USDA

United States Department of Agriculture

Food Security and Food Purchase Quality Among Low-Income Households: Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS)

Christian A. Gregory, Lisa Mancino, Alisha Coleman-Jensen

United States Department of Agriculture

Economic Research Service
www.ers.usda.gov

Cover photo: Getty Images.

Food Security and Food Purchase Quality Among Low-Income Households: Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS)

Christian A. Gregory, Lisa Mancino, Alisha Coleman-Jensen

Abstract

This report characterizes the difference in food purchase quality of low-income food-insecure and food-secure households using the National Household Food Acquisition and Purchase Survey (FoodAPS), a unique data collection fielded by the USDA, Economic Research Service in partnership with the USDA, Food and Nutrition Service focused on household food purchase behavior. FoodAPS collected food acquisition and purchase data from 4,826 households over a single week between April 2012 and January 2013. The survey measured food insecurity using the 10-item, 30-day food security module, a series of questions that focus on behaviors and conditions related to adequate food supplies in the household. There are salient differences in overall quality of total food acquisitions, measured by the 2010 Healthy Eating Index score, purchased by food-secure and food-insecure households at or below 130 percent of the Federal poverty line. There are particularly important differences in total fruit, whole fruit, as well as total protein and seafood and plant protein foods purchased for these households. Moreover, food-insecure households spend less per adult equivalent on all food, but food at home in particular. Additionally, there are significant differences in dietary components not purchased or purchased in excess by these households: food-insecure households are much more likely to have no fruit, dairy, or protein, but large amounts of refined grains in their total purchase basket. Taking food spending and purchase quality into account, food-insecure households purchase about half of the fruit per adult equivalent and about three-fifths of the protein foods per adult equivalent in comparison with food-secure households.

Keywords: Healthy Eating Index, FoodAPS, food security, food purchase

Acknowledgments

Contents

Food Security and Food Purchase Quality Among Low-Income Households: Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS)

Christian A. Gregory, Lisa Mancino, Alisha Coleman-Jensen

What Is the Issue?

Most households in the United States have access to enough food so that everyone in the household can lead active, healthy lives—they are food secure. A sizeable fraction of households are food insecure, meaning that they lack such access to enough food. Currently, there is a single security survey module used in the United States. In the module, the food security survey questions on which food security classification is based are largely focused on sufficient *quantities* rather than the *quality* of foods. However, the quality of food that food-insecure households acquire is also essential to know. Food insecurity is known to be associated with a host of adverse health outcomes in both adults and children. Some of those conditions are related to the quality of diet—for example, diabetes, high blood pressure, and dyslipidemia (abnormal levels of cholesterol or triglycerides in the blood). Looking more closely at the quality of food in food-insecure households could offer insights into the ways that food choices impact health for these households and might also underscore the importance of consumer education, particularly for low-income households. This study uses a novel data collection fielded by the USDA, Economic Research Service in partnership with the USDA, Food and Nutrition Service to quantify and characterize differences in food purchases by food-secure and food-insecure households in a way that, before now, has not been possible.

What Did the Study Find?

This study looks at the nutritional quality of food purchases of low-income food-secure and food-insecure households, as collected over 1 week in the National Household Food Acquisition and Purchase Survey (FoodAPS). The quality of the purchases were estimated using the 2010 Healthy Eating Index (HEI-2010) score, a standard measure of adherence to Federal dietary guidance widely used in research about healthfulness of food intakes and consumption. Total HEI-2010 scores are made up of 12 "component" scores that are added together. For both total and component HEI-2010 scores, higher numbers indicate better adherence to dietary guidance—i.e., more healthy purchases. There are significant differences in the purchase quality of low-income food-secure and food-insecure households. In particular:

- Food-insecure households spend about $13 less per adult equivalent (PAE) per week on food at home (FAH) than food-secure households.

- Food-insecure households spend a higher fraction of their total FAH budget at convenience stores than food-secure households do—food-insecure households spend about 20 percent, while food-secure households spend less than 10 percent.

- The total HEI-2010 score for the FAH purchase basket for food-insecure households (44.2) is about 10 percent lower than for food-secure households (48.9).

- For every 1,000 calories in their FAH total purchases, food-insecure households acquire less total fruit, whole fruit, total protein, and seafood and plant protein compared to food-secure households.

- Food-insecure households have significantly higher probabilities of purchasing no fruit, no dairy, and no protein foods for FAH than food-secure households. Food-insecure households also have a higher probability of having a zero score for refined grains, meaning that they purchase more refined grains per 1,000 calories than is recommended by dietary guidance.

- Food-insecure households acquire about half the fruit (in cup equivalents) PAE per week than food-secure households. Food-insecure households acquire about 3.6 cups, while food-secure households acquire just over 7 cups PAE.

- The relative deficits in whole fruit and total fruit persist across the income distribution.

- Food-insecure households also purchase significantly less in protein foods (measured in ounce equivalents) PAE than food-secure households.

- Food-insecure households acquire about 5,200 calories less PAE per week in FAH than food-secure households. That is roughly the intake of an adult male for 2 days.

- The difference in FAH calories PAE purchased is not due to income alone; food-insecure households at 200 percent of the Federal poverty level purchase about 2,700 calories PAE less per week than food-secure households—about the intake of an adult male in 1 day.

- Food-insecure households' HEI-2010 score for their food-away-from-home (FAFH) purchases is about 5 percent lower than for food-secure households.

- There are also some differences by food security status in FAFH purchases, including lower scores for protein foods that remain across the income distribution.

The large differences in FAH total and component scores underline the fact that the differences in the amounts of food that food-insecure households purchase also show up in differences in the *quality* of foods that they purchase. This adds important detail to the understanding of the meaning of food insecurity and its relevance to overall health.

How Was the Study Conducted?

Data from FoodAPS were used for this study. The data set is a cross-sectional survey that over-samples low-income Supplemental Nutrition Assistance Program (SNAP) and non-SNAP households; the data contain weights and sampling information that make the estimates nationally representative. A unique feature of the data is that they contain information on all food acquisitions made by anyone in any of the sample households over the survey week. Using information on the nutritional quality of all of the acquisitions, researchers have calculated HEI-2010 scores for the total purchases for at-home and away-from-home consumption. Regression-adjusted predictions were estimated for total HEI-2010, components of HEI-2010, total energy, and food spending across food security status.

Food Security and Food Purchase Quality Among Low-Income Households: Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS)

Introduction

Research has established food security as an important public health issue. Household food security status has been shown to be correlated with many kinds of adverse health outcomes including, among adults, chronic disease generally (Gregory and Coleman-Jensen, 2017; Laraia, 2013, Seligman et al., 2010a), diabetes (Seligman et al., 2007; Seligman et al., 2010b), problems with diabetes management (Seligman et al., 2010b, Seligman et al., 2012), hypoglycemia (Seligman et al., 2011), depression and mental health (Heflin et al., 2005), poor general health, (Gundersen and Ziliak 2015), and medication underuse (Bengle et al, 2010; Afulani et al., 2015; Herman et al., 2015; Berkowitz et al., 2014). Food insecurity is also associated with parental depression (Ryu and Bartfeld, 2012) and unfavorable health and unhealthy weight (Gundersen and Ziliak, 2015; Gundersen and Kreider, 2009). Among children, known health problems correlated with food insecurity include birth defects, anemia, asthma, cognitive problems, problems with social adaptation, and cognitive function (Howard, 2011).

Household food security in the United States is measured by a series of closed-end questions that pertain to conditions or behaviors associated with access to sufficient food for healthy living. Questions range in severity from anxiety about the household food supply to quality of food (i.e., being able to afford balanced meals), to disrupted eating patterns (i.e., skipping meals), to not having enough food to eat. Based on the questions affirmed in the survey, relatively less severe food insecurity tends to be characterized by anxiety about the household food supply and reductions in dietary quality while the relatively more severe range of food insecurity tends to be characterized by reductions in overall dietary intake. That food insecurity, associated with lower food quality, would be a source of such adverse health effects is not surprising.

Some of the health conditions with which food insecurity is associated—diabetes, hypoglycemia, hypertension, and dyslipidemia, for example—are clearly related to the quality as well as the quantity of food that food-insecure households consume. The co-existence of unhealthy weight outcomes (obesity and overweight) with food insecurity points to another type of nutritional deficiency—one that can be understood as having to do with the nutritional composition of food as much as the quantities available in the household.[1] In short, even where sufficient quantities of food exist, the kinds of foods available to food-insecure households can make a big difference in their health. Understanding the particulars of their lower purchase quality can help underscore the importance of good nutrition for supporting the well-being of low-income households.

---

[1]The literature on the correlation between food insecurity and obesity is somewhat mixed. Recent work has found that obesity is correlated with individual (instead of household) food insecurity for children aged 6–11 (Kaur, 2015) and for adult men (Hernandez, 2017). In addition, a recent review of the literature emphasized that food insecurity and obesity and overweight are associated for adult women (Larson and Story, 2011).

1

Food Security and Food Purchase Quality Among Low-Income Households:
Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS), ERR-269
USDA, Economic Research Service

To date, research linking diet quality and food security is limited. Partly, that is because a primary data source for diet quality—the National Health and Nutrition Examination Survey (NHANES)—asks about the conditions in the food security module (FSM) over the previous 12 months, but ascertains specific data on food intakes on a single day a few weeks after the food security interview.[2] Since the time period to which the FSM questions and the dietary intake data do not line up, it has been difficult to make clear conclusions about the relationship between food security and food quality. This has been true of other data sources as well.

The current study takes advantage of a unique data collection undertaken by the USDA, Economic Research Service in partnership with the USDA, Food and Nutrition Service. This study, the National Household Food Acquisition and Purchase Survey (FoodAPS), followed roughly 4,800 households for a week and tracked all of their food acquisitions for both at-home and away-from-home consumption. The survey also included the 30-day household FSM (as well as a rich set of other socio-demographic variables). Because the time period for the collection of food acquisitions and the reference period for the FSM largely overlapped, it is possible to review the relationship between the quality of food acquisitions and food security status more closely. This provides a unique opportunity to view the relationship between the nutritional quality of food purchases and food security. This, in turn, adds significant detail to the understanding of the relationship between food security status and potential health concerns.

---

[2]In NHANES, the 24-hour diet diary is completed in the Mobile Examination Center (MEC), usually within 3 weeks of the family interview, at which time the FSM is administered.

Related Research

This study looks at the nutritional quality of food purchases by food security status, taking advantage of the data collection in the National Household Food Acquisition and Purchase Survey (FoodAPS), described in more detail in the *Data* section of this report. However, the literature that examines nutritional quality of food and food insecurity addresses *food intakes*—the amount and kinds of food a person actually eats. This literature on food intakes was used for review because literature about purchases is limited.

A recent comprehensive review of the research on food security and diet quality found mixed evidence of strong associations between food intakes and food security status in U.S. adults and children (Hanson and Connor, 2014). Out of 170 studies, only 29 percent of the studies found strong associations between food security status and diet for adults; fewer—only 19 percent—found strong associations for children. As the authors of this report suggest, this could be a result of adults attempting to shield children from food insecurity (Hanson and Connor, 2014). A similar result was obtained in Bhattacharya, et al. (2004), who found that food security status had no predictive power regarding diet outcomes of pre-school or school-age children, but that it did have predictive power for adults.

Results across different populations in studies looking at diet quality and food security are also quite mixed. For example, food security and diet quality were found not to be significantly related in a study of pregnant women (Gamba et al., 2016). Middaugh et al. (2012) found very little in the way of associations between income—usually strongly correlated with food insecurity—and fruit and vegetable consumption. Although food security was predictive of non-zero consumption of some foods, Taylor et al. (2017) found that overall dietary patterns were not different across food insecurity status. However, Leung et al. (2014) found strong evidence that food insecurity is negatively associated with diet healthfulness; Nunnery et al. (2018) found that households with low and very low food security were less likely to have fresh fruits and vegetables available in their homes; and Spees et al. (2017) found evidence that food-secure households' diet advantages are partially associated with the sources of their food when compared to similar food-insecure households (grocery versus convenience stores).

Many of the studies of diet quality and food insecurity use a measure of food insecurity for which the reference period is the last 12 months. For example, of the primary studies cited above, all but Nunnery et al. (2018) used the the National Health and Nutrition Examination Survey (NHANES), which contains the 12-month food security module (FSM).[3] As mentioned earlier, the reference period for the 24-hour dietary recall in NHANES is a single day usually within 3 weeks of the initial interview. The data used for this study, described in the next section, provide a view of food security status that has a reference period of the past 30 days that has greater overlap with the reference period for food purchase data: the 7 days right before the administration of the FSM.

---

[3]Nunnery et al. (2018) uses a convenience sample of pregnant women at a clinic for participants in the Special Supplemental Nutrition Program for Women, Infants, and Children.

