Hispanic	0.074** (0.015)	-0.008 (0.007)	-0.105** (0.012)	-0.149** (0.018)	0.004 (0.015)	-0.062** (0.015)
Other	0.047 (0.029)	-0.009 (0.011)	-0.057** (0.020)	-0.035 (0.032)	-0.052** (0.017)	-0.083** (0.030)
High school graduate	-0.033** (0.012)	0.009 (0.006)	0.065** (0.011)	0.125** (0.014)	-0.016 (0.012)	-0.036** (0.012)
Age	-0.002** (0.001)	0.001 (0.000)	0.002** (0.001)	-0.001 (0.001)	-0.005** (0.001)	0.008** (0.001)
N	6,521	5,717	5,717	5,717	2,881	6,521

Notes: Standard errors in parentheses \* significant at 5% level; \*\* significant at 1% level.

**Table 20B(cont):** Effect of Food Insecurity on Health Outcomes, Low-Income Seniors

	High Blood Pressure	High Cholesterol	Congestive Heart Failure	Coronary Heart Disease	Heart Attack
	(7)	(8)	(9)	(10)	(11)
Food insecure	0.065** (0.016)	0.018 (0.019)	0.029** (0.011)	0.019 (0.011)	0.051** (0.013)
Not married or widowed	0.005 (0.016)	-0.001 (0.018)	-0.009 (0.009)	-0.021* (0.009)	0.005 (0.011)
Widowed	0.029 (0.016)	0.005 (0.018)	0.014 (0.009)	-0.000 (0.009)	0.020 (0.011)
Income/Poverty line	0.007 (0.014)	0.032* (0.016)	-0.017* (0.008)	-0.025** (0.009)	-0.009 (0.009)
Female	0.085** (0.013)	0.049** (0.014)	-0.022** (0.008)	-0.052** (0.008)	-0.082** (0.009)
Black	0.161** (0.016)	-0.020 (0.019)	-0.019* (0.009)	-0.058** (0.008)	-0.040** (0.009)
Hispanic	-0.032* (0.017)	-0.012 (0.018)	-0.047** (0.008)	-0.060** (0.008)	-0.073** (0.009)
Other	0.022 (0.030)	0.014 (0.032)	-0.051** (0.012)	-0.041** (0.013)	-0.066** (0.012)
High school graduate	-0.007 (0.013)	-0.013 (0.014)	-0.006 (0.008)	-0.007 (0.008)	-0.007 (0.008)
Age	0.004** (0.001)	-0.005** (0.001)	0.003** (0.001)	0.002** (0.001)	0.003** (0.001)
N	6,493	5,564	6,449	6,432	6,494

Notes: Standard errors in parentheses \* significant at 5% level; \*\* significant at 1% level.

**Table 20B(cont):** Effect of Food Insecurity on Health Outcomes, Low-Income Seniors

	Cancer	Chest Pain	Gum Disease	Gum Health (1- excellent 5-poor)	Psoriasis	Asthma
	(12)	(13)	(14)	(15)	(16)	(17)
Food insecure	0.000 (0.013)	0.114** (0.017)	0.024 (0.020)	0.196** (0.058)	0.001 (0.009)	0.056** (0.012)
Not married or widowed	-0.019 (0.012)	0.015 (0.015)	0.055** (0.021)	0.069 (0.059)	0.009 (0.010)	0.018 (0.011)
Widowed	-0.023* (0.011)	0.008 (0.015)	0.029 (0.023)	-0.008 (0.063)	-0.008 (0.009)	-0.002 (0.011)
Income/Poverty line	0.019 (0.011)	-0.020 (0.014)	-0.010 (0.018)	-0.171** (0.054)	0.006 (0.009)	-0.004 (0.009)
Female	-0.006 (0.010)	0.016 (0.012)	-0.021 (0.017)	-0.129** (0.050)	-0.001 (0.008)	0.046** (0.008)
Black	-0.066** (0.010)	-0.058** (0.015)	-0.030 (0.021)	0.144* (0.064)	-0.017* (0.008)	0.002 (0.011)
Hispanic	-0.107** (0.010)	-0.099** (0.015)	0.044 (0.023)	0.316** (0.065)	-0.016 (0.008)	-0.039** (0.010)
Other	-0.119** (0.011)	-0.049 (0.027)	0.062 (0.034)	0.106 (0.090)	-0.010 (0.011)	-0.014 (0.018)
High school graduate	0.021* (0.010)	-0.003 (0.013)	0.001 (0.017)	-0.193** (0.050)	0.005 (0.008)	0.001 (0.009)
Age	0.006** (0.001)	-0.003** (0.001)	-0.009** (0.001)	-0.016** (0.004)	0.000 (0.001)	-0.002** (0.001)
Constant				4.484** (0.299)		
N	6,512	6,503	2,251	2,298	2,454	6,514

Notes: Standard errors in parentheses \* significant at 5% level; \*\* significant at 1% level.

