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Changes in Eating Patterns and Diet Quality Among Working-Age Adults, 2005-2010

Jessica E. Todd

United States Department of Agriculture

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Abstract

The recession of 2007-09, the deepest of the postwar period, has had large and long-lasting effects. Using data from the 2005-10 National Health and Nutrition Examination Survey, this study compares a number of measures of food intake and diet quality for the cohort of working-age adults born between 1946 and 1985. During the period, consumption of food away from home (FAFH) declined, as measured by total daily calories, share of daily calories, and the number of FAFH meals and snacks. At the same time, diet quality improved slightly, with a lower share of calories coming from fat and saturated fat and with less cholesterol and more fiber consumed. Regression analysis indicates, however, that the decline in FAFH consumption explains less than 20 percent of the improvements in diet quality. Increased consumer preferences for nutritious foods and greater use of nutrition information during food shopping also likely led to improvements in diet quality over this period.

Keywords: food intake, diet quality, food away from home, recession

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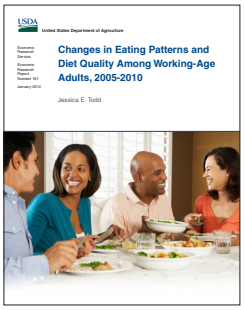
Contents

Errata

On May 13, 2014 the note to Table 5 in "Changes in Eating Patterns and Diet Quality Among Working-Age Adults, 2005-2010," was revised. It stated that household income relative to the poverty line was included in the regressions that were reported in the table, but in fact this variable was not included in the regression. The estimates in the table did not change.

United States Department of Agriculture

A report summary from the Economic Research Service January 2014



Find the full report at *www.ers.usda.gov/publications/err-economic-research-report/err-161.aspx*

Changes in Eating Patterns and Diet Quality Among Working-Age Adults, 2005-2010

Jessica E. Todd

What Is the Issue?

Food prepared outside the home (food away from home, FAFH) comprises a significant share of U.S. consumers' food expenditures, and FAFH intake has been linked to lower diet quality. Between 2006 and 2009, food spending declined 5 percent, due mainly to a 12.9-percent decline in expenditures on FAFH. This decline could have led to improvements in overall diet quality. However, the net effect on dietary intake and diet quality cannot be ascertained from expenditure data alone. This report documents how eating patterns and diet quality changed among working-age adults (those born between 1946 and 1985) from 2005 to 2010, a period that includes the recession of 2007-09, and explores the extent to which the change in diet quality can be attributed to changes in FAFH consumption.

What Did the Study Find?

The study found that changes in caloric intake were larger between 2005-06 and 2009-10 than between 2005-06 and 2007-08. In particular, the analysis found that:

- On average, daily caloric intake declined by 118 calories (about 5 percent) between 2005-06 and 2009-10 among working-age adults.
- Once the increase in age and other small shifts in demographic characteristics in this cohort are accounted for, the estimated change in caloric intake falls to 78 calories per day, or 3.4 percent relative to 2005-06.

Consumption of FAFH calories declined more than total daily caloric intake. After accounting for changes in age and other demographics in the cohort over the study period, the analysis revealed that between 2005-06 and 2009-10:

- FAFH intake fell by 127 calories per day, and the share of calories from FAFH declined 4.75 percentage points, from 34.7 percent in 2005-06.
- Daily fast-food calories (a portion of all FAFH) fell by 53, and the share of calories from fast food declined 1.8 percentage points, from 14.4 percent in 2005-06.
- Total FAFH meals consumed per day fell by 0.10 (from an average of 0.87 in 2005-06), and total FAFH snacks fell by 0.05 per day (from 0.41 per day in 2005-06).

Eating at home more often was associated with having more family meals.

- Working-age adults living with children under age 17 and older adults living in households with two or more people reported an increase in the number of meals eaten with the majority of their family.
- The number of those meals that were home-cooked (rather than from FAFH) also increased.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

There were significant changes in overall diet quality between 2005-06 and 2009-10 (after accounting for changes in age and other demographics in the cohort over the study period):

- The share of total calories from fat declined 1.12 percentage points (by 3.3 percent relative to 2005-06), and the share of total calories from saturated fat declined 0.67 percentage points (by 5.9 percent relative to 2005-06).
- Intake of cholesterol declined by 24 milligrams per day (by 7.9 percent relative to 2005-06), while fiber intake increased 1.2 grams per day (by 7.5 percent relative to 2005-06).
- The quality—in terms of saturated fat and fiber content—of both at-home and away-from-home foods increased between 2005-06 and 2009-10.
- The cholesterol content of FAFH improved over the period.

Subgroup analysis revealed some differences in changes over the period:

- The decline in calories from FAFH, the share of calories from FAFH and fast food, and the number of FAFH meals per day was smaller among adults with no college education than among those with at least some college.
- There were no differences between men with no college education and all adults with at least some college education.
- The calories and meals from FAFH did not change among older adults (born before 1946). This group experienced decreases in the share of calories from saturated fat and total cholesterol intake, but these changes were smaller than those among the working-age cohort.

The analysis showed that less than 20 percent of the improvements in diet quality could be attributed to decreased FAFH consumption. Responses to survey questions about diet behavior and nutrition (comparable only in the 2007-08 and 2009-10 surveys) suggested other factors influencing some of the improvement in diet quality:

- In 2009-10, compared with 2007-08, working-age and older adults were less likely to answer that thinness or fatness is something people are born with, suggesting that more individuals recognize weight is within individual control.
- More adults reported using the Nutrition Facts Panel (NFP) and package health claims always or most of the time when shopping for food in 2009-10 compared with 2007-08. Among working-age adults, 34 percent used the NFP always or most of the time in 2007-08 versus 42 percent in 2009-10. Among older adults, the share went from 51 to 57 percent between the two periods. Use of health claims always or most of the time increased from 18 to 31 percent for working-age adults and from 36 to 47 percent for older adults.
- Working-age adults showed increased concern for nutrition during grocery shopping between 2007-08 and 2009-10.
- Working-age adults were more likely to rate their own diet quality as excellent, very good, or good, as compared with fair or poor, in 2009-10 relative to 2007-08.

How Was the Study Conducted?

This report used data from three rounds of the National Health and Nutrition Examination Survey (NHANES), which provide a nationally representative sample of adults before, during, and after the Great Recession (unemployment, a likely influence on food spending, was actually higher after than during the recession). Mean caloric intake, calories from FAFH and fast food, the share of calories from FAFH and fast food, the total number of meals and snacks consumed in a day, as well as the number of meals and snacks from FAFH, were compared across the three periods. In addition, four measures of diet quality were studied: percent of calories from fat and from saturated fat, total cholesterol intake, and total fiber intake. Regression analysis was used to account for increasing age among the cohort and other small changes in demographics that may have occurred in estimating how much of the change in diet quality could be explained by changes in FAFH consumption. Responses to consumer behavior questions from the Flexible Consumer Behavior Survey in NHANES were also studied to explore whether there were changes in consumer attitudes toward nutrition and health over the period.

Changes in Eating Patterns and Diet Quality Among Working-Age Adults, 2005-2010

Introduction

The "Great Recession" of 2007-09 was by most measures the deepest economic downturn in the post-World War II period, and many of its effects have lingered beyond the official end.[1] Between December 2007 and October 2009, the national unemployment rate doubled from 5 percent to 10.1 percent, and by January 2010 total payroll employment was as low as in September 1999 (Şahin et al., 2010). As of June 2013, 4 years after the official end of the 2007-09 recession, unemployment was at 7.6 percent, more than 50 percent higher than at the start of the recession. This prolonged reduction in employment and earnings has many negative consequences, but it may also have positive effects. A wide-ranging literature explores how recessions and job loss influence health outcomes in both the United States and other developed countries (see, for example, Deb et al. 2011, Dehejia and Lleras-Muney, 2004, Economou et al., 2008, Gerdtham and Ruhm, 2006, Ruhm, 2003, and 2005, and Sullivan and von Wachter, 2009. For reviews, see Riva et al. 2011 and Suhrcke and Stuckler, 2012). Overall, the literature suggests that in the short run, the positive effects outweigh the negative, but not always and not for everyone.[2] This report contributes to the research by examining two direct inputs into health: food intake and diet quality.