3

Food Security and Food Purchase Quality Among Low-Income Households:
Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS), ERR-269
USDA, Economic Research Service

Data

FoodAPS

The data for this project come from the National Household Food Acquisition and Purchase Survey (FoodAPS), a data collection sponsored by the USDA, Economic Research Service and the USDA, Food and Nutrition Service. FoodAPS was fielded in the 9 months between April 2012 and January 2013 and followed 4,826 households, each for 1 week, obtaining detailed information for food-at-home (FAH) and food-away-from-home (FAFH) purchases. The sample was selected using a multi-stage stratification scheme and was representative of the contiguous United States. The four strata for the sample were (1) households receiving SNAP benefits (1,581 households), (2) non-SNAP households with incomes less that 100 percent of the Federal poverty line (346 households), (3) non-SNAP households with incomes between 100 and 185 percent of the Federal poverty guideline (851 households), and (4) non-SNAP households with incomes greater than 185 percent of the Federal poverty guideline (2,048 households). The sample is drawn with a clustered, multistage design, and is weighted so that descriptive statistics are nationally representative and inferences drawn from them are correct.

FoodAPS contains demographic, program participation, income, and food security information for each household. This information comes from two interviews—one conducted before the seven days of data collection on food acquisitions and one after. The final interview collects data on household eating habits (including food security), dietary needs, health status, income, and non-food expenditures. The initial interview contains a complete enumeration of persons in the household as well as information from the primary respondent—usually, the main food shopper in the household—about attitudes toward food and nutrition knowledge.

Food acquisitions in FoodAPS were tracked in several ways. Each household in the sample was issued a handheld scanner to track FAH items with a barcode. Items without a barcode, such as fresh produce, could be recorded by using a generic code for each item (i.e., tomatoes) and noting the weight, quantity (if available) and amount paid from store receipts. FAFH acquisitions were tracked using receipts and household members' records kept in acquisition diaries. For all persons under 11 years of age, FAFH acquisitions were recorded by the primary respondent.

Nutritional Quality: Healthy Eating Index

This study compares the nutritional quality of the food acquired by low-income food-secure households with that of low-income food-insecure households. As a basis for comparison, this study uses the 2010 Healthy Eating Index (HEI-2010) scores for the total foods acquired by the household over the survey week. These scores measure adherence to dietary guidelines outlined in the *Dietary Guidelines for Americans 2010*.[4] The total score is measured on a scale of 100 and is composed of 12 components. Nine of these components measure the adequacy of consumption: total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, and fatty acids. The remaining three components are moderation components, for which less consumption is generally better: refined grains, sodium, and empty calories (energy from solid fats, alcohol, and added sugars). For every 1,000 calories acquired, the HEI-2010 score awards

---

[4]This study uses HEI-2010 rather than the HEI-2015 because the survey was conducted in 2012–13 when the 2010 Dietary Guidelines were still current and the 2015 Dietary Guidelines and HEI-2015 were not yet released.

4

Food Security and Food Purchase Quality Among Low-Income Households:
Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS), ERR-269
USDA, Economic Research Service

points for obtaining higher amounts of the nine adequacy components while also awarding points for lower amounts of the three moderation components. As such, the total score can be considered an index of purchase healthfulness. Components are assessed on a density basis—quantities per 1,000 calories. For this application, HEI-2010 measures the healthiness of purchases—i.e. total food purchases over the survey week—rather than consumption.

Each item purchased in FoodAPS has to be matched to an amount—usually measured in cup equivalents—of HEI-2010 components, which is done by linking those foods to the USDA's Food Pattern Equivalent Database (FPED). This assignation can happen in several ways. Items are matched to a USDA nutrient food code either through the USDA Food and Nutrient Database for Dietary Studies (FNDDS) or the USDA National Nutrient Database for Standard Reference (SR). Matching to these sources uses item description and information about the degree of processing. For example, a carton of 2 percent milk would be matched to food code "11112110, milk, cow's, fluid, 2 percent fat," which would then be linked to the FPED values of the HEI-2010 components. The score for that item would use the quantities reported in the survey or imputed by USDA, Economic Research Service (ERS) researchers (Mancino et al., 2018a). More details about nutrient coding of foods in FoodAPS can be found in the *FoodAPS Nutrient Coding Overview* (ERS, 2016).

Categorizing Acquisitions

It is possible to assess total and component HEI-2010 scores for different store types, restaurant types, or, more generally, by FAH and FAFH. Acquisitions are separated into FAH and FAFH and HEI-2010 scores are assigned to each purchase basket, respectively. Acquisitions at grocery stores of all sizes, military commissaries, supermarkets, club stores, super stores, food specialty stores (meat, seafood, bakery), farmers markets, dollar stores, convenience stores, food pantries, or meals on wheels are all counted as FAH. All others are FAFH.[5] To characterize FAH spending, FAH acquisitions are divided into those at convenience stores, grocery stores or supermarkets, supercenters or club stores, and other stores. Dollar Stores, gas station markets, and pharmacies are counted as convenience stores; grocery stores of all sizes, farmers markets, and supermarkets are counted as grocery stores. Supercenters and club stores are the only stores counted in that category as such. All other stores or places for FAH acquisition are counted as other stores.

Energy and spending for FAH and FAFH per adult equivalent are normalized by using standards for energy requirements developed by the National Academies of Sciences, Institute of Medicine (now called the Health and Medicine Division). In general, a 2,000-calorie energy requirement is considered an adult equivalent. A family with 30-year-old male and female adults, a 10-year-old boy, and a 7-year-old girl would have energy requirements of 2,400, 1,800, 1,600, and 1,200 calories, respectively. So the household would have 3.5 adult equivalents.[6]

---

[5]This report follows the taxonomy of Todd and Scharadin (2016).

[6]In this case, Adult Equivalents (2,400+1,800+1,600+1,200)/2,000 = 3.5.

5

Food Security and Food Purchase Quality Among Low-Income Households:
Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS), ERR-269
USDA, Economic Research Service

Table 1
Understanding HEI-2010 score

Component	Maximum Score	Standard for Maximum Score	Standard for Minimum Score	1 point change =
Adequacy Components (more consumption = higher score)				
Total fruit	5	≥ 0.8 cup equiv./ 1,000 kcal	no fruit	.16 cup equiv./ 1,000 kcal
Whole fruit	5	≧ 0.4 cup equiv./ 1,000 kcal	no whole fruit	1.50 oz. equiv./ 1,000 kcal
Total vegetables	5	≥ 1.1 cup equiv./ 1,000 kcal	no vegetables	0.20 cup equiv./ 1,000 kcal
Greens and beans	5	≥ 0.2 cup equiv./ 1,000 kcal	no dark-green vegetables, beans, or peas	0.66 oz equiv./ 1,000 kcal
Whole grains	10	≥ 1.5 ounce equiv./ 1,000 kcal	no whole grains	0.16 oz equiv./ 1,000 kcal
Dairy	10	≥ 1.3 cup equiv./ 1,000 kcal	no dairy	2.00 oz equiv./ 1,000 kcal
Total protein foods	5	≥ 2.5 ounce equiv./ 1,000 kcal	no protein foods	0.50 oz equiv./ 1,000 kcal
Seafood and plant protein	5	≥ 0.8 ounce equiv./ 1,000 kcal	no seafood or plant proteins	0.16 oz equiv./ 1,000 kcal
Fatty acid ratio**	10	(PUF+MUF)/SFA > 2.5	(PUF+MUF)/SFA < 1.2	
Moderation Components (less consumption = higher score)				
Refined grains	10	≤ 1.8 ounce equiv./ 1,000 kcal	≥ 4.3 ounce equiv./ 1,000 kcal	0.25 oz equiv./ 1,000 kcal
Sodium	10	≤ 1.1 gram / 1,000 kcal	≥ 2.0 gram / 1,000 kcal	0.10 gram / 1,000 kcal
Empty calories†	20	≤ 19% of total energy	≥ 50% of total energy	1.55% of total energy

All scores between the minimum and maximum standards are assigned proportionately.
HEI = Healthy Eating Index
*PAE = Per Adult Equivalent (2,000 kcal)
** PUF = polyunsaturated fats, MUF = monounsaturated fats, SFA = saturated fatty acids
† Empty calories are also abbreviated as SOFAAS: solid fats, alcohol, and added sugar. Standard for counting alcohol is >13 grams/ 1,000 calories.
Source: HEI-2010 fact sheet: https://www.cnpp.usda.gov/sites/default/files/healthy_eating_index/CNPPFactSheetNo2.pdf

Table 1 shows the standards for HEI-2010 component scores: that is, what counts as a perfect score, what counts as a zero score, and what a 1-point difference in the component score means in terms of food quantities purchased. Except for fatty acids, quantities are normalized on a 1,000-calorie basis. The top of the table shows the adequacy components—that is, those components for which more consumption is better. The bottom panel of the table shows the moderation components—those components for which less consumption means a higher score. Intakes between the maximum and minimum standards are scored proportionately. So, for example, a food that had 0.4 cup equivalents of total fruit per 1,000 calories would get a score of 2.5, since it is half of the maximum standard, 0.8 cups, the score for which is 5.

Food Security

The 10-item, 30-day household food security module (FSM) was administered in the final interview, after a week of data collection on food acquisitions. The items in the FSM are administered in the order of severity, with the least severe item referring to worrying about household food stocks, and the most severe item referring to not eating for a whole day. The items are shown in Box 1. Items 1, 2, and 3 are counted as affirmative if the respondent says that the conditions are "sometimes" or "often" true. Items 5 and 10 are counted as affirmative if the respondent says that the conditions occurred in at least 3 days out of the last 30. Any household that responded affirmatively to 3 or more items was counted as food insecure.

Questions Used To Assess Food Security of Households in the National Household Food Acquisition and Purchase Survey (FoodAPS)

1. "We worried whether our food would run out before we got money to buy more." Was that often, sometimes, or never true for you in the last 30 days?

2. "The food that we bought just didn't last and we didn't have money to get more." Was that often, sometimes, or never true for you in the last 30 days?

3. "We couldn't afford to eat balanced meals." Was that often, sometimes, or never true for you in the last 30 days?

4. In the last 30 days, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food? (Yes/No)

5. (If yes to question 4) In the last 30 days, how many days did this happen?

6. In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money for food? (Yes/No)

7. In the last 30 days, were you ever hungry, but didn't eat, because there wasn't enough money for food? (Yes/No)

8. In the last 30 days, did you lose weight because there wasn't enough money for food? (Yes/No)

9. In the last 30 days did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food? (Yes/No)

10. (If yes to question 9) In the last 30 days, how many days did this happen?

Methods

The main estimation sample is comprised of households with incomes at or below 130 percent of the Federal poverty line (FPL), which was $23,050 for a family of four in 2012. This level of income is used because it is the gross income limit for SNAP eligibility.[7] In addition to sample means of the dependent and independent variables stratified by food security status, linear regressions of HEI-2010 total and component scores are estimated on demographics, household characteristics (including food security), and attitudes about nutrition. Selected results of the main regression estimates for income levels from 130 to 200 percent of the FPL are also shown. Finally, probit regressions are estimated that predict the probability of zero scores for HEI-2010 component scores.[8]

Socio-demographic Variables of Interest

In addition to data on food acquisitions, FoodAPS collects data on a rich set of individual and household characteristics. In this study, regression-adjusted estimates of HEI-2010 total and component scores include three broad sets of characteristics. The first are individual-level characteristics of the survey respondent—usually the household's primary food shopper. These include demographic characteristics (gender, race, and education), employment status, and health characteristics [body mass index (BMI), tobacco use, self-assessed health].

Second, the regression specifications include household characteristics that would be important to food choice: in particular, income (as a fraction of the FPL), household size, driving distance to the primary store, whether the household members use a car to get to the primary store, and whether the household has had a large expense in the past month that affected their food spending during the survey week.[9]

Finally, the regressions include a series of variables that reflect the nutrition knowledge and practices of the respondent. These measures contain binary variables indicating whether the respondent thinks that healthy foods cost more, take more time, and do not taste as good. Additional variables show whether the respondent has heard of MyPlate and MyPyramid, whether he or she thinks the household members should eat more fruits and vegetables, whether he or she uses the Nutrition Facts Label, participated in a nutrition education program in the previous 2 months, and whether he or she searched for nutrition information on the internet.

---

[7]Many States adopted broad-based categorical eligibility rules for SNAP eligibility. Under these policies, the gross income limit is raised to as much as 200 percent of the FPL, although the net limits are still in place. States without broad-based categorical eligibility policies in 2012 were Alaska, Arkansas, Indiana, Kansas, Missouri, South Dakota, Tennessee, Utah, Virginia, and Wyoming.

[8]All summary statistics and regressions are weighted and use survey design information to ensure that inferences using them are correct.

[9]All inferences for spending were robust to the inclusion of a regressor that indicated the number of days that children participated in school lunch and breakfast that week. Similarly, including the number of free events as a whole did not have any effect on the regression estimates.

Results

This section provides a description of what this study found. The importance of these findings is provided in the *Discussion* section.

Descriptive Results

Table 2 displays the total 2010 Healthy Eating Index (HEI-2010) scores and component scores for all food purchased by the households in the sample, as well as total spending per adult equivalent (PAE). As the table shows, food-insecure households have lower total and component scores across the board. However, only five of those differences are statistically significant: total fruit, whole fruit, total dairy, seafood and plant protein, and refined grains. Total HEI-2010 scores and spending PAE by food-secure and food-insecure households are significantly different as well.