Figure 1: Energy (kcal) by Food Insecurity Status for Seniors, 1999-2014

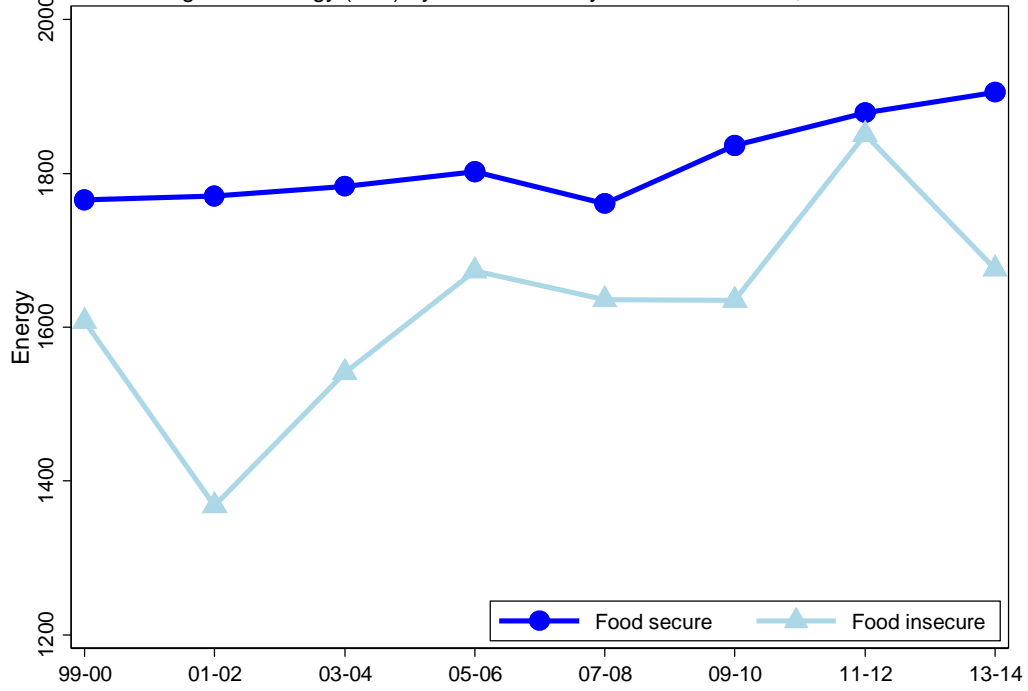


Figure 2: Protein (gm) by Food Insecurity Status for Seniors, 1999-2014

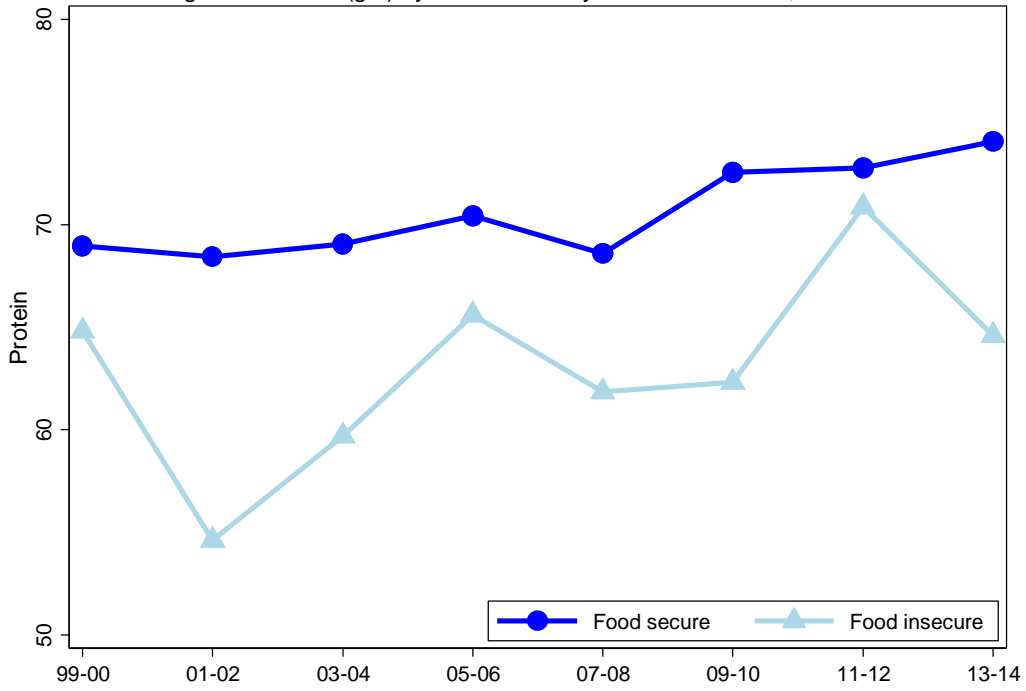


Figure 3: Calcium (mg) by Food Insecurity Status for Seniors, 1999-2014

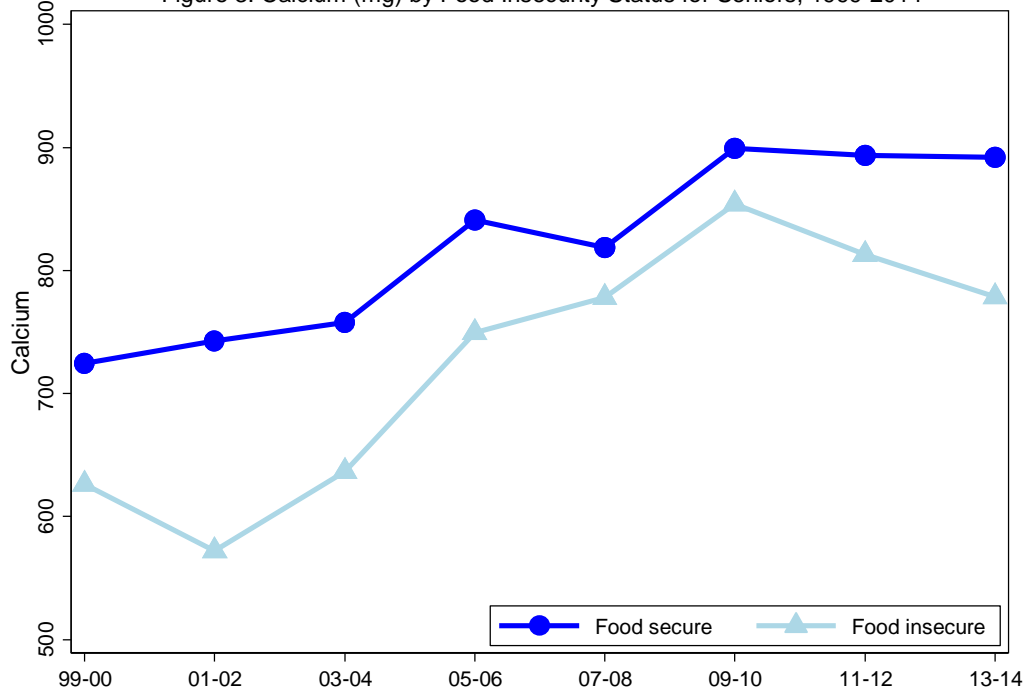