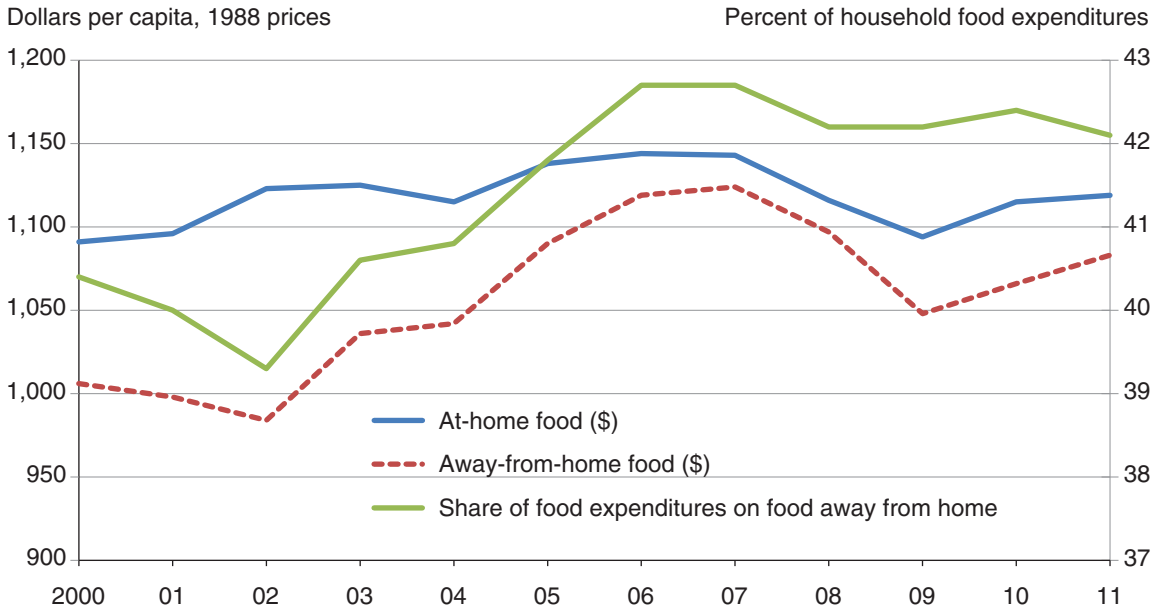
Food prepared outside the home (food away from home, FAFH) comprises a significant share of Americans' food expenditures and intake. Prior to the Great Recession, FAFH as a share of total food intake was on the rise. In the United States from 1970 until 2006, the share of food expenditures on FAFH increased from 26 to 42 percent, while the share of calories from FAFH grew from 18 percent in 1977-78 to 32 percent in 2006 (ERS, 2012).

One way that households compensate for decreased employment and earnings is to reduce expenditures, including for necessities such as food. Despite rising food costs (by an average of 3.8 percent per year between 2007 and 2009), U.S. household food expenditures declined 5 percent between 2006 and 2009 (Kumcu and Kaufmann, 2011). However, spending on at-home foods declined only 1.6 percent on average, while spending on food away from home fell 12.9 percent, more than eight times the decrease in at-home food spending. The smaller decrease in at-home food spending was partly due to greater purchases of lower priced private-label (store brand) items and fewer purchases of convenience or processed foods (e.g., precut fruit or prewashed salads). Although both at-home and away-from-home food spending began increasing in 2010, both were still below pre-recession levels in 2011, as was the share of total household food expenditures on FAFH (fig. 1).

[1]The National Bureau of Economic Research (NBER) marks the recession as having begun in December 2007 and ending in June 2009. NBER did not name this recession the "Great Recession," but this is the term used in the popular press, academic papers, and elsewhere.

[2]There is little research on the longrun impacts of recessions on health.

Figure 1
U.S. at-home and away-from-home food expenditures, 2000-2011



Source: USDA, Economic Research Service, *Food Expenditures Briefing Room*, tables 10 and 13.

Other research has shown that FAFH tends to be of lower nutritional quality—containing more total fat, saturated fat, sodium, and cholesterol and less fiber and calcium—than food prepared at home (Lin and Guthrie, 2012). Even after controlling for individual tastes and preferences, which likely influence diet quality and the decision to consume FAFH, consumption of FAFH increases total caloric intake and reduces diet quality among adults and children (Todd et al., 2010; Mancino et al., 2010). Thus, a shift away from FAFH may have positive impacts on diet quality and diet-related health outcomes. However, the net effect on dietary intake and diet quality cannot be ascertained from expenditure data alone. The decrease in expenditures on FAFH may be the result of households choosing less expensive options when eating out and not an overall decrease in meals and calories from FAFH. Moreover, substitution to less expensive FAFH options may lead to lower overall diet quality, if nutritional quality is at all associated with price.

Using detailed individual dietary intake data from the 2005-10 National Health and Nutrition Examination Survey (NHANES), this study investigates how consumers' food intake evolved between 2005 and 2010. The data can be analyzed in fixed 2-year cycles, which generally correspond to a "pre-recession" period (2005-06), a "recession" period (2007-08), and a "post-recession" period (2009-10). Although these survey rounds do not perfectly correspond to the recession's start and end dates, as only half of the 2007-08 period and a quarter of the 2009-10 period were officially in the recession, they do correspond fairly well to the pre-recession period of low unemployment, to rising unemployment during the recession, and to prolonged high unemployment following the end of the recession.[3]

[3]According to data from the Bureau of Labor Statistics, average unemployment was 4.85 percent during 2005-06, 5.21 percent during 2007-08, and 9.45 percent during 2009-10. Simple means for the 2-year periods were calculated using seasonal monthly unemployment rates of individuals age 16 and older (series LNS14000000). (Downloaded on July 25, 2013, from BLS, http://data.bls.gov/cgi-bin/surveymost.)

The study documents how food intake patterns and diet quality evolved by examining a wide range of food intake measures, including daily caloric intake, calories from all FAFH and just from fast food (total and share of daily caloric intake), the total number of meals consumed each day, and the number of meals away from home. Besides the sources of calories consumed, other measures of diet quality are also examined—specifically, the share of calories from fat and saturated fat and total intake of cholesterol and fiber. Given that average unemployment was actually higher in the post-recession period, the expectation is that the greatest difference in these measures will be between the 2009-10 and 2005-06 periods. The analysis focuses on the cohort of adults born between 1946 and 1985, who were of working age over the entire period of study (age 20-59 in 2005-06). Overall, consumption of FAFH declined, in terms of total daily calories, the share of daily calories, and the number of meals and snacks from FAFH. In addition, diet quality, as measured by fat, cholesterol, and fiber intake, improved over the study period. While FAFH calories began to decline in 2007-08, changes in the frequency of FAFH meals and diet quality are only statistically significant between 2005-06 and 2009-10.

A regression approach is used to help separate the changes in intake and diet quality that can be attributed to increasing age among this cohort and to other small changes in the characteristics of the cohort over time. Because of the strong link between FAFH consumption and diet quality, an attempt is also made to determine how much of the change in diet quality can be attributed to changes in FAFH consumption. The analysis finds that conditioning upon observable cohort characteristics reduces the estimated decline in FAFH consumption slightly and that less than 20 percent of the improvement in diet quality can be attributed to decreased FAFH consumption.

Some subgroups are analyzed separately to explore whether changes in intake, eating patterns, and diet quality were concentrated among certain groups or occurred across the population. Specifically, the working-age sample is divided into those with at least some college education and those with no college education, and the analysis also looks separately at men with no college education, who may have been more negatively impacted during the recession. Changes are also documented for adults born before 1946, who are less connected to the labor market and may have been less likely to change their intake in response to the recession. The results indicate that working-age adults with some college education may have changed their food intake more than other groups, but the changes were fairly similar in all working-adult subgroups. Among the older adults, there were also improvements in diet quality even though there were no significant changes in FAFH consumption.

Data from the Flexible Consumer Behavior Survey (FCBS), a separate module of the NHANES, are used to further enrich this study. The FCBS collects information about consumers' attitudes and perceptions about nutrition and health, as well as specific behaviors related to the purchase of foods. These data indicate that both working-age and older adults were more mindful of nutrition and used nutrition information more when shopping for food during the study period. This reinforces the idea that the improvements in diet quality were not solely due to decreases in FAFH consumption, but occurred in part through other changes in food choices.

Recognizing that sharing meals with one's family may influence diet quality and behavior in children (Hammons and Fiese, 2011; Skeer and Ballard, 2013), the author also examined changes in the frequency of family meals and family meals prepared at home. Over the study period, both working-age adults and older adults increased the number of family meals consumed per week and the number of meals prepared at home.

How Economic Downturns Might Influence Food Consumption

The most direct way that economic recessions may influence food intake is through loss of income, which reduces household expenditures and may lead to a shift in the types of food consumed. However, there are a number of other channels through which recessions could affect food consumption, including changes in job-linked benefits, stress and mental health, time availability, and physical activity.