Table 2

Means of HEI-2010 total score, components, and spending for all purchases

Component	Food secure	Food insecure	Difference
Total HEI-2010	50.605	46.959	3.646**
	(1.125)	(0.795)	(0.016)
Total vegetables	2.835	2.784	0.051
	(0.124)	(0.091)	(0.766)
Greens and beans	1.701	1.431	0.270
	(0.180)	(0.119)	(0.174)
Total fruit	2.157	1.565	0.593***
	(0.113)	(0.119)	(0.000)
Whole fruit	2.513	1.774	0.739***
	(0.143)	(0.149)	(0.000)
Whole grains	1.907	1.526	0.381
	(0.178)	(0.153)	(0.120)
Total dairy	5.157	4.730	0.427*
	(0.180)	(0.212)	(0.085)
Total protein	4.063	3.951	0.112
	(0.076)	(0.085)	(0.341)
Seafood/Plant protein	2.004	1.549	0.455***
	(0.107)	(0.109)	(0.002)
Fatty acid ratio	5.194	5.240	−0.046
	(0.208)	(0.195)	(0.857)
Sodium	5.711	5.573	0.138
	(0.167)	(0.266)	(0.636)
Refined grains	6.170	5.664	0.506*
	(0.250)	(0.210)	(0.075)
Empty calories	11.193	11.173	0.020
	(0.422)	(0.320)	(0.974)
Spending per adult equivalent ($)	67.301	55.190	12.110*
	(4.322)	(4.614)	(0.059)
Observations (unweighted)	777	660	

Note: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p <0.05; ***p < 0.01
HEI = Healthy Eating Index.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

Food Security and Food Purchase Quality Among Low-Income Households:
Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS), ERR-269
USDA, Economic Research Service

Table 3

Means of food at home (FAH) HEI-2010 total score, components, and spending

Component	Food secure	Food insecure	Difference
Total HEI-2010	48.995	44.223	4.772***
	(1.23)	(1.29)	(1.69)
Total vegetables	2.435	2.311	0.124
	(0.14)	(0.15)	(0.21)
Greens and beans	1.250	1.214	0.036
	(0.14)	(0.13)	(0.18)
Total fruit	2.260	1.518	0.742***
	(0.14)	(0.13)	(0.17)
Whole fruit	2.525	1.618	0.907***
	(0.15)	(0.16)	(0.19)
Whole grains	2.101	1.652	0.449*
	(0.22)	(0.16)	(0.26)
Total dairy	4.763	4.256	0.508**
	(0.22)	(0.20)	(0.25)
Total protein	3.528	3.105	0.423***
	(0.08)	(0.10)	(0.12)
Seafood/Plant protein	1.778	1.370	0.408**
	(0.09)	(0.14)	(0.15)
Fatty acid ratio	5.013	4.831	0.182
	(0.23)	(0.21)	(0.29)
Sodium	6.235	6.310	−0.075
	(0.23)	(0.32)	(0.40)
Refined grains	6.596	6.146	0.450
	(0.23)	(0.27)	(0.29)
Empty calories	10.512	9.894	0.618
	(0.45)	(0.44)	(0.60)
FAH spending per adult equivalent($)	55.437	42.835	12.602***
	(3.31)	(3.69)	(4.22)
Observations (unweighted)	777	660	

Note: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p <0.05; ***p < 0.01
HEI = Healthy Eating Index.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

In table 3, the differences in the average HEI-2010 scores for food at home (FAH) purchase baskets by food security status, as well as differences in spending on FAH PAE are shown. Figure 1 displays the average HEI-2010 component scores by food security status. The statistics in the table make clear that, not accounting for demographics, household characteristics, or attitudes about food, food-insecure households had total HEI-2010 scores for FAH about 10 percent lower than food-secure households. Additionally, there are statistically significant differences in component scores for total fruit, whole fruit, whole grains, total dairy, total protein, and seafood and plant protein. FAH spending PAE is almost $13 lower for food-insecure households per week than food-secure households. This implies that, over a month, a food-insecure household such as that described above (comprised of two adults and two children, with 3.5 adult equivalents) would spend roughly $182 less than a food-secure family on FAH.

Figure 1

Food-insecure households have lower Healthy Eating Index component scores for food at home than food-secure households
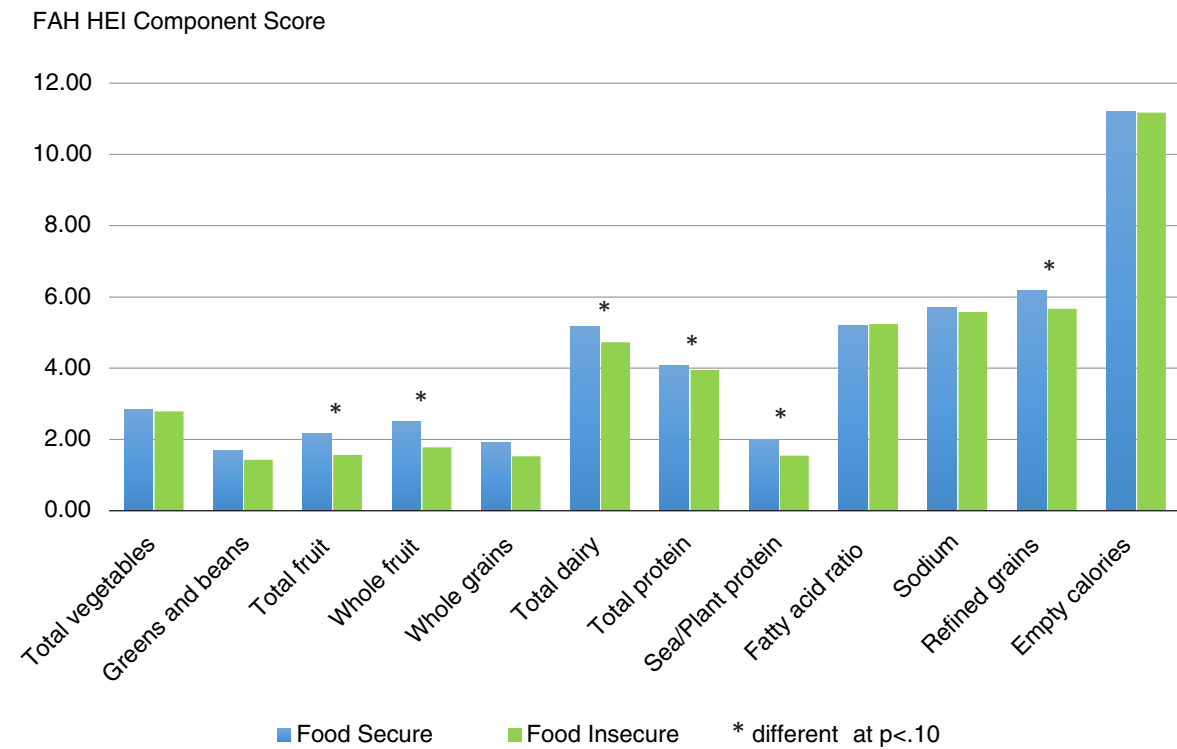
Note: FAH = food at home. HEI = Healthy Eating Index.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

Table 4 provides similar differences for food away from home (FAFH). However, the only difference that is statistically significant is for total protein foods. It is important to note that these statistics are only for households who had FAFH acquisitions over the study week: a total of 1,338 households in the sample had FAFH acquisitions, while 1,437 households reported only FAH acquisitions in the survey week.

Table 4

Means of HEI-2010 food-away-from-home total, components, and spending

| Component	Food secure	Food insecure	Difference
Total HEI-2010	42.192	40.025	2.167
	(0.82)	(1.20)	(1.48)
Total vegetables	2.957	2.844	0.113
	(0.10)	(0.14)	(0.19)
Greens and beans	1.313	1.202	0.110
	(0.14)	(0.13)	(0.18)
Total fruit	1.078	0.958	0.120
	(0.10)	(0.09)	(0.11)
Whole fruit	1.053	0.911	0.142
	(0.10)	(0.09)	(0.09)
Whole grains	0.696	0.525	0.171
	(0.07)	(0.09)	(0.12)
Total dairy	4.710	4.203	0.507
	(0.22)	(0.22)	(0.31)
Total protein	4.268	3.875	0.393**
	(0.07)	(0.13)	(0.15)
Seafood/Plant protein	1.212	0.976	0.236
	(0.10)	(0.12)	(0.16)
Fatty acid ratio	5.179	5.227	−0.049
	(0.24)	(0.22)	(0.37)
Sodium	3.366	3.506	−0.140
	(0.21)	(0.21)	(0.35)
Refined grains	4.382	4.081	0.301
	(0.21)	(0.23)	(0.39)
Empty calories	11.978	11.717	0.262
	(0.31)	(0.54)	(0.69)
Spending per adult equivalent ($)	16.769	14.411	2.359
	(1.65)	(2.71)	(3.27)
Observations (unweighted)	722	616	

Note: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p < 0.05; ***p < 0.01
HEI = Healthy Eating Index.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

The breakdown of FAH spending by store types for food-secure and food-insecure households can be seen in table 5. As was shown in table 3, food-insecure households spend about $13 less PAE on FAH than food-secure households. Most of that difference comes from shopping at the grocery store: food-secure households spend approximately $10 PAE more at the grocery store, $1.50 more at other stores, and $4 less at convenience stores than food-insecure households. In terms of the share of FAH spending, food-insecure households spend double the share of FAH spending at convenience stores than food-secure households.[10]

Table 5

Food at home (FAH) spending by store type ($)

Store type	Food Secure	Food Insecure	Difference
Spending per adult equivalent			
Convenience store	$3.42	$7.46	−$4.04*
	0.64	1.94	(2.07)
Grocery store/supermarket	$23.90	$13.46	$10.44***
	3.11	1.8	(3.48)
Supercenter/club store	$25.60	$20.98	$4.62
	2.28	2.7	(2.74)
Other store	$2.55	$1.02	$1.52**
	0.58	0.25	(0.62)
Fraction of FAH spending per adult equivalent			
Convenience store	0.099	0.196	−0.097***
	(0.01)	(0.02)	(0.02)
Grocery store/supermarket	0.395	0.349	0.047
	(0.03)	(0.03)	(0.03)
Supercenter/club store	0.460	0.428	0.031
	(0.03)	(0.03)	(0.03)
Other store	0.046	0.029	0.018*
	(0.01)	(0.01)	(0.01)
Observations (unweighted)	777	660	

Note: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p < 0.05; ***p < 0.01.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

With respect to household characteristics (table 6, middle panel), food-secure households have higher incomes even in this low-income sample. Food-secure households also travel farther to the primary store and are more likely to use a car to get to the store. Food-secure households are about a third as likely to have had a recent large expenditure that affected their food budget during the purchase week.

Table 6 also shows that respondents in food-insecure households are more than twice as likely as those in food-secure households to say that healthy foods cost more. They are significantly more likely to say that healthy foods don't taste good. They are less likely to have heard of MyPyramid, and more likely to say that they should eat more fruits and vegetables.

---

[10]Small differences in the sums and sum of differences in FAH spending here and in table 1 are due to rounding.

Table 6

Sample means of respondent characteristics, household characteristics, and attitudes and knowledge about healthy food variables

Characteristics and attitudes	Food secure	Food insecure	Difference
Respondent characteristics			
Female	0.673	0.707	−0.042
	(0.03)	(0.03)	(0.04)
Non-Hispanic White	0.511	0.442	0.092***
	(0.04)	(0.04)	(0.03)
Non-Hispanic Black	0.238	0.230	−0.027
	(0.04)	(0.04)	(0.03)
High school graduate	0.339	0.359	−0.012
	(0.03)	(0.02)	(0.04)
Some college	0.229	0.175	0.052**
	(0.02)	(0.02)	(0.02)
College graduate	0.231	0.180	0.047
	(0.03)	(0.02)	(0.03)
Employed	0.305	0.231	0.074**
	(0.03)	(0.02)	(0.04)
Use tobacco	0.267	0.434	−0.174***
	(0.03)	(0.04)	(0.04)
Body mass index (BMI)	28.484	29.755	−0.916
	(0.33)	(0.48)	(0.62)
Excellent/very good health	0.317	0.182	0.131***
	(0.03)	(0.02)	(0.04)
Household characteristics			
Income as percent of Federal poverty line (FPL)	82.763	72.935	9.819***
	(2.14)	(1.98)	(2.62)
Household size	2.354	2.512	−0.137
	(0.09)	(0.10)	(0.11)
Driving distance to primary store	4.971	3.851	1.369**
	(0.60)	(0.50)	(0.53)
Get to primary store by car	0.896	0.793	0.114***
	(0.02)	(0.03)	(0.04)
Recent large expenditure	0.072	0.209	−0.133***
	(0.01)	(0.03)	(0.04)
Attitudes and knowledge about healthy food			
Healthy foods cost more	0.301	0.658	−0.359***
	(0.02)	(0.03)	(0.04)
Heathy foods take more time	0.190	0.193	0.007
	(0.03)	(0.02)	(0.03)
Healthy foods don't taste as good	0.133	0.236	−0.124***
	(0.02)	(0.03)	(0.04)

—continued

Table 6

Sample means of respondent characteristics, household characteristics, and attitudes and knowledge about healthy food variables—continued

Characteristics and attitudes	Food secure	Food insecure	Difference
Attitudes and knowledge about healthy food, continued			
Heard of MyPlate	0.148	0.176	−0.031
	(0.02)	(0.02)	(0.03)
Heard of MyPyramid	0.526	0.423	0.101**
	(0.03)	(0.02)	(0.05)
Should eat more fruits/vegetables	0.668	0.802	−0.106***
	(0.02)	(0.02)	(0.04)
Always/most of the time use nutrition facts label	0.275	0.290	−0.015
	(0.02)	(0.02)	(0.03)
Participated in nutrition education last 2 months	0.044	0.056	−0.014
	(0.01)	(0.01)	(0.01)
Searched for nutrition information on internet	0.165	0.179	0.000
	(0.02)	(0.02)	(0.03)
Observations (unweighted)	777	660	

Note: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p < 0.05; ***p < 0.01.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

Regression Results

Food At Home

Table 7 presents the results for regressions of FAH HEI-2010 scores (total and component) on respondent characteristics, household characteristics, and respondent attitudes and knowledge about healthy food as shown in table 6. The table shows the conditional associations of food insecurity with total and component HEI-2010 scores for FAH in the left group of three columns, and these same associations for FAFH in the right three columns.[11] As the results in the left columns for FAH show, food-insecure households have lower total HEI-2010 scores and significantly lower component scores for total and whole fruit. The difference in total HEI-2010 scores between food-secure and food-insecure households—about 4 points—is between 9 and 10 percent of the average score, and accounts for 85 percent of the unconditional difference shown in table 4. Households that are food insecure have lower conditional scores for total protein and seafood and plant protein component scores; in addition, they spend almost $13 less PAE on FAH than food-secure households, and acquire about 5,200 calories PAE less than food-secure households.