Figure 4: Iron (mg) by Food Insecurity Status for Seniors, 1999-2014

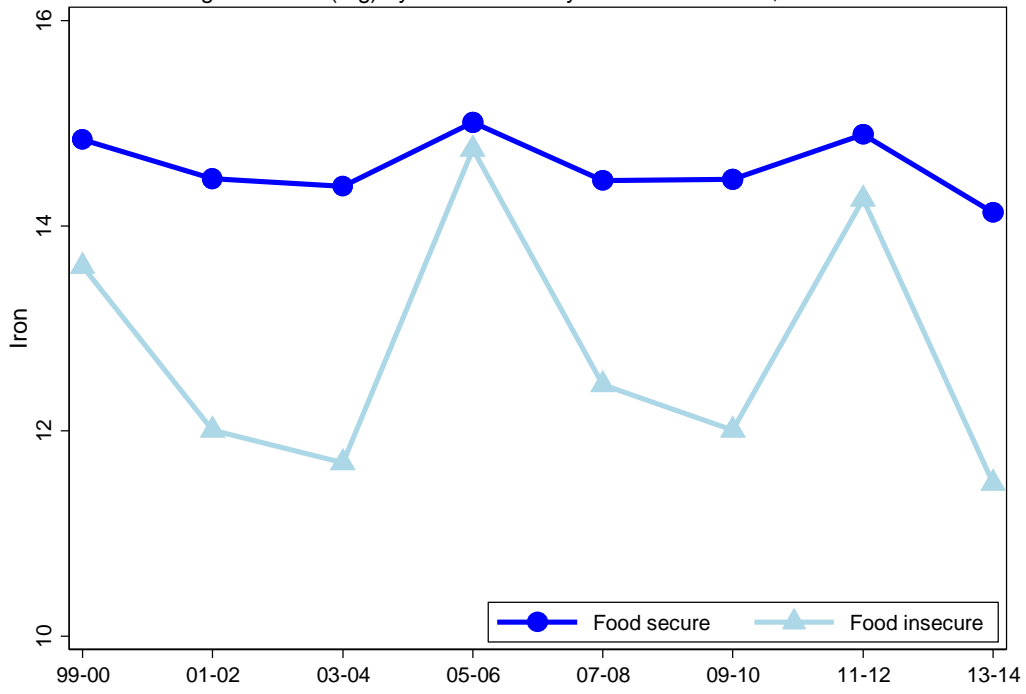


Figure 5: Diabetes Status by Food Insecurity Status for Seniors, 1999-2014

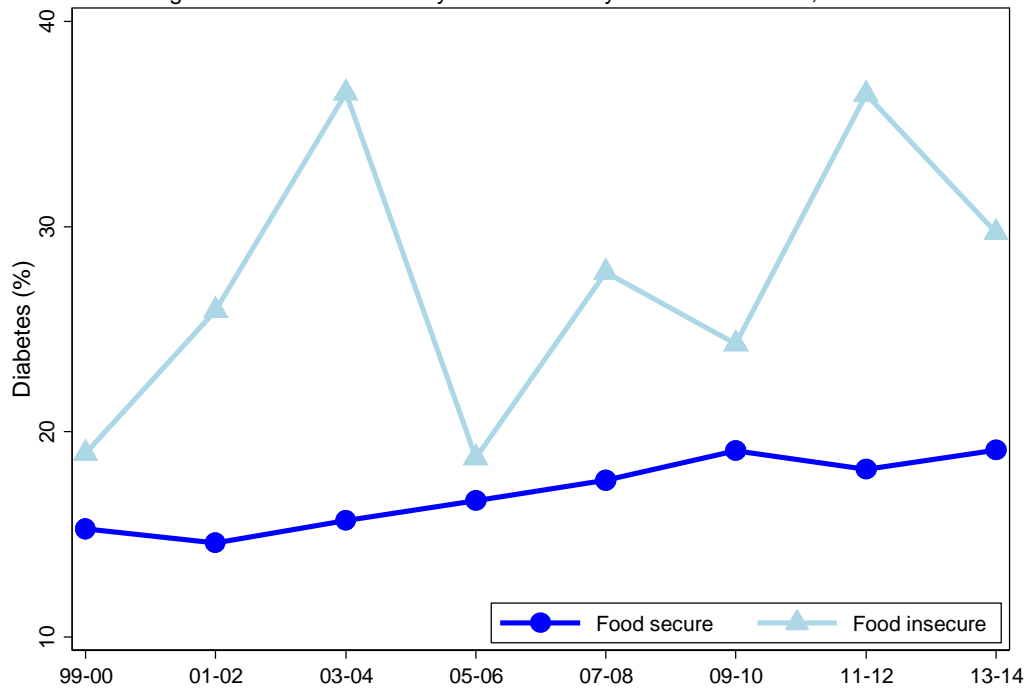




Figure 6: Very Good or Excellent Health by Food Insecurity Status for Seniors, 2001-2014