Job loss can have many negative effects besides lowering household income. Losing a job can mean losing access to health insurance. White and Reschovsky (2012) found that the share of children and working-age adults covered by employer-sponsored health insurance policies fell 10 percentage points between 2007 and 2010. They also found that although coverage through Medicaid, Medicare, and individual (nongroup) policies increased, the share of Americans completely uninsured increased from 16.3 to 19.5 percent over the period. Health insurance coverage may lead to a moral hazard, with covered individuals taking less care to protect their health because they do not face the full cost of treatments (Erlich and Becker, 1972). The loss of health insurance may have the opposite effect, encouraging individuals to take more care of their health by adopting healthier behaviors, such as healthier food intake.

The financial strain on individuals and households during recessions, as well as the emotional cost of job loss (and of the risk of job loss), are all likely to increase stress (Dooley et al., 2000; Ruhm, 2000).[4] People respond in various ways to stress, many of which are not very healthful. Some might turn to comfort foods to help deal with stress, which would decrease diet quality and may increase consumption of FAFH, while others lose their appetites and eat less. Others may reduce normal activities, reducing physical activity. Alcohol use and smoking may also be affected by stress and depression, and these behaviors may interact with food intake. Ruhm (2000) found that increases in the unemployment rate lead to a decline in the use of preventive and curative health care, but also to a decline in smoking. Deb et al. (2011) found that business closures (a proxy for job loss) increase alcohol consumption. Bor et al. (2013) found that the prevalence of drinking declined during 2008 and 2009, while binge drinking increased in frequency. Further evidence that recessions increase depression comes from Classen and Dunn (2012), who found that suicides increase mainly when unemployment spells are rather long but that large-scale layoffs can also lead to higher suicide rates.

Time available for preparing meals at home also likely increased during and after the 2007 recession. In addition to an increase in the share of workers unemployed, the number of individuals actually in the labor force declined—from 154.3 million in 2008 to 153.6 million in 2011 (BLS, 2013).[5] With less time dedicated to market work, individuals (and households) might spend more time preparing food. Since food is generally shared with the entire household, this time effect would alter food intake of not only the individual doing the food preparation, but also that of other household members. A related, but separate, outcome is the frequency with which households eat together. Family meals may positively influence diet quality and children's behavior (Hammons and Fiese, 2011; Skeer and Ballard, 2013). On the one hand, households might find it easier to share a meal when some members are not employed or

[4]Ruhm (2000) finds that suicide rates are positively associated with higher unemployment rates, suggesting a decline in mental health during recessions.

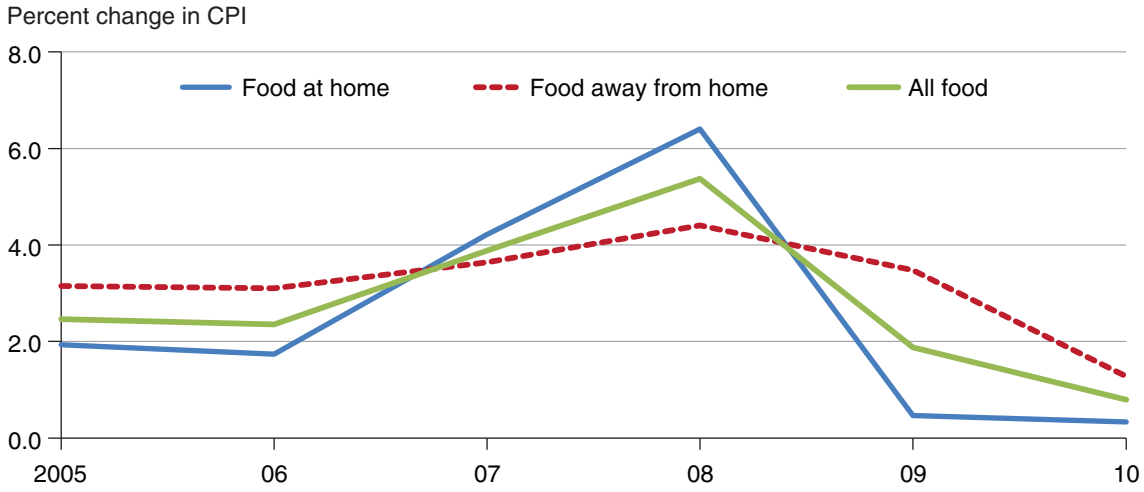
[5]The labor force has since begun to rise again. In 2012, it was at nearly 155 million.

are working shorter hours. On the other hand, if some household members work longer hours to make up for another's job loss or a part-time, odd-hours job is picked up to replace a lost full-time standard-shift job, it may be more difficult for the household to find time for everyone to eat together.

Physical activity levels can affect appetite and food intake. Although modern jobs are increasingly sedentary, the types of jobs lost in the last recession were those that include a fair amount of physical activity, including construction and manufacturing (Şahin et al., 2010). Stress and depression may also have an important effect on physical activity. Although Ruhm (2000) found that higher unemployment rates increase time spent exercising, time watching television and in other sedentary leisure activities also increases. Aguiar et al. (2011) found that between 30 and 40 percent of the increased time available (because of a decline in work hours) during the most recent recession was allocated to home production (nonmarket work)[6] and another 30 percent to sleeping and watching television. Colman and Dave (2013) found that total physical activity declines during economic downturns because the increase in recreational physical activity is not sufficient to compensate for reduced activity at work, with the decline in physical activity greatest for men without any college education.

Prices of food at home and FAFH also influence how consumers allocate their food budgets. During the recession, consumers faced food-at-home prices that were increasing more rapidly than FAFH prices; after the recession, food-at-home prices were relatively stable while FAFH prices continued to rise. In 2007 and 2008, food-at-home prices increased 4.2 and 6.4 percent, respectively, while FAFH price increases were slightly lower, at 3.6 and 4.4 percent, respectively (fig. 2). Given that consumer food preferences are rather entrenched and that the full effects of the recession were yet to be recognized during 2007-08, these price changes were not likely to have pushed consumers strongly away from FAFH. However, in 2009 and 2010, increases in food-at-home prices were less than 1 percent, while FAFH prices went up 3.5 and 1.3 percent, respectively. Thus, in addition to lower income and more time available for preparing food, price changes during the 2 years following the recession would have reinforced a move away from FAFH.

Figure 2
Change in CPIs for food at home and food away from home, 2005-10



Source: Economic Research Service estimates using data from Bureau of Labor Statistics, Consumer Price Index (CPI) data series, all urban consumers.

[6]Aguiar et al (2011) define "home production" to include activities such as cooking, cleaning, and laundry, as well as shopping, caring for older adults, and home maintenance.

Previous Research

A wide range of literature explores how recessions and job loss influence health outcomes (mainly mortality) in both the United States and other developed countries (see, for example, Deb et al. 2011; Dehejia and Lleras-Muney, 2004; Economou et al., 2008; Gerdtham and Ruhm, 2006; Ruhm, 2003, 2005; Sullivan and von Wachter, 2009; and for reviews Riva et al., 2011, and Suhrcke and Stuckler, 2012). Only two previous studies have specifically examined how recessions influence food consumption: Ruhm (2000) and Dave and Kelly (2012). Both used data from the Behavioral Risk Factor Surveillance System (BRFSS), which captures very limited information about food consumption, mainly the frequency with which certain foods are consumed. The advantages of the BRFSS are that it has been conducted since the 1980s, has a large sample size, and includes the State and month of interview for each individual surveyed, which allows researchers to identify the effect of changes in the State-level unemployment rate on outcomes of interest.

Using data from the 1987-95 BRFSS, Ruhm (2000) found that a higher unemployment rate decreases the amount of fat consumed per day but has no statistically significant effect on the average number of servings of fruits and vegetables. Dave and Kelly (2012) use BRFSS data between 1990 and 2009, capturing the 2007 recession. Focusing on individuals between ages 26 and 58, they find that a higher monthly State-level unemployment rate reduces the frequency of consumption of fruits, fruit juice, carrots, and green salad, but not of total vegetables, and increases the frequency of snacks. They also find that the reductions in consumption of healthy foods (including total vegetables) are largest among those predicted to be most likely to be unemployed.

There are many reasons to expect the Great Recession to have had large effects on consumption decisions—, and, as Tekin et al. (2013) point out,— for the effects to be different from those of previous recessions. The peak unemployment rate was the highest since the early 1980s (Şahin et al., 2010), and the average unemployment time was longer than during recent previous recessions. Moreover, the higher unemployment rates were sustained well beyond the official end of the recession. Given that consumers have strong food preferences, short economic downturns are less likely to lead to large or observable changes in intake. The length and severity of the Great Recession were arguably more likely to induce Americans to adjust their consumption patterns. Although this report does not specifically identify a "recession effect," its descriptive approach provides a first look at how a broad set of individual-level consumption outcomes evolved over this period.