---

[11]Full regression results can be found in the Appendix: FAH results are in tables 1a and 1b; FAFH results are in tables 2a and 2b.

Table 7

Difference in Nutritional Quality of Food Purchases for Food-insecure households

Component	Food at home			Food away from home		
HEI Component	Food Insecure	SE	R^2	Food Insecure	SE	R^2
Total HEI-2010	−3.974**	(1.757)	0.121	−2.288*	(1.270)	0.073
Total vegetables	−0.078	(0.238)	0.082	−0.090	(0.202)	0.029
Greens/beans	−0.047	(0.178)	0.138	−0.141	(0.202)	0.058
Total fruit	−0.719***	(0.180)	0.163	−0.092	(0.120)	0.108
Whole fruit	−0.867***	(0.223)	0.186	−0.101	(0.129)	0.101
Whole grain	−0.087	(0.249)	0.077	−0.133	(0.095)	0.048
Total dairy	−0.436	(0.290)	0.092	−0.307	(0.346)	0.138
Total protein	−0.439***	(0.151)	0.050	−0.355**	(0.142)	0.067
Seafood/plant	−0.446**	(0.179)	0.052	−0.220	(0.193)	0.049
Fatty acid ratio	−0.284	(0.320)	0.033	−0.170	(0.380)	0.055
Sodium	0.118	(0.431)	0.052	0.144	(0.276)	0.037
Refined grain	−0.279	(0.309)	0.064	−0.490	(0.337)	0.055
Empty calories	−0.409	(0.613)	0.067	−0.333	(0.500)	0.042
Calories PAE	−5,170.072***	(1,532.843)	0.167	−401.120	(459.680)	0.101
Spending PAE	−12.870***	(4.381)	0.169	−1.823	(3.127)	0.171
Observations (unweighted)	1,437			1,338		

Notes: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p < 0.05; ***p < 0.01. HEI = Healthy Eating Index; PAE = per adult equivalent; SE = standard error; R^2 = goodness-of-fit.

Models include controls for respondent characteristics, household characteristics, and respondent attitudes and knowledge about healthy food. Full regression results are shown in Appendix tables 1a and 1b.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

Food Away From Home

The conditional association of respondent and household observables with FAFH quality are shown in the three right columns of table 7. Food-insecure households have slightly lower total HEI-2010 and total protein food scores for FAFH. These differences in FAFH are statistically significant, but smaller than the differences in FAH scores (table 7, left three columns). None of the other dietary components, food spending PAE or energy PAE in FAFH is statistically different for food-insecure households compared with food-secure households.

Scores, Spending and Calories Purchased Across the Income Distribution

The association between food insecurity and income is well known. [For example, see Gregory and Smith (2018), figure 1.] However, food security status conveys information that is not captured in income alone, and the results shown so far with respect to food insecurity are not due solely to income. In order to demonstrate this, the regressions described in the main results are estimated for each income level between 130 and 200 percent of the Federal poverty line, inclusive.

Table 8

Conditional associations of food insecurity with food-at-home purchase quality across income distribution

	Income as percent of Federal poverty line							
	130	140	150	160	170	180	190	200
Total HEI-2010	−3.974**	−3.164*	−2.310	−2.069	−1.714	−1.657	−1.887	−1.730
	(1.757)	(1.743)	(1.713)	(1.506)	(1.437)	(1.418)	(1.431)	(1.379)
Total fruit	−0.698***	−0.568***	−0.483**	−0.431**	−0.521***	−0.515***	−0.518***	−0.466***
	(0.180)	(0.201)	(0.198)	(0.169)	(0.150)	(0.147)	(0.152)	(0.146)
Whole fruit	−0.867***	−0.760***	−0.691***	−0.563***	−0.631***	−0.624***	−0.654***	−0.597***
	(0.223)	(0.202)	(0.203)	(0.167)	(0.164)	(0.151)	(0.155)	(0.149)
Total dairy	−0.436	−0.529**	−0.421*	−0.476*	−0.565**	−0.596**	−0.501**	−0.520**
	(0.290)	(0.255)	(0.237)	(0.241)	(0.245)	(0.260)	(0.244)	(0.233)
Total protein	−0.439***	−0.308**	−0.249*	−0.185	−0.126	−0.112	−0.126	−0.121
	(0.151)	(0.143)	(0.141)	(0.114)	(0.106)	(0.108)	(0.108)	(0.105)
Seafood/plant protein	−0.446**	−0.336*	−0.278	−0.173	−0.117	−0.0941	−0.130	−0.176
	(0.179)	(0.197)	(0.200)	(0.187)	(0.181)	(0.170)	(0.173)	(0.155)
Spending per adult equivalent (PAE)	−12.87***	−10.47***	−9.555**	−5.643	−5.359	−5.607	−6.257	−7.354*
	(4.381)	(3.796)	(4.095)	(3.987)	(4.141)	(3.950)	(3.794)	(3.638)
Energy PAE	−5,170.072***	−4,682.751***	−4,521.500***	−2,702.307**	−2,506.605*	−2,450.805**	−2,372.360**	−2,696.697**
	(1,532.84)	(1483.380)	(1,496.278)	(1,320.577)	(1,281.357)	(1,197.724)	(1,145.702)	(1,075.534)
Observations (unweighted)	1,437	1,588	1,698	1,861	1,994	2,097	2,213	2,309

Note: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p < 0.05; ***p < 0.01.
HEI = Healthy Eating Index.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

Table 8 displays the conditional association of household food insecurity with total HEI-2010, five components of HEI-2010, spending, and energy (calories) PAE for FAH across the income distribution.[12] These conditional associations are shown for 130 through 200 percent of the Federal poverty line (FPL). These are not mutually exclusive income groups but are inclusive of all households at or below the specified percent of FPL.

---

[12]For FAH and FAFH, the components were chosen based on regression results shown in table 7.

In general, as more households are added to the sample, several changes are at work. First, higher income households are being included in the sample; they are going to be healthier and (presumably) have as good or better purchase quality than lower income households, all other things being equal. Second, because the sample size is also growing, if the food-secure and food-insecure differences were to stay the same, there would be increased estimate precision. Significant shifts in the estimates of the conditional association of food insecurity with elements of diet quality reflects differences between food-secure and food-insecure households as income increases.

While there is a slight shift in some of the point estimates of the conditional associations between food insecurity and some of the diet outcomes over the income distribution, tests suggest no significant change in these estimates. For example, the point estimate for the difference in spending for food-insecure households at or below 130 percent of the FPL is almost $13; for households at or below 200 percent of the FPL, it is a little more than $7. However, this difference in differences is not statistically significant. Similar observations could be made about total energy, dairy, whole fruit, total fruit, and total HEI-2010 scores.

Table 9

Conditional associations of food insecurity with food-away-from-home purchase quality across income distribution

	Income as percent of Federal poverty line							
	130	140	150	160	170	180	190	200
Total HEI	−2.288*	−1.851	−1.418	−1.737	−2.056*	−1.990*	−1.946	−1.262
	(1.270)	(1.232)	(1.266)	(1.174)	(1.194)	(1.146)	(1.155)	(0.865)
Total protein	−0.355**	−0.300**	−0.328**	−0.314**	−0.323**	−0.293**	−0.309**	−0.283**
	(0.142)	(0.133)	(0.133)	(0.130)	(0.123)	(0.118)	(0.116)	(0.103)
Whole grain	−0.133	−0.091	−0.094	−0.140*	−0.147*	−0.117	−0.084	−0.107
	(0.095)	(0.093)	(0.090)	(0.077)	(0.074)	(0.082)	(0.083)	(0.079)
Empty calories	−0.333	−0.345	−0.333	−0.660	−0.767	−0.898*	−0.912*	−0.736*
	(0.500)	(0.485)	(0.521)	(0.577)	(0.513)	(0.479)	(0.465)	(0.397)
Observations (unweighted)	1,338	1,483	1,589	1,745	1,865	1,965	2,079	2,171

Note: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p < 0.05; ***p < 0.01.
HEI = Healthy Eating Index.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

Selected conditional associations with HEI-2010 component scores for FAFH with food insecurity across the income distribution are displayed in table 9. Although total HEI-2010 is significantly lower for food-insecure households at 130 percent of the FPL, it is not significantly different at higher levels of income. Total protein scores are lower for food-insecure households across the income distribution, while whole grain scores are different only at 160 and 170 percent of the FPL. Scores for empty calories are lower only at higher levels of income—above 180 percent of the FPL.[13]

---

[13]Empty calories are the colloquial name given to the SOFAAS component. SOFAAS means solid fats, alcohol, and added sugar.

Probability of Zero Scores

Table 10 shows the results of probit regressions for predictions of the probability of having a zero component score for FAH components.[14] This study employs these models because the distribution of component scores is often skewed in ways that aren't evident with linear regression or summary statistics.[15] The results from this table show that the probability of food-insecure households having zero scores in total fruit, whole fruit, dairy, total protein, seafood and plant protein, and refined grains is significantly higher than for food-secure households. For all of the adequacy components—total fruit, whole fruit, dairy, total protein, and seafood and plant protein—a zero score means no consumption. For refined grains, a zero score means that consumption is greater than 4.3 ounce equivalents per 1,000 calories. Food-insecure households have roughly double the probability of having zero scores for total fruit and whole fruit components. They have a greater probability of zero scores on seafood and plant proteins, and refined grains as food-secure households.[16]

Table 10

Difference in probability of zero score on HEI-2010 food at home components for food-insecure and food-secure households

Probability	Total vegetables	Greens/beans	Total fruit	Whole fruit	Whole grain	Total dairy
Difference	0.044	0.026	0.164***	0.191***	0.026	0.110***
	(0.041)	(0.042)	(0.042)	(0.040)	(0.045)	(0.022)
Food insecure	0.173	0.583	0.322***	0.411***	0.494	0.182***
	(0.183)	(0.362)	(0.080)	(0.083)	(0.287)	(0.033)
Food secure	0.129	0.557	0.158***	0.220***	0.468	0.072***
	(0.137)	(0.346)	(0.040)	(0.046)	(0.801)	(0.015)
Probability	Total protein	Seafood/plant protein	Fatty acid ratio	Sodium	Refined grain	Empty calories
Difference	0.095***	0.115***	0.017	0.028	0.045*	0.050
	(0.017)	(0.036)	(0.030)	(0.033)	(0.024)	(0.036)
Food insecure	0.144***	0.433***	0.216	0.182	0.18*	0.156
	(0.026)	(0.136)	(0.123)	(0.153)	(0.096)	(0.214)
Food secure	0.048***	0.318***	0.199	0.154	0.135***	0.106
	(0.009)	(0.099)	(0.360)	(0.183)	(0.073)	(0.077)
Observations (unweighted)	1,437					

Note: Standard errors in parenthesis. Estimates account for survey design. *p < 0.1; **p < 0.05; ***p < 0.01.
HEI = Healthy Eating Index.

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

---

[14]Parameter estimates from these regressions are available upon request.

[15]These differences are predicted by calculating the marginal conditional association of food insecurity with zero purchases in a given HEI-2010 category, and then adding that quantity to the appropriate subgroup's predicted probability. Statistical significance is assigned according to the significance of the coefficient on food insecurity.

[16]Differences in these probabilities for FAFH not shown, as none were significant.

Differences in Purchased Quantities

Figures 2 and 3 provide a picture of the differences in FAH HEI-2010 scores and total energy purchased per week mean on a practical level for food-insecure households. Food-insecure households purchase just about half as much total fruit and whole fruit PAE than food-secure households (figure 2).[17] Food-insecure households generally purchase 3.6 cups of total fruit PAE during the week, while food-secure households purchase over 7 cups PAE. In terms of whole fruit, food-insecure households purchase just under 2 cups PAE while food-secure households purchase just under 4 cups. Figure 3 shows that while food-secure households purchase about 35 ounces of total protein foods PAE, food-insecure households have roughly two-thirds of that, at about 23 ounces. Similarly, food-secure households have about 6 ounces of seafood and plant proteins PAE in their FAH purchase baskets, while food-insecure households have about 3 ounces.