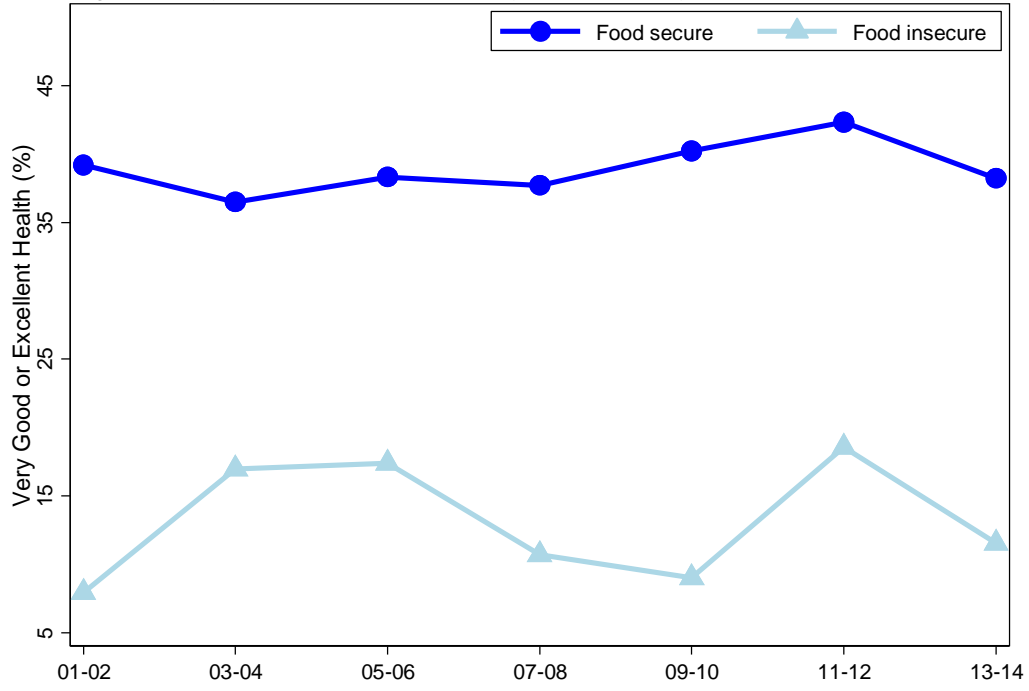


Figure 7: Suffers from Depression by Food Insecurity Status for Seniors, 2007-2014

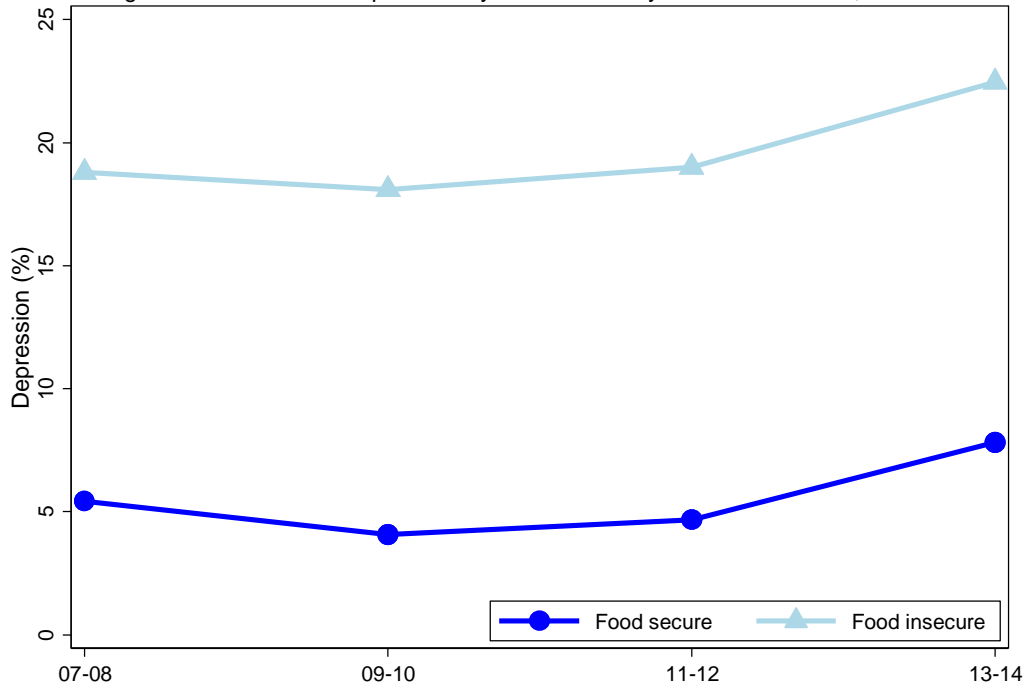


Figure 8: At least one ADL Limitation by Food Insecurity Status for Seniors, 1999-2014