Data

The National Health and Nutrition Examination Survey (NHANES) is a continuous survey with data released in 2-year segments. The survey collects detailed individual and household information on a wide range of health-related topics through questionnaires, a physical exam, and related lab work. The survey is designed to be nationally representative for each of the 2-year data releases (referred to as "rounds"), with sampling weights provided with each round. NHANES respondents report 2 days (24-hour periods) of dietary intake via recall. The first day is reported at the time of the physical examination, while the second day is reported through a followup phone interview approximately 10 days later. The study sample is restricted to working-age adults, defined as those born between 1946 and 1985, who would be approximately age 20 to 59 at the time of the 2005-06 survey and 25-64 at the time of the 2009-10 round. Members of this cohort are most likely to have been affected by the recession as they are of working age through the entire period of study.[7] The individual's birth year is estimated by subtracting age at the time of the survey from the first year of the respective round. For example, a 30-year-old in the 2007-08 round is estimated to have been born in 1977. The sample is further restricted to those whose household income relative to the poverty line is not missing.

The sample is composed of 9,839 individuals (3,014 in the 2005-06 round, 3,294 in the 2007-8 round, and 3,531 in the 2009-10 round). Weighted sample means of individual and household characteristics for each survey round are reported in table 1. As expected, because the sample is defined by birth year and not age at the time of the survey, the cohort ages approximately 2 years from round to round; otherwise, there are no statistically significant changes in demographic characteristics over the 6-year period. While not statistically significant, there does appear to be a slight decrease in the share of the cohort that is White or Black (and an increase in the share that is Hispanic or another race/ethnicity), a decline in the share that has completed high school or some college, and a decrease in income relative to the poverty line between 2005-06 and 2009-10. Given that age, race/ethnicity, and education are all associated with food intake and diet quality, these small differences may lead to differences in mean food intake over the survey rounds. Besides age, the only other statistically significant difference is in the share of respondents reporting a second day of dietary intake through the followup survey, which is 5 percentage points lower in 2007-08 than in 2005-06 (86 versus 91 percent). For this reason, the analysis is limited to the first day of dietary intake.

[7]This cohort may include age groups that are not as attached to the labor force, such as those under 25, who may still be pursuing an education, and those nearing retirement age. Estimates were also obtained using the sample born between 1951 and 1980 (or age 25-54 in 2005-06) and were similar qualitatively and quantitatively to those using the full working-age cohort.

Table 1

Summary of demographic characteristics, adults born between 1946 and 1985, by NHANES survey round

	2005-06	2007-08	2009-10
Age	39.22	41.30***	43.27***
Born 1946-55	0.23	0.22	0.23
Born 1956-65	0.27	0.29	0.27
Born 1966-75	0.26	0.24	0.25
Born 1976-85	0.25	0.25	0.25
Male	0.49	0.48	0.49
White	0.70	0.69	0.69
Black	0.12	0.12	0.11
Hispanic	0.12	0.14	0.14
Other race/ethnicity	0.06	0.05	0.06
Married	0.66	0.66	0.66
High school education or less	0.24	0.24	0.22
Some college or more	0.62	0.58	0.61
Household size	3.14	3.15	3.14
Household income <130% PL	0.16	0.18	0.17
Household income 131-200%PL	0.13	0.12	0.12
Household income >200% PL	0.72	0.70	0.70
Two days of intake reported	0.91	0.86***	0.89
Observations	3,014	3,294	3,531

Notes: Weighted means reported; *** indicates difference from 2005-06 is statistically significant with p<0.01; ** indicates difference from 2005-06 is statistically significant with p<0.05; * indicates difference from 2005-06 is statistically significant with p<0.10; PL = Poverty line.

Source: Author's estimates using data from the 2005-10 National Health and Nutrition Examination Survey (NHANES).

Defining FAFH and Classifying Intake

For each 24-hour period of dietary intake, respondents report each time they ate or drank, the type and amount of each food or beverage consumed, and where each food was obtained. The total caloric content, as well as other features of each food, are included in the data. Each food is classified as at home or away from home. At-home foods include those obtained from a grocery store, a mail order purchase, or grown or caught by the individual or someone the individual knows. All other foods are considered to be FAFH; these sources include full-service and fast-food restaurants, bars and lounges, sporting venues, vending machines, soup kitchens and shelters (including food pantries), Meals on Wheels, street vendors and food trucks, residential dining facilities, pizza places, and any other source not considered to be an at-home source. Foods purchased from fast-food or pizza places are also identified separately. The total calories consumed in the day are then added up, along with the total from FAFH and the total from fast-food restaurants. These totals are then used to calculate the share of daily caloric intake from all FAFH and specifically from fast foods.

For each food item reported, the individuals provide the time the food was eaten and are asked to name the eating occasion (i.e., breakfast, brunch, lunch, dinner, supper, a drink, or a snack).[8] Eating occasions are uniquely identified by the time at which they occur. Those described as breakfast, brunch, lunch, dinner, or supper are considered to be a meal,[9] while all other types of eating occasions reported are classified as snacks. The total number of meals and total snacks consumed on the intake day are then calculated for each individual.[10] Each meal or snack is also classified by source. Since someone could eat a meal comprised of both at-home and away-from-home foods, the entire eating occasion is classified by the source of the majority of calories consumed at the occasion. For example, if someone eats a fast-food sandwich and an apple brought from home for lunch, the meal is considered to be a FAFH meal because the majority of calories were obtained from a restaurant. Following Mancino et al. (2009), when the source of calories is split equally between the two sources, the meal is classified as an away-from-home meal.[11]

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[8] Individuals are also allowed to report an eating occasion by its name in Spanish.

[9] Meals defined in Spanish include desayuno, almuerzo, comida, merienda, and cena. All other eating occasions described in Spanish are considered to be snacks.

[10] Because each individual describes or names each meal and there are geographic and cultural differences in how meals are described (e.g., the midday meal is often called dinner in some areas of the country, while others use that term to describe the evening meal), and because some individuals reported consuming the same type of meal on the same day (e.g., the person reported eating breakfast at both 8 a.m. and 10 a.m.), breakfasts, lunches, and dinners are not counted separately for analysis.

[11] In fact, only a handful of meals were split evenly between food-at-home and food-away-from-home.

Declining Consumption of FAFH and Improvements in Diet Quality

Table 2 presents means for each of the intake and diet quality measures examined in 2005-06, as well as the change in means between 2005-06 and 2007-08 and between 2005-06 and 2009-10. The statistical significance of the changes is obtained by regressing each dependent variable on indicators for the 2007-08 and 2009-10 survey rounds.[12] The statistical significance of the difference in means between 2007-08 and 2009-10 is tested by restricting the regression to these two periods. In 2005-06, adults born between 1946 and 1985 reported consuming 2,328 calories per day over 5 separate eating occasions, of which 2.75 were meals (table 2). On average, about one-quarter of all eating occasions were of FAFH (0.87 meal and 0.41 snack from FAFH), while about 35 percent of daily calories were from FAFH and 14 percent were specifically from fast food. Nearly 34 percent of calories were from fat (11 percent from saturated fat), average intake of cholesterol was 308 milligrams per day, and fiber intake was just over 16 grams per day. The *2010 Dietary Guidelines* recommends that adults limit total fat intake to between 20 and 35 percent of total caloric intake, saturated fat to 10 percent of daily caloric intake, and cholesterol intake to 300 milligrams per day, and that women consume at least 25 grams of fiber per day and men at least 38 grams (USDA and USHHS, 2010).

The changes observed across the three periods suggest a gradual change in consumption patterns over the study period. Between 2005-06 and 2007-08, the study cohort had reduced its total daily intake by 113 calories, with 84 fewer calories from FAFH and 47 fewer from fast food. The decline in calories from FAFH was proportionally larger than the decline in total daily intake, and the share of calories from FAFH decreased nearly 3 percentage points. Although the share of calories from fast food and the number of meals and snacks from FAFH also decreased, the changes are not statistically significant.

By 2009-10, total daily intake was 118 calories lower than in 2005-06 (not a significant change from 2007-08), but the decline in calories from FAFH nearly doubled: daily intake of FAFH was 166 calories less than in 2005-06 and intake from fast food was 84 calories less. The net result is that over the entire 6-year period, the share of calories from FAFH declined almost 6 percentage points, and the fast-food share declined nearly 3 percentage points. It appears that the decline in daily caloric intake between 2005-06 and 2009-10 was achieved by consuming less at each eating occasion and eating FAFH less often. Between 2005-06 and 2009-10, the total number of meals consumed per day increased by about 0.11 per day, but the number of FAFH meals declined by 0.13 and the total number of FAFH snacks declined by 0.06 per day—declines of nearly 15 percent relative to 2005-06.