Figure 2

Food-secure households purchase significantly more total and whole fruit per adult equivalent for food-at-home consumption than food-insecure households

Cup equivalents per adult equivalent
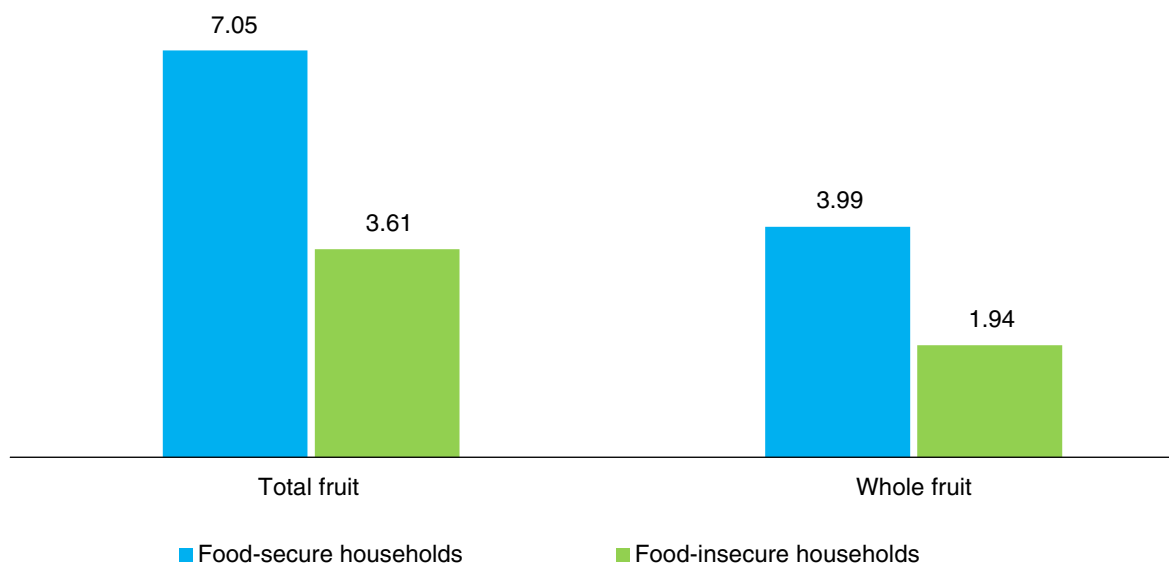
■ Food-secure households   ■ Food-insecure households

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

---

[17]These were calculated by using the information in table 1 and the household component HEI-2010 score. For example, in this case: (average HEI-2010 component score/maximum component HEI-2010) × (cup/ounce equivalents per 1,000 kcal) × (average kcal PAE) for food-secure and food-insecure households), respectively. The figures show the averages.

Figure 3

Food-secure households purchase significantly more food-at-home protein foods than food-insecure households

Ounce Equivalents per adult equivalent
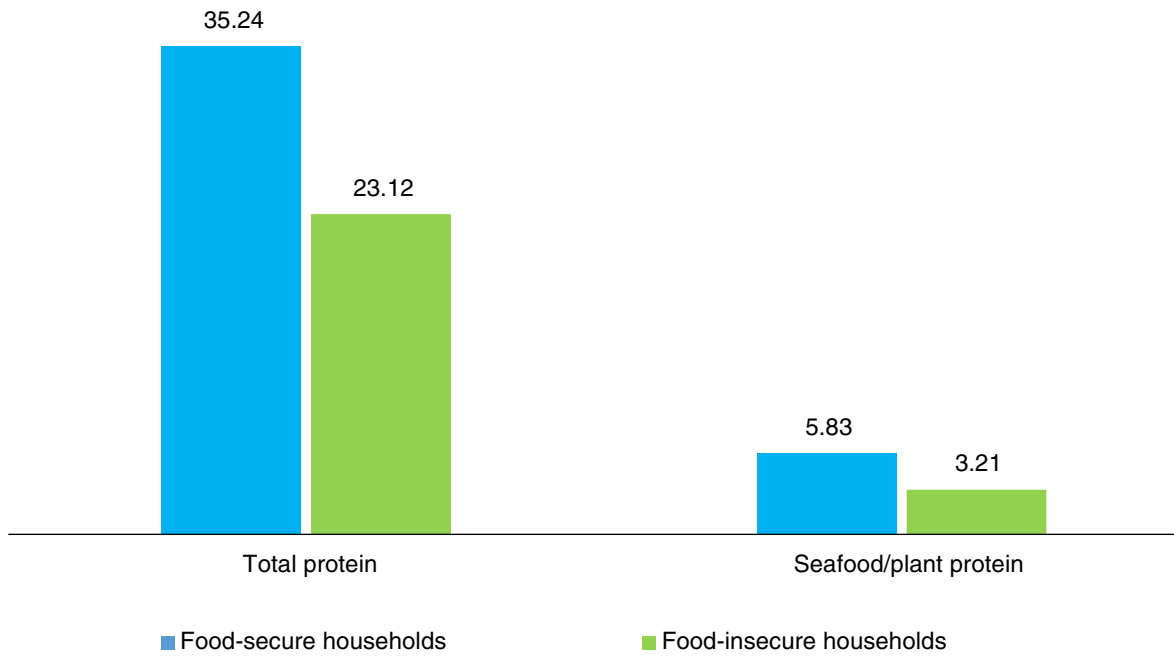
■ Food-secure households   ■ Food-insecure households

Source: USDA, Economic Research Service using data from the National Household Food Acquisition and Purchase Survey.

Food Security and Food Purchase Quality Among Low-Income Households:
Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS), ERR-269
USDA, Economic Research Service

Discussion

This report examines the purchases of food-secure and food-insecure households in order to understand the nutritional differences in the foods that they acquire. It also examines deficits in food expenditure and energy per adult equivalent (PAE) per week for these households. This is the first study that has been able to quantify these deficits at the same time. Moreover, because of the timing of the data collections in the National Household Food Acquisition and Purchase Survey (FoodAPS), it is possible to describe the correlations between quality, quantity, and food security with more confidence than when using other surveys.

Limitations of This Study

One limitation to the current study is that the measure of the healthfulness of purchase baskets does not get at what people eat but what they buy. Obviously, these two would be correlated, but the study did not include information on how households prepare meals or snacks with what is purchased and the inventories that they currently have in the household or how much food may be wasted. Although recent work shows that the the Healthy Eating Index (HEI) is highly correlated with a similar purchase index (Brewster et al., 2018), it seems likely that home inventories and food preparation practices for those in food-insecure households might be different from those in food-secure households. Without information about those practices or inventories, it is not possible to account for those significant aspects of food intake.

There may also be differences in food shopping and provisioning skills or practices between food-insecure and food-secure households that cannot be fully accounted for here. For example, possible differences in the frequency or patterns of food shopping between food-insecure and food-secure households—such as stocking up on food when it is in season or on sale and storing it for later use—may not be reflected in one week's purchase basket.

This analysis assumes that food purchases are averaged evenly across all household members and measured PAE. However, this may not be the case, especially in food-insecure households where adults may try to protect children from food insecurity.

Importance of Findings

Although there have been no studies that look directly at how food security is related to purchase quality in FoodAPS, the results presented here are consistent with what other studies using this data have found. For example, Tiehen, et al. (2017) compared expenditures for SNAP and eligible but non-participating SNAP households and found an unconditional difference of about $13, which is very similar to the differences in total and food at home (FAH) spending PAE found and shown in tables 2 and 4 (about $12), as well as the conditional difference shown for FAH in table 7 (about $12.50). Similarly, Zeballos and Anekwe (2018) found very little difference in the healthfulness of acquisitions of food away from home (FAFH) between SNAP and non-SNAP households, but did find larger differences for FAH acquisition. These results are similar to the results shown here in tables 3, 4, and 7. The study by Mancino et al. (2018b) compared SNAP households at a slightly higher income cut-off than used in this study for food security, and found that the unconditional difference in the 2010 Healthy Eating Index (HEI-2010) scores was 3 points, similar to what was shown in table 2 in regards to food-secure relative to food-insecure households. While the SNAP subsample is distinct from the food-insecure subsample, the two populations clearly overlap.

While some previous research has not found strong relationships between food expenditure and food security (Gundersen and Ribar, 2011), this study shows that food-insecure households spend significantly less PAE on FAH, and that they acquire significantly fewer calories PAE in FAH than food-secure households. The estimate of this study is that food-insecure households spend about $13 less PAE on FAH and acquire about 5,200 calories less PAE. They acquire fewer calories PAE across the income distribution. Findings on food spending differences are consistent with those reported in USDA's annual food security report. In 2017, the median food-secure household spent about 23 percent more for food than the median food-insecure household (Coleman-Jensen et al, 2018).

Our results also suggest that food-insecure households have lower purchase quality for FAH on a per-1,000 calories basis. Their conditional overall scores are lower in total HEI-2010, total fruit, whole fruit, total protein, and seafood and plant protein. Scores for the individual components total fruit and whole fruit are significantly lower at all levels of income examined here. The score for total dairy, which is not significantly correlated with food insecurity at 130 percent of the Federal poverty line (FPL), shows strong associations with food insecurity at and above 140 percent of the FPL. Total protein and seafood and plant protein foods are areas of quality deficits for food-insecure households at low levels of income.

The results with respect to lower total calories purchased by food-insecure households may seem paradoxical, given studies have suggested that some adults in food-insecure households are more likely to be obese than those in food-secure households (Larson and Story, 2011). It is worth noting that the largest differences in purchase quality for FAH of food-insecure households are precisely of those foods whose consumption is sometimes promoted as helping to maintain a healthy weight—such as fruit and vegetables, and protein foods (Johnston et al., 2004). Food-insecure households have a higher probability than food-secure households of not purchasing any of these more healthful foods. Additionally, regressions include the body mass index (BMI) of the respondent: the correlation of BMI with expenditure and energy is significant and positive, but it does not change the result with respect to food security. Moreover, results indicate that there is no difference in calories acquired as FAFH for food-insecure households, meaning that a larger share of their intake comes from FAFH. Some research has shown that increased FAFH is associated with lower diet quality (Todd, et al., 2010; Lin and Guthrie, 2012), although more recent research is mixed about this association (Saksena et al., 2018, chapter 8). This remains an important question for future research.

This study also shows that food-insecure households get only about half of the total fruit and whole fruit than food-secure households acquire. Moreover, total protein food acquisition for food-insecure households is about two-thirds what it is for food-secure households. Seafood and plant protein foods acquired by food-insecure households are a little over half of what they are for food-secure households.

Finally, food-insecure households have a higher probability of purchasing no foods that fall into some important dietary categories for FAH. In particular, they are more than twice as likely to purchase no whole fruit or total fruit, and they are more likely to have no seafood or plant protein foods, and to have excess refined grains in the weekly purchase baskets. They are also significantly more likely to have no acquisitions of dairy or total protein foods over the study week.

23

Food Security and Food Purchase Quality Among Low-Income Households:
Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS), ERR-269
USDA, Economic Research Service

These results are important because they add significant detail to understanding food-insecure households' food acquisitions. The food security module is comprised of questions pertaining mostly to the quantity of food available in the household with relatively less information about food quality. It shows that there are significant and measureable differences by food security status in the nutritional quality of food acquired. This finding serves to validate the food security measure. That food-insecure households spend less on food and do not meet healthy eating guidance is also relevant to programs and policies aimed at reducing food insecurity. Significantly lower amounts of total fruit, whole fruit, total protein, seafood and plant protein, and calories underscore the potential value of nutrition education for low-income populations, as well as the value of food assistance programs for these populations.

References

Afulani, Patience, D. Herman, A. Coleman-Jensen, and G. Harrison. 2015. "Food Insecurity and Health Outcomes Among Older Adults: The Role of Cost-Related Medication Underuse." *Journal of Nutrition in Gerontology and Geriatrics* 34(3): 310-342. doi: 10.1080/21551197.2015.1054575.

Bengle, Rebecca, S. Sinnett, T. Johnson, M. Johnson, A. Brown, and J. Lee. 2010. "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* 29(2):170-179. doi: 10.1080/01639361003772400.

Berkowitz, Seth A., H. Seligman, and N Choudry. 2014. "Treat or Eat: Food Insecurity, Cost-Related Medication Underuse, and Unmet Needs." *American Journal of Medicine* 127:303-310

Bhattacharya, Jayanta, Janet Currie, and Steven Haider. 2004. "Poverty, Food Insecurity, and Nutritional Outcomes in Children and Adults." *Journal of Health Economics* 23:839-862.

Brewster, P.J., C.M. Durward, J.F. Hurdle, G.J. Stoddard, and P.M. Guenther. 2019. "The Grocery Purchase Quality Index-2106 Performs Similarly to the Health Eating Index-2015 in a National Survey of Household Food Purchases." Journal of the Academy of Nutrition and Dietetics. 119 (1): 45-56. doi: 10.1016/j.jand.2015.01.003.

Coleman-Jensen, Alisha, Matthew P. Rabbitt, Christian A. Gregory, and Anita Singh. 2018. *Household Food Security in the United States in 2017.* Economic Research Report 256, USDA, Economic Research Service.