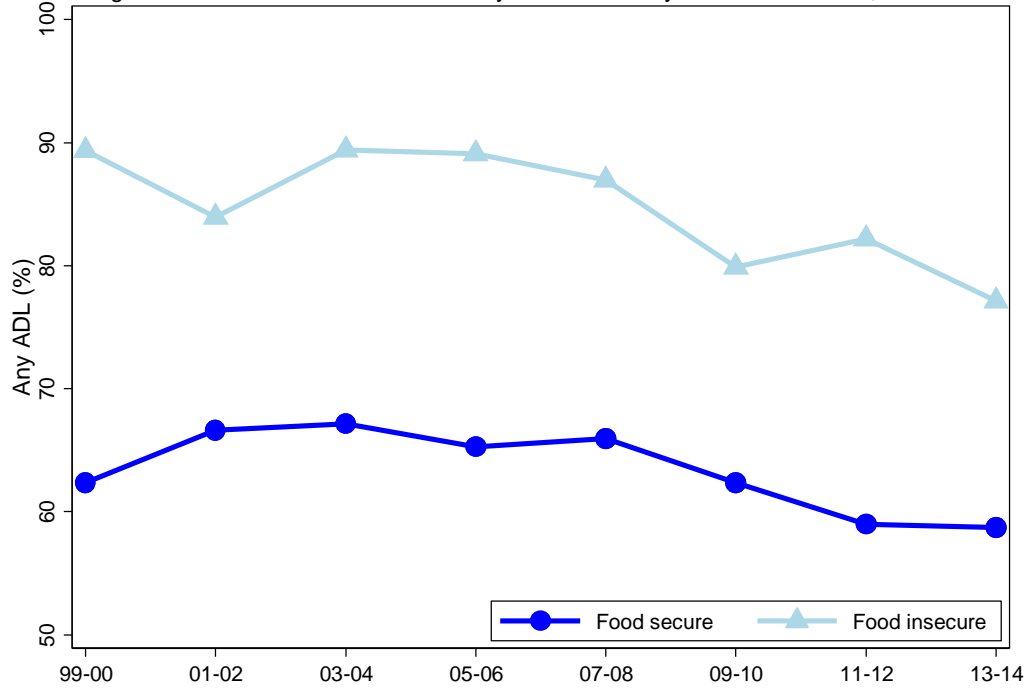


Figure 9: High Blood Pressure by Food Insecurity Status for Seniors, 1999-2014

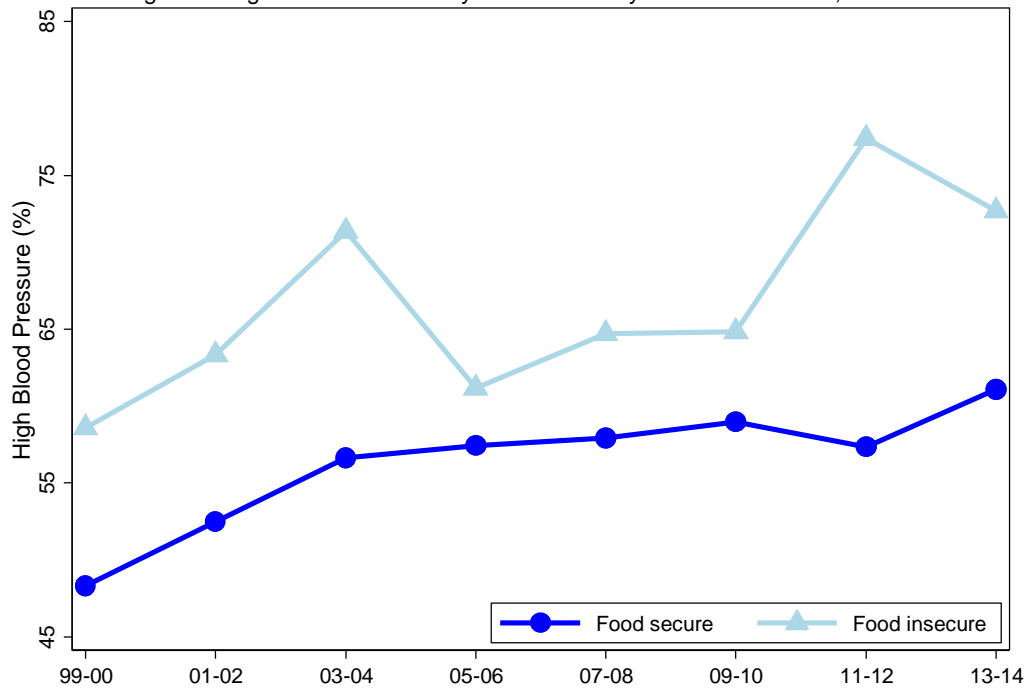


Figure 10: Congestive Heart Failure by Food Insecurity Status for Seniors, 1999-2014