Although intake of fat, cholesterol, and fiber did not change significantly between 2005-06 and 2007-08, by 2009-10 the share of calories from fat had decreased nearly 1 percentage point (or about 3 percent from the level in 2005-06); most of that was from a decline in saturated fat, which fell 0.64 percentage points, or 5.6 percent, from the 2005-06 level. Cholesterol intake decreased 24 milligrams per day (about 8 percent), and fiber intake increased 1.4 grams per day (about 9 percent). While nearly the entire decline in caloric intake occurred between 2005-06 and 2007-08 and the change in the share of calories from FAFH was spread rather evenly over the 6-year period, most of the changes in meal patterns and diet quality occurred between 2007-08 and 2009-10.

[12]Sample weights are used in the regressions, and the complex sampling design is accounted for when estimating standard errors for making inferences.

Table 2

Food intake, eating patterns, and diet quality, 2005-06, and changes between 2007-08 and 2009-10 NHANES survey rounds, adults born 1946-85

	2005-06	Change 2005-06 to 2007-08	Change 2005-06 to 2009-10	
Total calories	2,328.48	-112.83**	-117.73***	
Calories from FAFH	832.86	-83.60**	-165.93***	++
Percent calories FAFH	34.70	-2.72**	-5.89***	++
Calories from fast food	351.29	-47.27*	-83.95***	
Percent calories from fast food	14.44	-1.32	-2.92***	+
Eating occasions	5.01	-0.03	0.10	+
Total meals	2.75	-0.01	0.11***	++
Meals FAFH	0.87	-0.05	-0.13***	+
Total snacks	2.26	-0.03	-0.01	
Snacks FAFH	0.41	-0.05	-0.06**	
% Calories from fat	33.77	-0.13	-0.96**	++
% Calories from saturated fat	11.30	-0.18	-0.64***	+++
Cholesterol (mg)	307.83	0.30	-24.01***	++
Fiber (g)	16.08	-0.15	1.40**	++
Observations	3,014	3,294	3,531	

Notes: Means reflect day 1 intake only; weighted means reported; FAFH = food away from home; difference in means across survey rounds estimated by regressing each outcome on indicators for 2007-08 and 2009-10 round (or just 2009-10 round when comparing 2007-08 to 2009-10). Sampling weights applied in estimation and complex survey design accounted for to estimate standard errors.

* Indicates difference from 2005-06 is statistically significant with p<0.1; ** p<0.05; *** p<0.01.

+ Indicates difference in variable mean between 2007-08 and 2009-10 is statistically significant with p<0.10; ++ p<0.05; +++ p<0.01.

Source: Author's estimates using data from the 2005-10 National Health and Nutrition Examination Survey (NHANES).

Estimating food intake through dietary recall surveys is prone to error. Individuals might not remember what they ate the previous day with complete accuracy, or, for various reasons, some individuals may misreport what they consumed. As a check on the estimated decrease in FAFH meals using the 24-hour recall data, the change in the number of FAFH meals reported in the Flexible Consumer Behavior Survey (FCBS) module of the NHANES survey is also examined. The FCBS is administered through a number of different survey instruments throughout the NHANES. Some questions are asked at the time of the household survey prior to the physical exam and are released in the Diet Behavior and Nutrition (DBQ) or Consumer Behavior (CBQ) datasets. Other questions are asked in the Consumer Behavior followup questionnaire, conducted over the phone after the physical exam and after the first day of dietary intake is reported. In 2007-08 and 2009-10, individuals were asked to report how many meals they had consumed in the past 7 days that were not prepared at home. In 2007-08, the mean was 4.22 FAFH meals, while in 2009-10 it was 3.83. This decline of 0.39 FAFH meal per week is statistically significant (p=0.041), corroborating the decline in FAFH meals as measured through a single day's dietary recall. Moreover, this indicates that individuals themselves are aware of their decline in FAFH consumption.

Explaining the Changes in Food Intake and Diet Quality

Comparing means across survey rounds does not allow us to determine why the changes occurred. The recession and its aftermath were likely a large factor, but its influence on food intake cannot be separated from that of other factors that occurred at the same time. One factor that may explain part of the change in caloric intake is age. Over the period studied, the cohort became older and caloric needs decline with age among adults—about 3.8 calories per day per year for men and 2.67 calories for women (Gerrior et al., 2006). In addition, slight changes in the composition of the cohort over time could also lead to differences in mean intake.

To help isolate the change in food intake that can be associated with changing macroeconomic conditions (and their various repercussions) and other unobserved factors, the differences across the survey rounds, conditional upon individual demographic and household characteristics, are estimated using regression. Table 3 presents these conditional mean differences as well as the unconditional mean differences between 2005-06 and 2009-10. Three different sets of characteristics are conditioned upon, and they are added in sequence. First, the change between 2005-06 and 2009-10 when only age is controlled for, is tested against the unconditional difference in means across the two rounds. Next, the change when age and other demographics (household size, gender, race/ethnicity, marital status, and education), as well as for whether the dietary recall day was a Friday or fell on the weekend (Saturday or Sunday) are controlled for, is tested against the change estimated when only age is conditioned upon. Finally, the change when all of these characteristics are controlled for, along with household income relative to the poverty line, is tested against the change estimated when income is not controlled for. The change estimated from this last, full model is also tested against the unconditional change in means between 2005-06 and 2009-10.

When only age is controlled for, the estimated change in daily caloric intake between 2005-06 and 2009-10 falls from 118 to 90 calories. This 28-calorie difference between the two estimates is statistically significant ($p<0.01$). The age effect is slightly high but still reasonable. According to Gerrior et al. (2006), a man's daily caloric need would have declined 22.8 calories over these 6 years and a woman's by 16 calories, all else equal. The differences in means of the other variables across the period also decline when controlling for age, except for the number of FAFH snacks and total cholesterol intake. Adding additional demographic controls and day-of-week indicators (but not income) lowers the estimated change in the percent of calories from FAFH and the number of meals from FAFH, but it has no significant effect on the estimates for any of the other outcomes.

Household income relative to the poverty line is the final control added in this sequence. Adding income to the model changes the estimates for total calories and share of daily calories from FAFH, total eating occasions, total meals, total FAFH meals, and FAFH snacks, but does not eliminate the significant change between 2005-06 and 2009-10. In fact, changes in household income explain very little of the change in food intake and eating patterns observed. In sum, only about one-third of the decrease in caloric intake between 2005-06 and 2009-10—and less than 10 percent of the change in the frequency of eating FAFH—can be explained by changes in demographic characteristics and income.

Changes in Food Intake Among Subgroups

Although the recession affected nearly all industries, the decline in employment in manufacturing and construction was relatively larger than for other sectors (Şahin et al., 2010). Given differences

Table 3

Unconditional and conditional differences in mean outcomes between 2005-06 and 2009-10, adults born 1946-85

	Unconditional	Conditional upon age	Conditional upon age, other demo-graphics	Conditional upon age, other demo-graphics, and income	
Total calories	-117.73	-90.37***	-78.45	-78.79	++
Calories from FAFH	-165.93	-140.92***	-126.88	-134.61**	+++
Percent calories FAFH	-5.89	-5.18***	-4.75*	-5.09**	++
Calories from fast food	-83.95	-58.46***	-53.27	-52.89	+++
Percent calories from fast food	-2.92	-1.98***	-1.83	-1.83	+++
Eating occasions	0.10	0.04***	0.05	0.05**	+
Total meals	0.11	0.08***	0.07	0.06**	+++
Meals FAFH	-0.13	-0.12**	-0.10*	-0.12**	
Total snacks	-0.01	-0.04***	-0.02	-0.02	
Snacks FAFH	-0.06	-0.06	-0.05	-0.06**	
% Calories from fat	-0.96	-1.26***	-1.12	-1.15	
% Calories from saturated fat	-0.64	-0.71***	-0.67	-0.67	
Cholesterol (mg)	-24.01	-24.54	-24.38	-24.10	
Fiber (g)	1.40	1.23**	1.20	1.16	+

Notes: weighted means reported; FAFH = food away from home; other demographics includes household size and indicators for male, Black, Hispanic, other race/ethnicity, married, having completed high school (or GED), and having at least some college education. Income is measured as household income relative to the poverty line for household size.

* Indicates difference from model to the left is statistically significant at p<0.10; ** p<0.05; *** p<0.01.

+ Indicates difference between full model (conditional upon age, other demographics and income) and unconditional is statistically significant at p<0.1; ++ p<0.05; +++ p<0.01.