Gamba, Ryan, Cindy W. Leung, Sylvia Gundelman, and Maureen Lahiff. 2016. "Household Food Insecurity Is Not Associated with Overall Diet Quality Among Pregant Women in NHANES 1999-2008." *Maternal and Child Health Journal* 20(11):2348-2356.

Gregory, Christian A. and Alisha Coleman-Jensen. 2017. Food Insecurity, Chronic Disease, and *Health Among Working Age Adults* (ERR-235), USDA, Economic Research Service.

Gregory, Christian A. and Travis A. Smith. 2018. "Salience, Food Security, and SNAP Receipt." *Journal of Policy Analysis and Management.*

Gundersen, Craig, and B. Kreider. 2009. "Bounding the Effects of Food Insecurity on Children's Health Outcomes." *Journal of Health Economics* 28:971-983. doi: 10.1016/j.jhealeco.2009.06.012.

Gundersen, Craig, and J. Ziliak. 2015. "Food Insecurity and Health Outcomes." *Health Affairs* 34(11):1830-1839. doi: 10.1377/hlthaff.2015.0645.

Gundersen, Craig, and D. Ribar. 2011. "Food Insecurity and Insufficiency at Low Levels of Food Expenditures." *Review of Income and Wealth* 57(4):704-726. doi: 10.1111/j.1475-4991.2011.00471.

Hanson, Karla, and L. Connor. 2014. "Food Insecurity and Dietary Quality in US Adults and Children: A Systematic Review." *American Journal of Clinical Nutrition* 100:684-692.

25

Food Security and Food Purchase Quality Among Low-Income Households:
Findings From the National Household Food Acquisition and Purchase Survey (FoodAPS), ERR-269
USDA, Economic Research Service

Heflin, Colleen M., K. Siefert, D. and Williams. 2005. "Food Insufficiency and Women's Mental Health: Findings from a 3-Year Panel of Welfare Recipients." *Social Science & Medicine* 61: 1971-1982. doi:10.1016/j.socscimed.2005.04.014.

Herman, Dena, P. Afulani, A. Coleman-Jensen, and G. Harrison. 2015. "Food Insecurity and Cost-Related Medication Underuse Among Nonelderly Adults in a Nationally Representative Sample." *American Journal of Public Health* 105(10):e48-e59. doi:10.2105/AJPH.2015.302712.

Hernandez, D.C., L. Reesor, and R. Murillo. 2017. "Gender Disparities in Food Insecurity-Overweight and Food Insecurity-Obesity Paradox among Low-Income Older Adults." Journal of the Academy of Nutrition and Dietetics. 117(7): 1087-1096.

Howard, Larry L. 2011. "Does Food Insecurity at Home Affect Non-Cognitive Performance at School? A longitudinal Analysis of Elementary Student Classroom Behavior." *Economics of Education Review.* doi: 10.1016/j.econedurev.2010.08.003.

Johnston, Carol S., Sherri L. Tjonn, and Pamela D. Swann. 2004. "High-Protein, Low-Fat Diets are Effective for Weight Loss and Favorably Alter Biomarkers in Healthy Adults." *Human Nutrition and Metabolism* 134(3):586-591.

Kaur, J., M.M. Lamb, and C.L. Ogden. 2015. "The Association between Food Insecurity and Obesity in Children – The National Health and Nutrition Examination Survey." Journal of the Academy of Nutrition and Dietetics. 115(5): 751-758.

Laraia, Barbara A. 2013. "Food Insecurity and Chronic Disease." Advances in Nutrition 4:203-212. doi: 10.3945/an.112.003277.

Larson, N.I. and M.T. Story. 2011. "Food Insecurity and Weight Status Among U.S. Children and Families: A Review of the Literature." American Journal of Preventative Medicine. 40(2): 166-73.

Leung, Cindy W, Elissa S. Epel, Lorrene D. Ritchie, Patricia B. Crawford, and Barbara A. Laraia. 2014. "Food Insecurity is Inversely Associated with Diet Quality of Lower Income Adults." *Journal of the Academy of Nutrition and Dietetics* 114(12):1943-1953.

Lin, Biing-Hwan and Joanne Guthrie. 2012. *Nutritional Quality of Food Prepared at Home and Away from Home, 1977-2008*. Economic Information Bulletin 105. USDA, Economic Research Service.

Mancino, Lisa, Jessica E. Todd, and Benjamin Scharadin. 2018a. USDA's National Household Food Acquisition and Purchase Survey: Methodology for Imputing Missing Quantities To Calculate Healthy Eating Index-2010 Scores and Sort Foods Into ERS Food Groups (TB-1947), USDA, Economic Research Service.

Mancino, Lisa, Joanne Guthrie, Michele Ver Ploeg, and Biing-Hwan Lin. 2018b. *Nutritional Quality of Foods Acquired by Americans: Findings from USDA's National Household Food Acquisition and Purchase Survey*. Economic Information Bulletin 188. USDA, Economic Research Service.

Middaugh, Amanda L, Paul S. Fisk, Ardith Brunt, and Yeon S. Rhee. 2012. "Few Associations between Income and Fruit and Vegetable Consumption." *Journal of Nutrition Education and Behavior* 44(3):196-203.

National Household Food Acquisition and Purchase Survey (FoodAPS): Nutrient Coding Overview. USDA, Economic Research Service, November 2016.

Nunnery, Danielle L., Jeffrey D. Labban and Jigna M. Dharod. 2018. "Interrelationship between Food Security Status, Home Availability of Variety of Fruits and Vegetables and their Dietary Intake Among Low-Income Pregnant Women." *Public Health Nutrition* 21(4):807-815.

Ryu, Jeong-Hee and J. Bartfeld. 2012. "Household Food Insecurity During Childhood and Subsequent Health Status: The Early Childhood Longitudinal Study-Kindergarten Cohort." *American Journal of Public Health* 102(11):e50-e55. doi: 10.2105/AJPH.2012.300971.

Saksena, Michelle, et al. 2018. *America's Eating Habits: Food Away from Home*. Economic Information Bulletin 196. U.S. Department of Agriculture, Economic Research Service.

Seligman, Hilary K., A. Bindman, E. Vittinghoff, A. Kanaya, and M. Kushel. 2007. "Food Insecurity is Associated with Diabetes Milletus: Results from the National Health Examination and Nutrition Survey (NHANES) 1999-2002." *Journal of General Internal Medicine* 22(7):1018-1023. doi: 10.1007/s11606-007-0192-6.

Seligman, Hilary K., B. Laraia and M. Kushel. 2010a. "Food Insecurity is Associated with Chronic Disease among Low-Income NHANES Participants." *Journal of Nutrition* 140(2):304-310. doi: 10.3945/jn.109.112573.

Seligman, Hilary K., T. Davis, D. Schillinger, and M. Wolf. 2010b. "Food Insecurity is Associated with Hypoglycemia and Poor Diabetes Self-Management in a Low-Income Sample with Diabetes." *Journal of Health Care for the Poor and Underserved* 21:1227-1233.

Seligman, Hilary K., E. Jacobs, A. Lopez, J. Tschann, and A. Fernandez. 2012. "Food Insecurity and Glycemic Control Among Low-Income Patients with Type 2 Diabetes." *Diabetes Care* 35(2):233-238. doi: 10.2337/dc11-1627/-/DC1.

Seligman, Hilary K., E. Jacobs, A. Lopez, U. Sarkar, J. Tschann, A. Fernandez. 2011. "Food Insecurity Among Safety Net Patients with Diabetes." *Archives of Internal Medicine* 171(13):1024-1025.

Spees, Colleen, Jill E. Clark, Neal H. Hooker, Rosanna P. Watowicz, and Christopher A. Taylor. 2017. "Dietary Intake Contributions of Food and Beverages by Source and Food Security Status in US Adults." *Journal of Nutritional Education and Behavior.* 49(8):667-72.

Taylor, Christopher A., Colleen K. Spees, Anyana M. Markwordt, Rosanna P. Watowicz, Jill K. Clark, and Neal H. Hooker. 2017. "Differences in US Adult Dietary Patterns by Food Security Status." *Journal of Consumer Affairs* 51(5):549-565.

Tiehen, Laura, Constance Newman and John A. Kirlin. 2017. *The Food Spending Patterns of Households Participating in the Supplemental Nutrition Assistance Program: Findings from USDA's FoodAPS*. Economic Information Bulletin 176. USDA, Economic Research Service.

Todd, Jessica, Lisa Mancino and Biing-Hwan Lin. 2010. *The Impact of Food Away From Home on Adult Diet Quality.* Economic Research Report 90. USDA, Economic Research Service.

Todd, Jessica and Benjamin Scharadin. 2016. *Where Households Get Food in a Typical Week: Findings From USDA's FoodAPS.* Economic Information Bulletin 156. USDA, Economic Research Service.

Zeballos, Eliana and Tobenna D. Anekwe. 2018. *The Association Between Nutrition Information Use and the Healthfulness of Food Acquisitions.* Economic Research Report 247. USDA, Economic Research Service.

Appendix

Appendix Table 1a

<table>
<tr><td colspan="8" align="center">Diet quality of food-at-home (FAH) purchases and food insecurity</td></tr>
<tr><th>Characteristics</th><th>Total</th><th>Total vegetables</th><th>Greens/ beans</th><th>Total fruit</th><th>Whole fruit</th><th>Whole grain</th><th>Dairy</th></tr>
<tr><td colspan="8" align="center">Respondent Characteristics</td></tr>
<tr><td>Female</td><td>0.504</td><td>0.277</td><td>0.242</td><td>−0.0528</td><td>0.0804</td><td>−0.561*</td><td>0.0539</td></tr>
<tr><td></td><td>(2.026)</td><td>(0.214)</td><td>(0.165)</td><td>(0.195)</td><td>(0.173)</td><td>(0.286)</td><td>(0.350)</td></tr>
<tr><td>Non-Hispanic White</td><td>−0.867</td><td>−0.273*</td><td>−0.622***</td><td>−0.506***</td><td>−0.701***</td><td>0.272</td><td>1.269***</td></tr>
<tr><td></td><td>(1.711)</td><td>(0.160)</td><td>(0.173)</td><td>(0.175)</td><td>(0.194)</td><td>(0.260)</td><td>(0.293)</td></tr>
<tr><td>Non-Hispanic Black</td><td>−5.152**</td><td>−0.619***</td><td>−0.863***</td><td>−0.732***</td><td>−1.006***</td><td>0.322</td><td>−0.568</td></tr>
<tr><td></td><td>(2.148)</td><td>(0.179)</td><td>(0.188)</td><td>(0.223)</td><td>(0.269)</td><td>(0.287)</td><td>(0.360)</td></tr>
<tr><td>High school graduate</td><td>1.315</td><td>−0.319*</td><td>−0.174</td><td>0.252</td><td>0.0152</td><td>0.580*</td><td>0.38</td></tr>
<tr><td></td><td>(1.774)</td><td>(0.170)</td><td>(0.214)</td><td>(0.204)</td><td>(0.211)</td><td>(0.341)</td><td>(0.229)</td></tr>
<tr><td>Some college</td><td>3.181*</td><td>−0.148</td><td>−0.0387</td><td>0.0357</td><td>−0.148</td><td>0.399</td><td>0.326</td></tr>
<tr><td></td><td>(1.613)</td><td>(0.167)</td><td>(0.228)</td><td>(0.198)</td><td>(0.236)</td><td>(0.329)</td><td>(0.296)</td></tr>
<tr><td>College graduate</td><td>4.045**</td><td>−0.126</td><td>−0.221</td><td>0.159</td><td>−0.143</td><td>0.661*</td><td>1.128**</td></tr>
<tr><td></td><td>(1.639)</td><td>(0.217)</td><td>(0.176)</td><td>(0.215)</td><td>(0.247)</td><td>(0.377)</td><td>(0.512)</td></tr>
<tr><td>Respondent employed</td><td>−2.365</td><td>−0.136</td><td>−0.0661</td><td>−0.226*</td><td>−0.253*</td><td>−0.164</td><td>−0.526*</td></tr>
<tr><td></td><td>(1.736)</td><td>(0.208)</td><td>(0.144)</td><td>(0.125)</td><td>(0.131)</td><td>(0.336)</td><td>(0.263)</td></tr>
<tr><td>Respondent uses tobacco</td><td>−5.321***</td><td>−0.375**</td><td>−0.528***</td><td>−0.835***</td><td>−0.886***</td><td>−0.893***</td><td>0.138</td></tr>
<tr><td></td><td>(1.592)</td><td>(0.159)</td><td>(0.167)</td><td>(0.176)</td><td>(0.206)</td><td>(0.232)</td><td>(0.276)</td></tr>
<tr><td>Respondent body mass index (BMI)</td><td>−0.0319</td><td>−0.00143</td><td>−0.00446</td><td>0.0144*</td><td>0.0238**</td><td>−0.013</td><td>0.0361*</td></tr>
<tr><td></td><td>(0.057)</td><td>(0.009)</td><td>(0.008)</td><td>(0.008)</td><td>(0.010)</td><td>(0.015)</td><td>(0.019)</td></tr>
<tr><td>Respondent: Excellent/very good health</td><td>3.788**</td><td>0.345*</td><td>0.693**</td><td>0.348*</td><td>0.470**</td><td>−0.0959</td><td>0.0588</td></tr>
<tr><td></td><td>(1.811)</td><td>(0.185)</td><td>(0.262)</td><td>(0.175)</td><td>(0.185)</td><td>(0.272)</td><td>(0.285)</td></tr>
<tr><td colspan="8" align="center">Household characteristics</td></tr>
<tr><td>Household income (%FPL)</td><td>−0.008</td><td>−0.001</td><td>−0.002</td><td>0.001</td><td>0.001</td><td>0.001</td><td>0.002</td></tr>
<tr><td></td><td>(0.017)</td><td>(0.002)</td><td>(0.002)</td><td>(0.002)</td><td>(0.002)</td><td>(0.003)</td><td>(0.003)</td></tr>
<tr><td>Household size</td><td>−0.171</td><td>−0.066</td><td>−0.009</td><td>−0.025</td><td>−0.041</td><td>−0.009</td><td>0.252***</td></tr>
<tr><td></td><td>(0.282)</td><td>(0.047)</td><td>(0.040)</td><td>(0.037)</td><td>(0.034)</td><td>(0.072)</td><td>(0.091)</td></tr>
<tr><td>Prime store driving distance</td><td>−0.055</td><td>−0.017</td><td>−0.018</td><td>0.001</td><td>0.010</td><td>0.017</td><td>0.016</td></tr>
<tr><td></td><td>(0.086)</td><td>(0.011)</td><td>(0.012)</td><td>(0.009)</td><td>(0.010)</td><td>(0.022)</td><td>(0.027)</td></tr>
<tr><td>Get to prime store by car</td><td>−2.288</td><td>−0.297</td><td>−0.406**</td><td>−0.201</td><td>−0.459**</td><td>0.286</td><td>−0.214</td></tr>
<tr><td></td><td>(1.599)</td><td>(0.199)</td><td>(0.151)</td><td>(0.183)</td><td>(0.202)</td><td>(0.268)</td><td>(0.338)</td></tr>
<tr><td>Recent large expenditure</td><td>−1.252</td><td>−0.012</td><td>−0.020</td><td>0.205</td><td>0.325</td><td>0.015</td><td>0.043</td></tr>
<tr><td></td><td>(1.708)</td><td>(0.212)</td><td>(0.152)</td><td>(0.237)</td><td>(0.223)</td><td>(0.528)</td><td>(0.308)</td></tr>
<tr><td>Household is food insecure</td><td>−3.974**</td><td>−0.078</td><td>−0.047</td><td>−0.719***</td><td>−0.867***</td><td>−0.087</td><td>−0.436</td></tr>
<tr><td></td><td>(1.757)</td><td>(0.238)</td><td>(0.178)</td><td>(0.180)</td><td>(0.223)</td><td>(0.249)</td><td>(0.290)</td></tr>
</table>