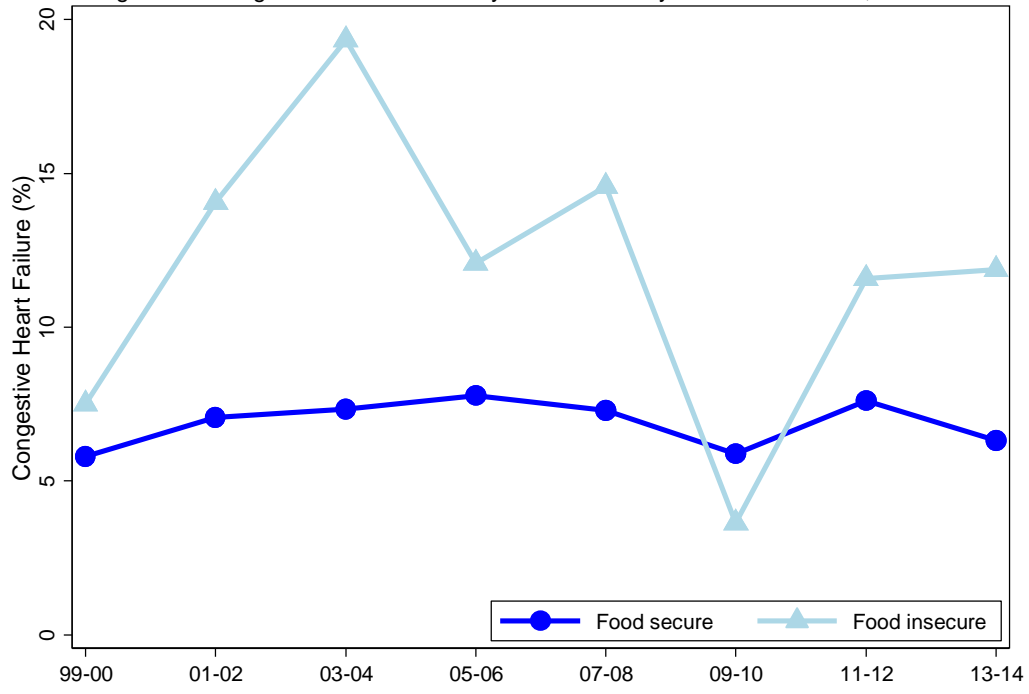


Figure 11: Heart Attack by Food Insecurity Status for Seniors, 1999-2014

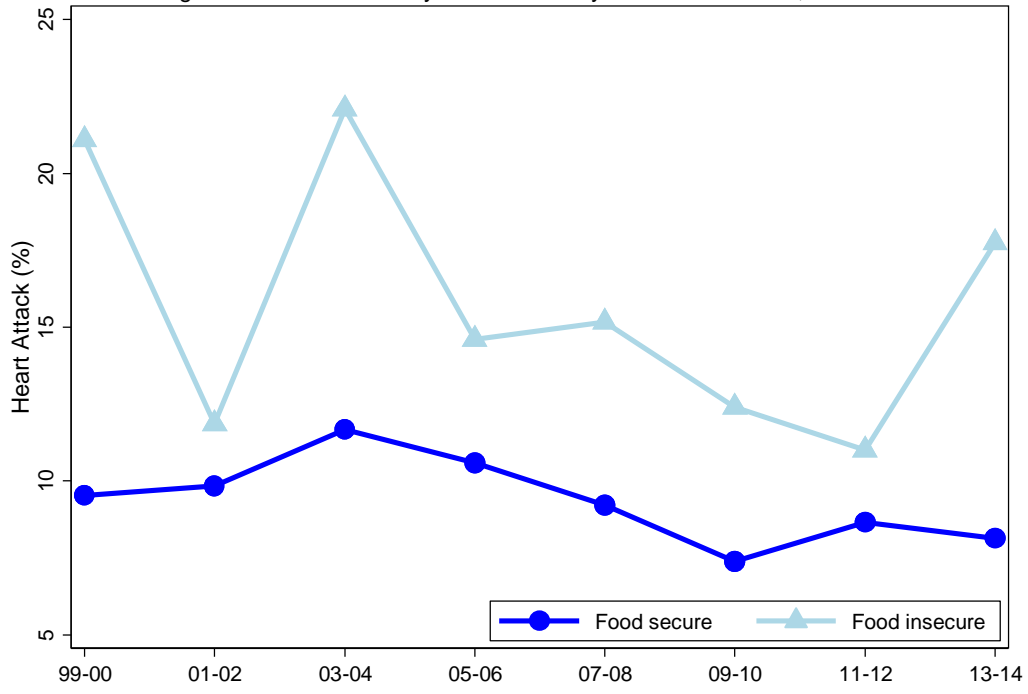


Figure 12: Chest Pain by Food Insecurity Status for Seniors, 1999-2014

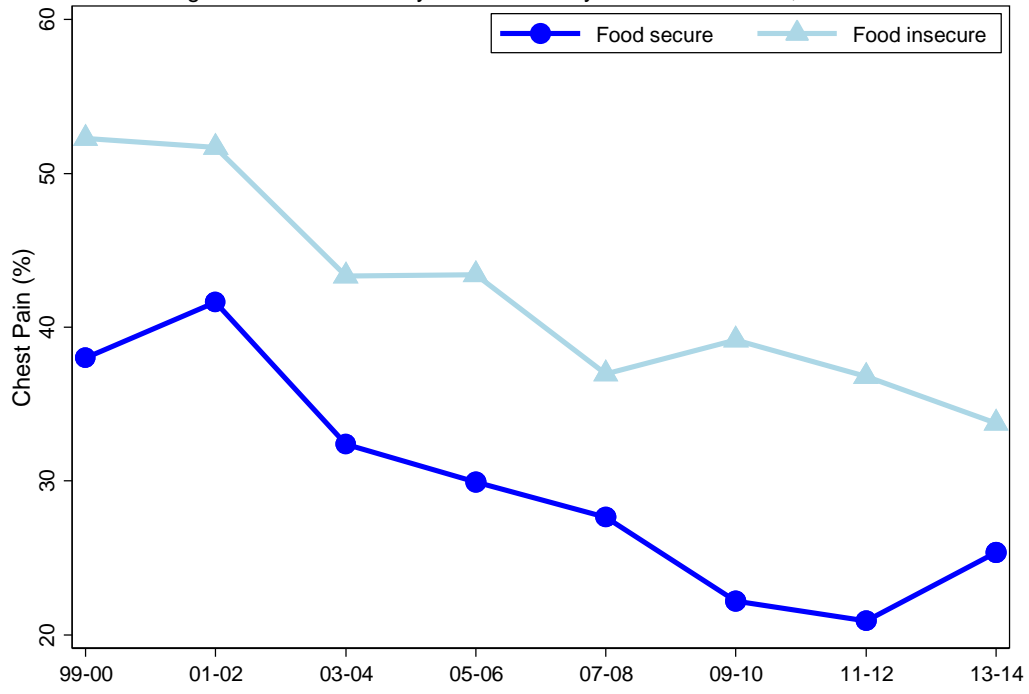


Figure 13: Asthma by Food Insecurity Status for Seniors, 1999-2014

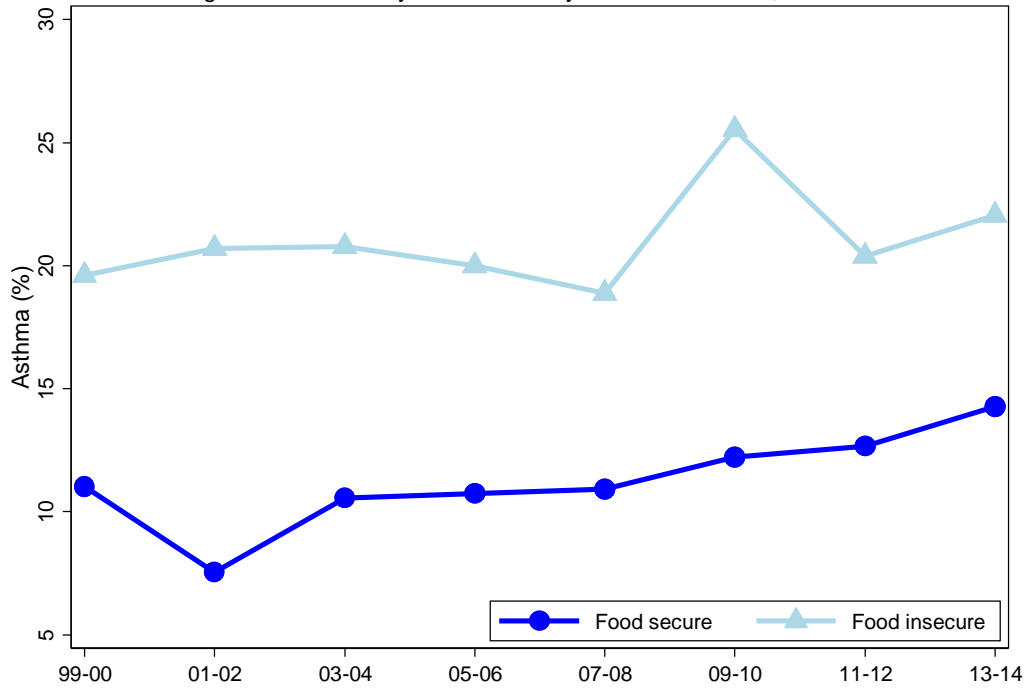




Figure 14: Effect of Food Insecurity on Nutrition

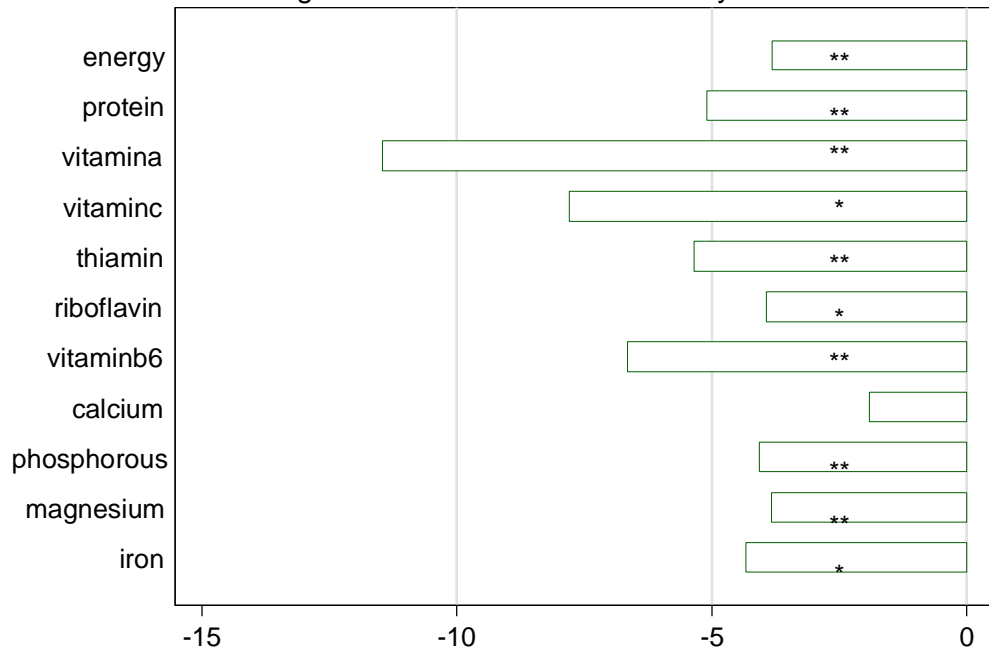
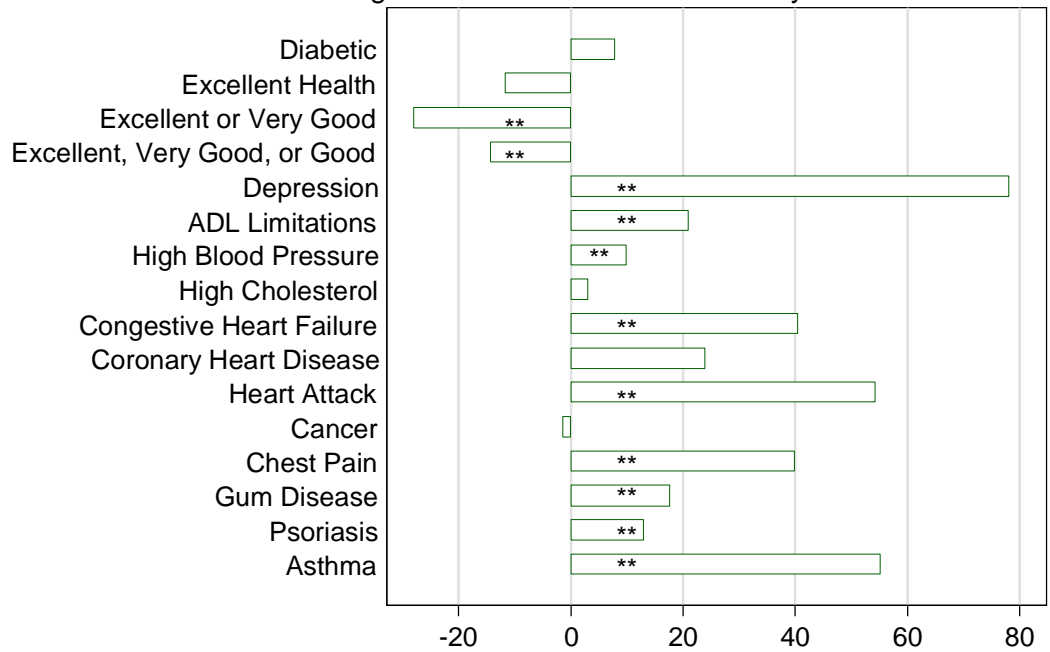


Figure 15: Effect of Food Insecurity on Health Outcomes



## About the Authors

**James P. Ziliak, Ph.D.**, holds the Carol Martin Gatton Endowed Chair in Microeconomics in the Department of Economics and is Founding Director of the Center for Poverty Research at the University of Kentucky. He earned received his BA/BS degrees in economics and sociology from Purdue University, and his Ph.D. in Economics from Indiana University. He served as assistant and associate professor of economics at the University of Oregon, and has held visiting positions at the Brookings