Source: Author's estimates using data from the 2005-06 and 2009-10 National Health and Nutrition Examination Survey (NHANES).

in the types of individuals that may work in these industries versus those in sectors less affected by the recession (e.g., health care and education), differences in the changes in food intake and eating patterns across subgroups of the working-age cohort are explored. Specifically, the conditional mean change between 2005-06 and 2009-10 was estimated for adults with no college education, those with some college or a college degree (identified as college-or-more in the rest of the report), and men with no college education, conditioning on age and demographics (excluding income). Differences in the change in food intake over time across these groups may provide some insight into the mechanisms influencing the outcomes. As an additional test of the "recession effect," the change in intake was estimated for adults born before 1946 who were age 60 and older in 2005-06. Changes in food intake, eating patterns, and diet quality over the study period—conditional upon age and other demographics—are likely smaller for this older cohort, given its weaker attachment to the labor market, than changes observed in the working-age cohort.

The means in 2005-06 and conditional change between 2005-06 and 2009-10 for each of the four subgroups are reported in table 4. The declines in total daily caloric intake (86 calories), total calories from FAFH and fast food (162 and 76 calories, respectively), and the share of calories

from FAFH and fast food (6.4 and 2.8 percentage points, respectively) are statistically significant for working-age adults with at least some college education. This group also increased the total number of meals consumed (by 0.09 per day), but decreased the number of FAFH meals (by 0.15 per day) and FAFH snacks (by 0.07 per day). Improvements in diet quality are also observed in all four measures examined. The share of calories from fat decreased 1.15 percentage points and from saturated fat 0.76 percentage points, cholesterol intake declined by 34 milligrams per day, and fiber intake increased by 1.6 grams per day.

In contrast, there are few statistically significant changes among those with no college education—only the decline in the share of calories from fat and saturated fat are statistically significant. However, the 70-calorie decline in daily intake among this group is not significantly different from the 86-calorie decline estimated for those with at least some college education (the statistically significant differences between these groups are denoted in bold text in table 4). In fact, the only changes that are statistically significant between these two groups are the decline in calories per day from FAFH (-73 for those with no college versus -162 for those with some college), the share of calories from FAFH (-2.2 versus -6.4 percent), the share of calories from fast food (-0.35 versus -2.8 percent) and the number of FAFH meals (-0.04 versus -0.15).

Among men with no college education, there is a statistically significant decline in the number of FAFH snacks (0.12 per day) and the percent of calories from fat and saturated fat (1.4 and 0.5 percentage points, respectively). While these are the only three measures that are statistically significant for this subgroup, none of the changes between 2005-06 and 2009-10 are statistically different from those for the subgroup with at least some college education.

The conditional mean changes in intake between 2005-06 and 2009-10 for adults born before 1946 were also estimated. This cohort of adults was at or near retirement age in 2005-06 and was therefore less likely to be heavily impacted by the rise in unemployment during the study period. There were very few significant changes in food intake and eating patterns between 2005-06 and 2009-10 among this older cohort, with only a slight increase in the number of meals consumed per day (0.07), a small decrease in the share of calories from saturated fat (0.37 percentage points), and a 14-milligram decrease in cholesterol intake. When compared with the working-age cohort with at least some college education, the changes in total calories from FAFH and fast food—and the share of daily calories from these sources—are statistically significant, as are the changes in calories from fat and total intake of cholesterol.

Overall, these results indicate that the changes in food intake, eating patterns, and diet quality among working-age adults may have been slightly larger among those with at least some college education, but in general, the differences across the working-age subgroups are not much different statistically. In contrast, there were fewer changes among older adults, particularly with respect to FAFH consumption, and the improvement in diet quality was smaller.

Decreasing FAFH Consumption: How Much of Diet Quality Improvement Does It Explain?

Both working age adults and older adults experienced improvements in diet quality: a decline in total and saturated fat and an increase in fiber intake in the working-age cohort and a decrease in saturated fat and cholesterol intake among older adults. However, only the working-age cohort decreased their FAFH consumption at the same time.

Table 4

Conditional changes in food intake, meal patterns, and diet quality between 2005-06 and 2009-10, adult subgroups

	Born 1946-85, some college or more		Born 1946-85, no college education		Men, born 1946-85, no college		Adults born before 1946	
	2005-06	Change 2005-06 to 2009-10	2005-06	Change 2005-06 to 2009-10	2005-06	Change 2005-06 to 2009-10	2005-06	Change 2005-06 to 2009-10
Total calories	2325.61	-85.89**	2333.15	-70.15	2794.45	-103.93	1788.48	-2.08
Calories from FAFH	878.54	-162.17***	758.4	**-73.38**	904.33	-101.95	407.54	**-14.39**
Percent calories FAFH	36.75	-6.42***	31.37	**-2.16**	31.82	-3.39	23.32	**-2.02**
Calories from fast food	347.56	-75.92***	357.37	-17.53	420.12	-22.30	102.13	**5.87**
Percent calories from fast food	14.52	-2.78***	14.31	**-0.35**	14.07	-0.36	5.69	**0.00**
Eating occasions	5.16	0.11	4.77	-0.04	4.83	-0.07	4.89	-0.04
Total meals	2.8	0.09**	2.68	0.04	2.65	0.05	2.83	0.07**
Meals FAFH	0.93	-0.15***	0.77	**-0.04**	0.78	-0.08	0.6	-0.05
Total snacks	2.36	0.02	2.09	-0.08	2.18	-0.12	2.05	-0.11
Snacks FAFH	0.46	-0.07**	0.34	-0.03	0.41	-0.12**	0.23	-0.01
Percent calories from fat	34.36	-1.15**	32.81	-1.15**	32.64	-1.40**	34.01	**0.09**
Percent calories from saturated fat	11.47	-0.76***	11.02	-0.57***	10.91	-0.50*	11.39	-0.37**
Cholesterol (mg)	313.96	-33.70***	297.84	-11.54	357.04	-8.11	257.57	**-14.01***
Fiber (g)	16.74	1.60**	15	0.68	17.14	0.44	15.34	0.71
Observations	1,643	1,813	1,371	1,718	683	877	1,311	1,320

Notes: weighted means reported; FAFH = food away from home; change between 2005-06 and 2009-10 estimated via ordinary least squares regression, including individual age, household size, and indicators for male, Black, Hispanic, other race/ethnicity, married, the dietary intake day was on Friday, or on Saturday/Sunday, and for the older cohort, having completed high school (or GED), having at least some college education as controls.

*Indicates change from 2005-06 is statistically significant at p<0.10; ** p<0.05; *** p<0.01.

Bold indicates the estimate is different from that for the group with at least some college education, with p<0.10.

Source: Author's estimates using data from the 2005-06 and 2009-10 National Health and Nutrition Examination Survey (NHANES).

Previous research has documented that, as consumed, FAFH is of lower nutritional quality than at-home food (Lin and Guthrie, 2012) and that additional FAFH meals reduce diet quality (Todd et al., 2010). Using 2 days of dietary intake data from 1994-96 and 2003-04, Todd and her colleagues found that FAFH reduced overall diet quality among adults. Specifically, FAFH reduced fruit and vegetable intake and increased the percent of calories from solid fat, added sugar, and alcohol. Thus, it is not surprising to see improved diet quality (lower fat and cholesterol and higher fiber intake) as FAFH consumption declines. The question is whether the improvement in diet quality can be explained entirely by lower FAFH intake or whether the types of food individuals were selecting, both at and away from home, changed as well.

Regression analysis demonstrates how the decline in FAFH consumption affects each of the four diet-quality outcomes. The estimated change between 2005-06 and 2009-10, controlling only for age and other demographics, the total number of meals and snacks consumed, and whether the intake day was a Friday or a weekend day (Saturday or Sunday), is compared to the estimate when the

number of FAFH meals and snacks are also included as explanatory variables. In other words, we compare γ^A_{0708} to γ^B_{0708} and γ^A_{0910} to γ^B_{0910} from equations 1 and 2:

$$\mathrm{DQ_i} = \gamma^{\mathrm{A}}_{0708}(\mathrm{YR0708}) + \gamma^{\mathrm{A}}_{0910}(\mathrm{YR0910}) + \beta_1(\mathrm{Meals_i}) + \beta_2(\mathrm{Snacks_i}) + \delta\mathbf{X}_\mathrm{i} + \Delta\varepsilon_\mathrm{i} \quad (1)$$

$$\mathrm{DQ_i} = \gamma^{\mathrm{B}}_{0708}(\mathrm{YR0708}) + \gamma^{\mathrm{B}}_{0910}(\mathrm{YR0910}) + \beta_1(\mathrm{Meals_i}) + \beta_2(\mathrm{Snacks_i}) + \lambda_1(\mathrm{MealsFAFH_i}) + \lambda_2(\mathrm{SnacksFAFH_i}) + \delta\mathbf{X}_\mathrm{i} + \Delta\varepsilon_\mathrm{i} \quad (2)$$

In equation 1, γ^A_{0708} estimates the change in diet quality between 2005-06 and 2007-08, conditional upon overall eating patterns (number of meals and snacks) and X (the individual's age, indicators for whether the intake day was a Friday or a weekend day, being male, Black, Hispanic, other race/ethnicity, whether married, education level, and household size). Similarly, γ^A_{0910} estimates the change between 2005-06 and 2009-10, conditional on the same set of controls. The main difference between these coefficients and the conditional changes reported in table 4 is that eating patterns are also included as controls.