—continued

Appendix Table 1a—continued

Diet quality of food-at-home (FAH) purchases and food insecurity

Characteristics	Total	Total vegetables	Greens/ beans	Total fruit	Whole fruit	Whole grain	Dairy
Respondent attitudes / knowledge							
Healthy foods cost too much	1.551	−0.041	−0.019	0.155	0.097	−0.260	0.046
	(1.497)	(0.165)	(0.124)	(0.142)	(0.168)	(0.240)	(0.307)
Healthy foods take more time	0.154	0.225	−0.057	0.224	0.245	0.078	0.224
	(2.211)	(0.208)	(0.174)	(0.174)	(0.186)	(0.378)	(0.385)
Healthy foods don't taste good	−0.398	0.030	0.109	0.186	0.098	−0.123	0.017
	(2.188)	(0.183)	(0.150)	(0.168)	(0.183)	(0.311)	(0.283)
Heard of MyPlate	2.805	0.100	0.309	0.265	−0.082	−0.067	−0.590
	(1.855)	(0.220)	(0.195)	(0.162)	(0.267)	(0.261)	(0.473)
Heard of MyPyramid	1.407	0.083	−0.156	0.420**	0.543***	0.385*	0.229
	(1.276)	(0.155)	(0.108)	(0.163)	(0.185)	(0.224)	(0.268)
Should eat more fruits and vegetables	1.018	−0.211	−0.001	0.314*	0.223	0.687***	0.207
	(1.411)	(0.165)	(0.141)	(0.182)	(0.172)	(0.176)	(0.267)
Always/almost always use nutrition facts label	2.033	0.017	0.147	0.167	0.278	0.576	−0.132
	(1.517)	(0.210)	(0.147)	(0.131)	(0.179)	(0.363)	(0.370)
Participated in nutrition education last 30 days	2.831	0.799***	0.908***	−0.018	0.108	−0.444	1.139*
	(2.923)	(0.267)	(0.328)	(0.223)	(0.329)	(0.522)	(0.653)
Used internet to search for nutrition information	0.752	0.137	0.177	−0.163	−0.173	0.400	0.039
	(1.923)	(0.158)	(0.160)	(0.173)	(0.217)	(0.329)	(0.449)
Constant	50.33***	3.341***	2.405***	1.922***	2.356***	1.345*	1.880***
	(3.166)	(0.384)	(0.433)	(0.329)	(0.462)	(0.765)	(0.671)
Observations (unweighted)	1,437						
R^2 (Goodness-of-fit)	0.121	0.082	0.138	0.163	0.186	0.077	0.092

Note: Standard errors in parenthesis. Estimates account for survey design. FPL = Federal poverty level.

Source: USDA, Economic Research Service, using data from the National Household Food Acquisition and Purchase Survey.

*p < 0.1, **p < 0.05, ***p < 0.01.

Appendix Table 1b

Diet quality of food-at-home (FAH) purchases and food insecurity

Characteristics	Total protein	Seafood/ plant	Fatty acid ratio	Sodium	Refined grain	SOFAAS	Calories PAE	Spending PAE
Respondent Characteristics								
Female	−0.069	0.227*	−0.003	0.329	0.484	−0.504	5,229.128***	14.35***
	(0.200)	(0.123)	(0.423)	(0.380)	(0.307)	(0.748)	(1,241.585)	(3.843)
Non-Hispanic White	−0.117	−0.0217	−0.546	−0.675	0.674*	0.381	−932.366	−0.589
	(0.151)	(0.165)	(0.393)	(0.518)	(0.350)	(0.760)	(1,466.441)	(3.023)
Non-Hispanic Black	−0.481**	−0.428**	0.094	−0.988*	0.575	−0.46	−4,099.057**	−9.629*
	(0.205)	(0.193)	(0.547)	(0.536)	(0.450)	(0.735)	(1,721.188)	(4.848)
High school graduate	−0.00392	0.186	−0.722	0.870*	1.118***	−0.868	2,812.947	6.623
	(0.218)	(0.171)	(0.434)	(0.430)	(0.363)	(0.921)	(2,005.573)	(5.506)
Some college	0.214	0.146	0.125	1.351***	1.776***	−0.857	794.511	5.451
	(0.221)	(0.212)	(0.388)	(0.427)	(0.277)	(0.923)	(2,165.827)	−5.722
College graduate	−0.0869	0.438**	−0.779	1.422***	1.394***	0.2	−1,968.894	3.309
	(0.182)	(0.196)	(0.534)	(0.427)	(0.313)	(0.831)	(1,843.603)	(5.629)
Respondent employed	0.0429	−0.139	0.248	−0.55	−0.131	−0.466	−890.972	−5.652*
	(0.131)	(0.179)	(0.366)	(0.346)	(0.349)	(0.651)	(1,114.254)	(2.812)
Respondent uses tobacco	0.040	0.116	(0.092)	(0.016)	0.128	−2.118***	920.848	0.127
	(0.185)	(0.229)	(0.371)	(0.414)	(0.299)	(0.631)	(1,605.242)	(4.621)
Respondent body mass index (BMI)	0.0176**	−0.000658	−0.00696	−0.0385*	−0.0303	−0.0284	309.506***	0.815***
	(0.009)	(0.009)	(0.014)	(0.020)	(0.024)	(0.032)	(94.503)	(0.260)
Respondent: Excellent/very good health	−0.0454	0.146	0.295	−0.0284	0.143	1.460**	−962.565	0.19
	(0.129)	(0.258)	(0.438)	(0.386)	(0.387)	(0.565)	(1,750.969)	(4.961)
Household characteristics								
Household income (%FPL)	−0.002	−0.002	0.000	0.001	−0.002	−0.004	−34.766	−0.092
	(0.002)	(0.002)	(0.004)	(0.005)	(0.004)	(0.007)	(22.813)	(0.060)
Household size	0.036	−0.066	−0.119	0.076	−0.027	−0.171	−2,207.421***	−7.371***
	(0.028)	(0.050)	(0.089)	(0.090)	(0.109)	(0.200)	(326.823)	(1.131)
Prime store driving distance	0.003	0.000	−0.020	0.012	−0.004	−0.055	271.915*	0.429
	(0.010)	(0.016)	(0.031)	(0.027)	(0.024)	(0.041)	(152.268)	(0.447)
Get to prime store by car	−0.050	−0.242	0.333	0.534	−0.342	−1.231	2,142.368	1.840
	(0.175)	(0.218)	(0.461)	(0.471)	(0.382)	(1.012)	(1,634.852)	(4.401)
Recent large expenditure	−0.476**	−0.405**	−0.056	0.485	−0.665	−0.691	332.809	−1.208
	(0.196)	(0.193)	(0.454)	(0.336)	(0.491)	(0.935)	(1,487.378)	(3.818)
Household is food insecure	−0.439***	−0.446**	−0.284	0.118	−0.279	−0.409	−5,170.072***	−12.87***
	(0.151)	(0.179)	(0.320)	(0.431)	(0.309)	(0.613)	(1,532.843)	(4.381)

—continued

Appendix Table 1b—continued

Diet quality of food-at-home (FAH) purchases and food insecurity

Characteristics	Total protein	Seafood/ plant	Fatty acid ratio	Sodium	Refined grain	SOFAAS	Calories PAE	Spending PAE
Respondent attitudes / knowledge								
Healthy foods cost too much	0.136	0.060	0.419	0.221	0.088	0.648	1,882.711	5.248
	(0.142)	(0.172)	(0.298)	(0.378)	(0.339)	(0.583)	(1,812.566)	(4.020)
Healthy foods take more time	−0.170	−0.079	−0.783*	0.306	−0.712	0.654	−5,422.579***	−10.78***
	(0.213)	(0.206)	(0.451)	(0.548)	(0.497)	(0.814)	(1,451.122)	(3.569)
Healthy foods don't taste good	0.042	0.244	−0.308	−0.443	0.277	−0.530	−1,600.092	−0.600
	(0.235)	(0.217)	(0.663)	(0.519)	(0.393)	(0.883)	(1,335.991)	(4.299)
Heard of MyPlate	0.209	0.310	0.312	0.800**	0.179	1.060	−2,760.736*	−7.351
	(0.229)	(0.267)	(0.332)	(0.360)	(0.530)	(0.886)	(1,520.740)	(4.802)
Heard of MyPyramid	0.199	−0.027	−0.326	0.118	−0.181	0.120	647.994	2.260
	(0.206)	(0.156)	(0.258)	(0.331)	(0.387)	(0.621)	(1,282.490)	(3.661)
Should eat more fruits and vegetables	−0.100	0.048	−0.224	0.039	−0.535	0.572	−3,358.740**	−14.41**
	(0.160)	(0.218)	(0.297)	(0.380)	(0.375)	(0.676)	(1,564.154)	(6.212)
Always/almost always use nutrition facts label	0.145	0.146	0.251	0.055	0.282	0.101	−558.865	−0.749
	(0.204)	(0.218)	(0.310)	(0.321)	(0.363)	(0.604)	(1,484.388)	(5.240)
Participated in nutrition education last 30 days	0.233	−0.381*	0.201	−0.014	0.245	0.055	3,095.798	16.36**
	(0.327)	(0.210)	(0.667)	(0.658)	(0.707)	(1.489)	(2,050.016)	(7.757)
Used internet to search for nutrition information	−0.045	0.235	−0.244	−0.378	−0.101	0.869	−1,962.324	−6.952*
	(0.212)	(0.273)	(0.348)	(0.285)	(0.475)	(0.632)	(1,545.059)	(3.991)
Constant	3.262***	1.944***	6.114***	5.819***	6.529***	13.41***	16,560.178***	54.99***
	(0.500)	(0.450)	(0.650)	(0.751)	(1.014)	(1.656)	(3,800.094)	(9.808)
Observations (unweighted)	1,437							
R² (Goodness-of-fit)	0.050	0.052	0.033	0.052	0.064	0.067	0.167	0.169

Note: Standard errors in parenthesis. Estimates account for survey design. FPL: Federal poverty level. PAE = per adult equivalent. SOFAAS = solid fats, alcoholic beverages, and added sugars.

Source: USDA, Economic Research Service, using data from the National Household Food Acquisition and Purchase Survey.

*p < 0.1, **p < 0.05, ***p < 0.01.