Institution, University College London, University of Michigan, and University of Wisconsin. His research expertise is in the areas of labor economics, poverty, food insecurity, and tax and transfer policy. Recent projects include the causes and consequences of hunger among older Americans; trends in earnings and income volatility in the U.S.; trends in the antipoverty effectiveness of the social safety net; the origins of persistent poverty in America; and regional wage differentials across the earnings distribution. He is editor of *Welfare Reform and its Long Term Consequences for America's Poor* published by Cambridge University Press (2009) and *Appalachian Legacy: Economic Opportunity after the War on Poverty* published by Brookings Institution Press (2012), and co-editor of *SNAP Matters: How Food Stamps Affect Health and Well Being* at Stanford University Press (2015).

**Craig Gundersen, Ph.D.**, is the Soybean Industry Endowed Professor in Agricultural Strategy in the Department of Agricultural and Consumer Economics at the University of Illinois, is on the Technical Advisory Group for Feeding America, is the lead researcher on Feeding America's Map the Meal Gap project, and is the Managing Editor for *Applied Economic Perspectives and Policy*. He is also a Round Table Member of the Farm Foundation, a Non-Resident Senior Fellow at the Chicago Council on Global Affairs, and a Faculty Affiliate of the Wilson Sheehan Lab for Economic Opportunities (LEO) at the University of Notre Dame. His research concentrates on the causes and consequences of food insecurity and on the evaluation of food assistance programs, with an emphasis on SNAP.

Contact information:

Professor James P. Ziliak  
Center for Poverty Research  
University of Kentucky  
Gatton Building, Suite 234  
550 South Limestone St.  
Lexington, KY 40506-0034  
Phone: (859) 257-6902  
Email: [jziliak@uky.edu](mailto:jziliak@uky.edu)

Professor Craig Gundersen  
Department of Agriculture and Consumer Economics  
University of Illinois  
323 Mumford Hall  
1301 W. Gregory Dr.  
Urbana, IL 61801  
Phone: (217) 333-2857  
Email: [cggunder@illinois.edu](mailto:cggunder@illinois.edu)