In equation 2, γ^B_{0708} estimates the change between 2005-06 and 2007-08 when the number of FAFH meals and snacks are also included as controls, and γ^B_{0910} estimates the change between 2005-06 and 2009-10. If γ^A_{0708} is larger than γ^B_{0708} (and γ^A_{0910} is larger than γ^B_{0910}), it indicates that the decline in FAFH consumption explains some of the improvement in diet quality over the years compared. If γ^B_{0708} or γ^B_{0910} are not statistically different from zero, then the change in FAFH consumption explains all of the improvement in diet quality. Equations 1 and 2 are estimated via ordinary least squares (OLS).[13]

Table 5 presents the estimates of γ^A_{0708}, γ^B_{0708}, γ^A_{0910}, and γ^B_{0910} for percent of calories from fat and saturated fat and total intake of cholesterol and fiber (full results are reported in table A.1). For all four diet quality measures, both γ^A_{0708} and γ^B_{0708} are not significantly different from zero, meaning that even conditional upon observable individual characteristics and eating patterns, there were no statistically significant changes in diet quality between 2005-06 and 2007-08. This is consistent with the unconditional changes between the two survey rounds reported in table 3.

The estimates of γ^A_{0910} are significant and similar in magnitude to those reported in table 4. Once the number of FAFH meals and snacks consumed are accounted for, the estimated change in each measure between 2005-06 and 2009-10 falls and the difference between γ^A_{0910} and γ^B_{0910} is statistically significant ($p<0.05$). However, the change in FAFH meals and snacks explains only a small share of the total change in diet quality over the period—15.1 percent of the decline in the share of calories from fat (6.9 percent of the decline for saturated fat), 13.8 percent of the decline in cholesterol intake, and 11.1 percent of the increase in fiber intake. Thus, a decline in the frequency of FAFH consumption is not the main factor explaining improvements in diet quality.

[13]Using models such as a fractional logit for the percent fat and saturated fat, or log-transforming the fiber and cholesterol outcomes, does not change the results. Given that the OLS coefficients are also the marginal effects, allowing for direct interpretation of the result, and that the interest is in the estimates for the binary survey round indicators, this report focuses on the OLS results.

Table 5

Regression results attributing change in diet quality to change in FAFH consumption

	% Calories from fat		% Calories from saturated fat		Cholesterol (mg)		Fiber (g)	
	FAFH meals and snacks not included	w/ FAFH meals and snacks	FAFH meals and snacks not included	w/ FAFH meals and snacks	FAFH meals and snacks not included	w/ FAFH meals and snacks	FAFH meals and snacks not included	w/ FAFH meals and snacks
2007-08 round	-0.136	-0.111	-0.179	-0.172	2.777	3.641	-0.081	-0.111
	(0.371)	(0.363)	(0.147)	(0.146)	(9.571)	(9.510)	(0.614)	(0.615)
2009-10 round	-1.148***	**-0.975****	-0.678***	**-0.631*****	-26.758***	**-23.059*****	1.036**	**0.921***
	(0.374)	(0.364)	(0.146)	(0.144)	(6.787)	(6.928)	(0.497)	(0.500)
Constant	29.601***	29.003***	10.638***	10.476***	94.564***	82.201***	3.220***	3.599***
	(0.870)	(0.855)	(0.364)	(0.371)	(24.246)	(23.663)	(0.897)	(0.924)
Observations	9,839	9,839	9,839	9,839	9,839	9,839	9,839	9,839
R-squared	0.030	0.049	0.026	0.034	0.103	0.113	0.140	0.145
Percent of change explained by FAFH consumption		15.1		6.9		13.8		11.1

Notes: Weights applied in regressions; standard errors adjusted for complex sampling design. Additional controls include individual's age, indicators for whether the intake day was a Friday or weekend day, being male, Black, Hispanic, other race, married, education level, household size, total number of meals consumed, and total number of snacks consumed on intake day. FAFH controls (included in second column for each outcome) are the total number of FAFH meals and total number of FAFH snacks consumed on intake day.

Bold indicates that coefficient is significantly different than coefficient estimated when FAFH consumption variables are not included in regression.

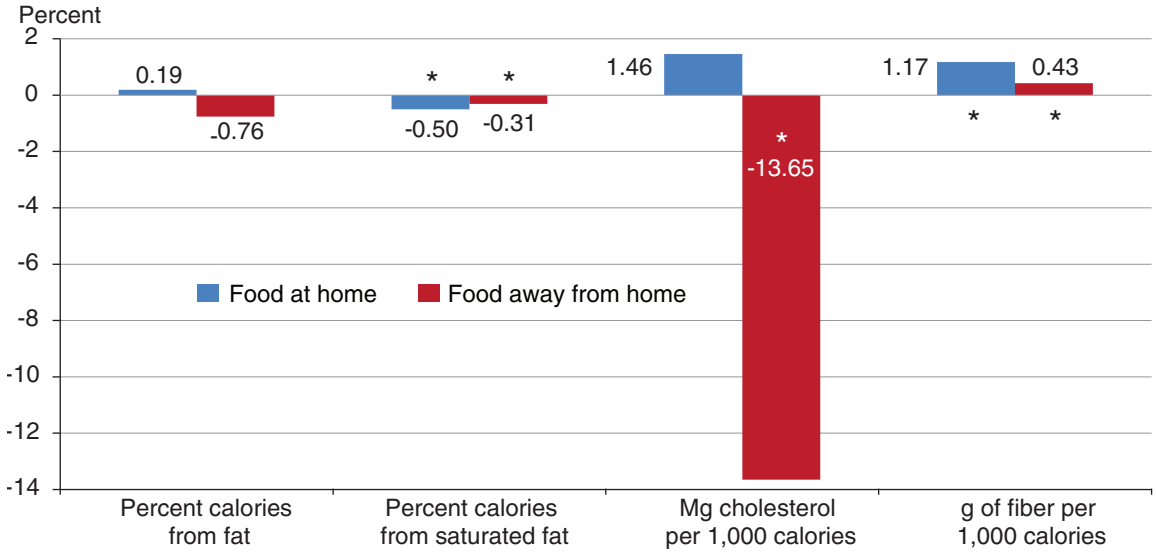
Changes in Quality of Foods Consumed and Attitudes Toward Nutrition

Since the decline in the frequency of FAFH consumption explains less than 20 percent of the improvement in diet quality between 2005-06 and 2009-10, the overall quality of food consumed must have also improved over this period. Figure 3 presents the changes in mean diet quality of food at home (FAH) and FAFH, as consumed among the working-age cohort. Fat is measured in terms of the share of calories from each source, while cholesterol and fiber are measured in terms of density, that is, milligrams (cholesterol) or grams (fiber) per 1,000 calories.

Between 2005-06 and 2009-10, the quality of food from both sources improved in terms of saturated fat and fiber, while FAFH also improved in terms of cholesterol. Specifically, the share of calories from saturated fat in FAH fell by 0.5 percentage points and in FAFH by 0.31 percentage points. Although the estimate is larger for FAH, it is not different statistically from the change in FAFH. In contrast, the increase in fiber content of FAH was greater than that in FAFH. For every 1,000 calories of FAH, individuals were consuming 1.17 more grams of fiber in 2009-10 than in 2005-06, while fiber intake increased only 0.43 gram per 1,000 calories of FAFH. Working-age adults also consumed 13.65 fewer milligrams of cholesterol in 2009-10 for every 1,000 calories of FAFH compared with 2005-06.

Figure 3

Changes in quality of at-home foods and FAFH between 2005-06 and 2009-10, adults born 1946-85



Notes: * = change between 2005-06 and 2009-10 is statistically significant with p<0.10.
Source: Author's estimates using 2005-06 and 2009-10 NHANES data; difference in weighted means reported.

These improvements in the quality of FAH and FAFH could be due to consumers making more healthful food choices and/or an improvement in the quality of foods available. Mancino et al. (2008) found that an increase in the consumption of whole grains in recent years can be attributed to both an increase in consumer demand and an increase in the availability of whole-grain products, through new product introductions and reformulations of existing foods.