Appendix Table 2a

Diet quality of food-away-from-home (FAFH) purchases and food insecurity

Characteristics	Total	Total vegetables	Greens/ beans	Total fruit	Whole fruit	Whole grain	Dairy
Respondent characteristics							
Female	0.374	−0.206	0.0226	0.460***	0.463***	−0.139	−0.0797
	(1.258)	(0.16 3)	(0.222)	(0.136)	(0.112)	(0.152)	(0.297)
Non-Hispanic White	1.627	0.135	−0.169	0.0913	0.500**	−0.00136	0.684*
	(1.680)	(0.199)	(0.212)	(0.191)	(0.184)	(0.142)	(0.362)
Non-Hispanic Black	2.273	0.0849	0.0170	0.159	0.379*	0.0562	0.0527
	(2.273)	(0.283)	(0.251)	(0.285)	(0.196)	(0.196)	(0.386)
High school graduate	1.549	0.342	0.168	−0.0531	−0.182	0.0917	0.234
	(1.746)	(0.268)	(0.219)	(0.179)	(0.172)	(0.159)	(0.431)
Some college	−0.569	0.0645	0.273	0.0166	−0.0421	0.297	0.260
	(1.798)	(0.221)	(0.221)	(0.206)	(0.177)	(0.183)	(0.391)
College graduate	0.257	0.116	0.388	0.241	0.374*	0.376*	−0.153
	(2.195)	(0.243)	(0.240)	(0.190)	(0.217)	(0.193)	(0.382)
Respondent employed	0.281	0.0750	−0.0616	0.00240	−0.154	−0.169*	1.074***
	(1.453)	(0.171)	(0.167)	(0.119)	(0.125)	(0.0869)	(0.317)
Respondent uses tobacco	−1.629	−0.222	−0.405**	0.0601	0.0951	−0.263**	0.499
	(1.100)	(0.182)	(0.185)	(0.149)	(0.128)	(0.124)	(0.329)
Respondent body mass index (BMI)	0.134*	0.0123	0.00934	0.00808	0.0162	−0.00479	0.0231
	(0.0667)	(0.00779)	(0.0101)	(0.00975)	(0.0114)	(0.00535)	(0.0172)
Respondent: Excellent/very good health	0.116	0.0354	0.153	0.0715	0.313**	−0.154	0.0954
	−1.998	−0.158	−0.236	−0.142	−0.152	−0.177	−0.339
Household characteristics							
Household income (%FPL)	−0.023	−0.001	−0.003	−0.002	−0.002	0.000	−0.001
	(0.017)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Household size	0.688**	−0.010	−0.076*	0.155***	0.157***	0.073***	0.447***
	(0.337)	(0.047)	(0.044)	(0.037)	(0.036)	(0.020)	(0.071)
Prime store driving distance	−0.112*	−0.005	−0.019	0.007	0.000	−0.009*	−0.005
	(0.066)	(0.010)	(0.011)	(0.009)	(0.008)	(0.005)	(0.017)
Get to prime store by car	2.014	0.284	0.140	−0.050	−0.116	−0.171	−0.148
	(3.086)	(0.255)	(0.232)	(0.127)	(0.149)	(0.247)	(0.418)
Recent large expenditure	3.164**	0.200	0.122	0.120	0.006	0.053	0.824**
	(1.438)	(0.163)	(0.286)	(0.214)	(0.170)	(0.120)	(0.337)
Household is food insecure	−2.288*	−0.090	−0.141	−0.092	−0.101	−0.133	−0.307
	(1.270)	(0.202)	(0.202)	(0.120)	(0.129)	(0.095)	(0.346)

—continued

Appendix Table 2a—continued

				Diet quality of food-away-from-home (FAFH) purchases and food insecurity			
Characteristics	Total	Total vegetables	Greens/ beans	Total fruit	Whole fruit	Whole grain	Dairy
Respondent attitudes / knowledge							
Healthy foods cost too much	−0.348	−0.003	0.222	0.034	0.063	−0.002	−0.408
	(1.229)	(0.134)	(0.151)	(0.137)	(0.174)	(0.112)	(0.297)
Healthy foods take more time	1.627	−0.084	0.394*	−0.008	0.066	−0.096	−0.379
	(1.587)	(0.224)	(0.205)	(0.130)	(0.136)	(0.110)	(0.408)
Healthy foods don't taste good	−2.656*	0.020	−0.132	−0.235*	−0.170	−0.205**	−0.476
	(1.450)	(0.130)	(0.234)	(0.125)	(0.134)	(0.095)	(0.395)
Heard of MyPlate	2.918	0.084	0.437	0.235	0.343	0.050	−0.240
	(2.153)	(0.173)	(0.298)	(0.219)	(0.228)	(0.255)	(0.280)
Heard of MyPyramid	−0.578	−0.172	−0.264	0.376***	0.248*	0.100	0.433*
	(1.388)	(0.174)	(0.170)	(0.130)	(0.145)	(0.160)	(0.233)
Should eat more fruits and vegetables	1.883	0.040	−0.229	0.002	−0.011	0.164	−0.091
	(1.185)	(0.153)	(0.166)	(0.179)	(0.128)	(0.124)	(0.263)
Always/almost always use nutrition facts label	−0.896	−0.061	0.007	−0.138	−0.192	0.188	−0.193
	(1.417)	(0.160)	(0.176)	(0.124)	(0.125)	(0.276)	(0.362)
Participated in nutrition educa- tion last 30 days	−0.989	−0.074	−0.240	0.158	0.144	0.057	0.375
	(1.493)	(0.287)	(0.275)	(0.277)	(0.242)	(0.245)	(0.523)
Used internet to search for nutri- tion information	1.799	0.014	0.106	−0.121	−0.087	−0.054	0.852***
	(1.241)	(0.179)	(0.192)	(0.148)	(0.169)	(0.233)	(0.289)
Constant	33.749***	2.476***	1.441***	−0.040	−0.409	0.710**	2.161***
	(4.493)	(0.371)	(0.506)	(0.304)	(0.313)	(0.306)	(0.744)
Observations (unweighted)	1,338						
R² (Goodness- of-fit)	0.073	0.029	0.058	0.108	0.101	0.048	0.138

Note: Standard errors in parenthesis. Estimates account for survey design. FPL = Federal poverty level.

Source: USDA, Economic Research Service, using data from the National Household Food Acquisition and Purchase Survey.

*p < 0.1, **p < 0.05, ***p<0.01.

Appendix Table 2b

Diet quality of food-away-from-home (FAFH) purchases and food insecurity

Characteristics	Total protein	Seafood/ plant	Fatty acid ratio	Sodium	Refined grain	SOFAAS	Calories PAE	Spending PAE
Respondent Characteristics								
Female	−0.0148	0.182	0.0314	−0.0430	0.379	−0.680	400.422	−0.714
	(0.151)	(0.119)	(0.265)	(0.280)	(0.342)	(0.719)	(495.279)	(2.377)
Non-Hispanic White	−0.257**	−0.244	−0.00327	0.706*	0.0660	0.120	−5.259	−1.551
	(0.114)	(0.157)	(0.263)	(0.397)	(0.367)	(0.728)	(534.832)	(2.151)
Non-Hispanic Black	0.144	−0.0307	0.578	−0.240	−0.402	1.474**	472.263	9.287*
	(0.142)	(0.215)	(0.400)	(0.486)	(0.485)	(0.695)	(479.772)	(5.036)
High school graduate	0.228	0.315	−0.0567	0.345	0.379	−0.262	465.285	0.0633
	(0.148)	(0.221)	(0.481)	(0.397)	(0.412)	(0.714)	(409.751)	(2.691)
Some college	0.0859	0.468**	−0.324	−0.411	−0.561	−0.697	656.100	1.346
	(0.253)	(0.190)	(0.419)	(0.376)	(0.450)	(0.880)	(508.445)	(3.285)
College graduate	0.00915	0.565**	−0.464	−0.147	0.172	−1.220	1,443.800*	10.43**
	(0.310)	(0.252)	(0.483)	(0.450)	(0.394)	(0.862)	(792.270)	(3.991)
Respondent employed	−0.0304	−0.0560	−0.343	0.186	−0.640*	0.398	550.646	0.0596
	(0.135)	(0.175)	(0.399)	(0.307)	(0.366)	(0.579)	(343.951)	(1.662)
Respondent uses tobacco	−0.313*	−0.170	−0.597**	0.458	0.329	−1.101*	889.457	−3.170
	(0.167)	(0.151)	(0.218)	(0.327)	(0.290)	(0.643)	(538.155)	(2.637)
Respondent body mass index (BMI)	0.0103	0.00619	0.00432	0.0128	0.0355**	0.000261	48.709*	−0.0685
	(0.00831)	(0.00799)	(0.0189)	(0.0151)	(0.0151)	(0.0348)	(24.887)	(0.125)
Respondent: Excellent/very good health	0.0788	0.254	−0.379	0.0527	0.55	−0.956	−369.459	2.798
	−0.211	−0.193	−0.411	−0.351	−0.393	−0.902	(425.856)	−3.512
Household Characteristics								
Household Income (%FPL)	0.000	0.001	−0.003	−0.001	−0.002	−0.010	0.401	0.034
	(0.002)	(0.002)	(0.004)	(0.004)	(0.003)	(0.006)	(4.096)	(0.040)
Household size	−0.007	0.017	−0.047	0.109	−0.110*	−0.020	−320.432***	−2.300***
	(0.036)	(0.035)	(0.082)	(0.070)	(0.059)	(0.184)	(71.708)	(0.623)
Prime store driving distance	0.003	−0.023***	−0.040**	0.004	−0.020	−0.004	62.698	−0.117
	(0.007)	(0.006)	(0.019)	(0.014)	(0.023)	(0.030)	(51.335)	(0.140)
Get to prime store by car	0.364	−0.152	0.921	0.031	0.671	0.240	−274.054	7.109**
	(0.243)	(0.229)	(0.568)	(0.411)	(0.549)	(1.161)	(631.988)	(3.432)
Recent large expenditure	0.129	0.377	0.127	0.155	0.482	0.570	1,548.330**	9.142
	(0.128)	(0.265)	(0.335)	(0.497)	(0.603)	(0.854)	(603.193)	(6.003)
Household is food insecure	−0.355**	−0.220	−0.170	0.144	−0.490	−0.333	−401.120	−1.823
	(0.142)	(0.193)	(0.380)	(0.276)	(0.337)	(0.500)	(459.680)	(3.127)

—continued

Appendix Table 2b—continued

Diet quality of food-away-from-home (FAFH) purchases and food insecurity

Characteristics	Total protein	Seafood/ plant	Fatty acid ratio	Sodium	Refined grain	SOFAAS	Calories PAE	Spending PAE
Respondent attitudes / knowledge								
Healthy foods cost too much	0.037	−0.023	0.270	−0.217	−0.253	−0.068	447.282	1.955
	(0.144)	(0.108)	(0.305)	(0.365)	(0.357)	(0.534)	(308.262)	(2.453)
Healthy foods take more time	0.236	0.013	0.201	0.547	0.694	0.042	423.124	2.456
	(0.158)	(0.120)	(0.371)	(0.334)	(0.445)	(0.644)	(366.105)	(2.246)
Healthy foods don't taste good	−0.128	−0.091	−0.256	−0.177	0.026	−0.832	−516.615	0.625
	(0.188)	(0.177)	(0.413)	(0.272)	(0.328)	(0.692)	(369.760)	(2.507)
Heard of MyPlate	−0.010	0.039	0.943**	0.546	−0.014	0.503	447.588	−5.547*
	(0.255)	(0.216)	(0.432)	(0.405)	(0.462)	(0.908)	(590.815)	(3.139)
Heard of MyPyramid	−0.001	−0.017	−0.467*	−0.237	−0.701**	0.125	438.968	−1.142
	(0.159)	(0.162)	(0.266)	(0.421)	(0.339)	(0.506)	(399.164)	(1.920)
Should eat more fruits and vegetables	0.230*	0.055	0.583	−0.207	0.387	0.961	−536.717	−5.052
	(0.116)	(0.148)	(0.359)	(0.460)	(0.384)	(0.913)	(459.917)	(3.394)
Always/almost always use nutrition facts label	−0.183	−0.334*	−0.083	0.295	0.023	−0.225	−314.174	−0.917
	(0.189)	(0.168)	(0.400)	(0.285)	(0.400)	(0.639)	(436.991)	(2.241)
Participated in nutrition education last 30	0.113	−0.173	−0.917**	0.402	0.270	−1.104	923.921	23.171*
	(0.196)	(0.241)	(0.386)	(0.608)	(0.688)	(0.898)	(708.959)	(13.000)
Used internet to search for nutrition information	0.215	−0.096	0.049	0.149	0.083	0.689	−494.000	4.330
	(0.176)	(0.156)	(0.302)	(0.405)	(0.331)	(0.745)	(493.161)	(2.780)
Constant	3.472***	0.825*	4.868***	2.358***	2.993***	12.895***	1,532.093	13.450**
	(0.373)	(0.447)	(0.926)	(0.784)	(0.589)	(1.971)	(1,266.232)	(5.868)
Observations (unweighted)	1,338							
R^2 (Goodness-of-fit)	0.067	0.049	0.055	0.037	0.055	0.042	0.101	0.171

Note: Standard errors in parenthesis. Estimates account for survey design. FPL: Federal poverty level. PAE = per adult equivalent. SOFAAS = solid fats, alcoholic beverages, and added sugars.

Source: USDA, Economic Research Service, using data from the National Household Food Acquisition and Purchase Survey.

$*p < 0.1, **p < 0.05, ***p < 0.01.$