Data from the FCBS are used to investigate whether there was increased demand for healthy food. Results for the working-age cohort are compared with the cohort of older adults. Despite the fact that older adults did not change their FAFH consumption over 2005-10, their diet quality did improve. The first survey question examined gets at an individual's perception of how much control he or she has over body weight. This is the "born-fat" question, where respondents were asked how much they agreed with the statement, "Some people are born to be fat and some thin; there is not much you can do to change this." When individuals believe that their actions directly affect their body weight (that is, disagree with the statement), they might be more inclined to make healthier food choices. The proportion of working-age adults who agreed with this statement (either strongly or somewhat) declined 3 percentage points—from 29 percent in 2007-08 to 26 percent in 2009-10—while the proportion who disagreed (either strongly or somewhat) increased 2 percentage points—from 64 percent in 2007-08 to 66 percent in 2009-10 (table 6, panel a).[14] Among adults born before 1946, there was a 5-percentage-point decline in the share that disagreed with this born-fat statement—from 38 percent to 33 percent—between the two survey rounds. This suggests that more adults believe that weight status is affected in part by individual decisions but that the change in perceptions or beliefs is not limited to working-age adults.

[14]This question was also asked in 2005-06, but was collected in a different survey module in a different setting. In both 2007-08 and 2009-10, the question was asked during the Consumer Behavior Adult phone followup days after the physical exam and first day of dietary intake, while in 2005-06, the question was asked at the time of the physical exam as part of the Diet Behavior questionnaire. Because differences in interview setting and instruments could affect the responses to this question, the discussion of the responses is limited to the two survey rounds in which the data were similarly collected.

Respondents are also asked how often they use the Nutrition Facts Panel (NFP) or package health claims when deciding whether to buy a food (table 6, panel a). The share that report using the NFP "always or most of the time" increased from 34 percent to 42 percent between 2007-08 and 2009-10, and the share that report using package health claims "always or most of the time" increased from 18 percent to 31 percent (both changes are statistically significant with $p<0.01$). Older adults also increased their use of package information, by 6 percentage points for the NFP and 11 percentage points for package health claims. More than 70 percent of working-age and older adults report that they would use nutrition information in restaurants often or sometimes if it were readily available, and there were no changes between 2007-08 and 2009-10 in the responses. In contrast, only one-quarter of working-age adults and one-third of older adults report that they have tried to implement the MyPyramid plan (a dietary plan derived from the *Dietary Guidelines for Americans*).[15]

The increased focus on nutrition is also observed in the response to questions about the importance of nutrition in shopping for food (table 6, panel b). Members of the working-age cohort were slightly more likely to report that nutrition was very or somewhat important when they shopped for food (and less likely to report that it is not too important or not at all important) in 2009-10 than in 2007-08. A Pearson Chi-squared test of the difference in the distribution of these qualitative responses indicates that the shift is statistically significant at the 90-percent level of confidence ($p<0.10$). In comparison, there was no change in the importance among older adults. Interestingly, there was also no difference between 2007-08 and 2009-10 in how working-age adults or older adults ranked the importance of price in food shopping (results not shown; available upon request).

Individuals were also asked to rate their overall diet quality. The changes in the share that rated their diet as excellent, very good, or good do not provide a clear pattern of change over the two survey rounds (table 6, panel c). However, the share of working-age adults who rated their diet as either fair or poor fell in 2009-10 compared with 2007-08. Overall, the distribution of ratings is different between 2007-08 and 2009-10 ($p<0.068$). In contrast, there was no significant change in the ratings provided by older adults.

Taken together, these results indicate that between 2005-06 and 2009-10, the quality of at-home and away-from-home food increased among working-age adults. It appears that part of this improvement in diet quality was due to an increased focus on the nutritional qualities of foods selected. However, the increased importance on nutrition over the period was not limited to working-age adults, as older adults also reported greater use of the NFP and package health claims when shopping for food, as well as a decrease in the perception that one has no control over body weight.

[15]MyPyramid was replaced with MyPlate in 2011, but this report refers to MyPyramid since that term was used in the NHANES surveys between 2007 and 2010.

Table 6

Perceptions of control over weight, importance of nutrition when shopping for food, and self-rated diet quality, adults born between 1946 and 1985

(a) Belief about control over weight and use of package information‡

	Born 1946-85		Born before 1946	
	2007-08	2009-10	2007-08	2009-10
Agree that people are born to be fat or thin	0.29	0.26*	0.38	0.33*
Disagree that people are born to be fat or thin	0.64	0.66*	0.55	0.57
Use Nutrition Facts Panel always/most of time	0.34	0.42***	0.51	0.57**
Use package health claims always/most of time	0.18	0.31***	0.36	0.47***
Would use nutrition information in restaurants often/sometimes	0.75	0.76	0.71	0.71
Have tried to implement MyPyramid plan#	0.27	0.28	0.34	0.38

(b) Importance of nutrition when shopping at grocery stores

	Born 1946-85		Born before 1946	
	2007-08	2009-10	2007-08	2009-10
	Percent			
Very important	57.1	58.7	67.7	68.2
Somewhat important	37.5	38.0	27.5	28.3
Not too important	4.3	3.0	3.8	2.5
Not at all important	1.1	0.4	1.0	1.1
Observations	2,692	2,955	1,190	1,014
Pearson Chi-squared test =	2.64, p=0.068		0.834, p=0.458	

(c) Self-rated diet quality†

	Born 1946-85		Born before 1946	
	2007-08	2009-10	2007-08	2009-10
	Percent			
Excellent	7.6	7.9	15.3	16.3
Very Good	22.1	21.2	30.0	31.4
Good	40.1	44.0	38.2	40.4
Fair	23.0	22.5	13.2	9.3
Poor	7.1	4.5	3.3	2.5
Observations	3,012	3,529	1,307	1,320
Pearson Chi-squared =	2.63, p=0.053		1.565, p=0.194	

Notes: weighted means reported; Pearson Chi-squared values account for complex survey design. Unless otherwise noted, variables were collected in the Consumer Behavior Adult followup survey (CBQAPF). † Collected in the Diet Behavior dataset; ‡ Comparable data not available for 2005-06, see appendix table A2 for sample sizes. # If individual has not heard of MyPyramid or the Food Pyramid, there response is recorded as "no" to this question.

*Difference from 2007-08 is statistically significant with p<0.10, ** p<0.05, *** p<0.01.

Source: Author's estimates using data from the 2007-10 National Health and Nutrition Examination Survey (NHANES).

Increased Family Meals: Another Positive Change in Eating Habits

The frequency with which household members eat together may also affect food choices and diet quality. For example, research finds that family meals are associated with improved eating habits and diet quality among children (Videon and Manning, 2003; Patrick and Nicklas, 2005) and with higher psychological development in adolescents (Eisenberg et al., 2004). A decrease in FAFH consumption (and a corresponding increase in food-at-home) could reasonably result in more family meals being taken together. Although the dietary recall does not include those who shared the meal with the respondent, the Consumer Behavior module in the 2007-08 and 2009-10 NHANES rounds asked individuals about the frequency of family meals and time spent preparing and cleaning up after dinner at home. This information is used to explore whether there was any increase in family meals, family meals cooked at home, and the total time spent over a week in cooking dinner and cleaning up. This analysis included only respondents living in households with two or more people, a subset of these living with children, and, for comparison, older adults living in households with two or more people.

Table 7 presents the average number of meals per week that the individual's family (or most of the family) ate together, as well as how many of those meals were prepared at home in 2007-08 and 2009-10 (this information was not collected in 2005-06). The total number of family meals prepared at home increased among working-age adults in multiperson households from 5.33 to 5.73 per week, although the increase in the total number of family meals was not statistically significant. Among the working-age subsample living with children under age 17, the number of family meals increased from 5.80 to 6.29 per week, and the number prepared at home increased from 5.35 to 5.77 per week. Despite the increase in family meals prepared at home and the decrease in FAFH meals, the increase in time spent preparing dinner and cleaning up each week is not statistically significant. However, the question regarding time was asked only about the time related to dinner. Therefore, it likely does not capture the full change in time spent preparing and cleaning up associated with increased meals at home, which may include breakfasts and lunches.

Older adults report consuming more family meals per week and more family meals prepared at home. In 2007-08, this group reported an average of 8.25 family meals per week (7.60 prepared at home). Interestingly, family meals and family meals prepared at home also increased among older adults in multiperson households, up to 9.13 and 8.48 in 2009-10, respectively. Similar to the working-age groups, older adults report no significant change in the time spent preparing dinner and cleaning up afterward.

Overall, the analysis of data from the Consumer Behavior module is consistent with the analysis of the dietary intake data, showing an increase in meals at home. Further, we see that many of these meals at home were family meals, with both working-age adults and older adults reporting increases between 2007-08 and 2009-10.

Table 7

Number of family meals and family meals prepared at home per week

	Working-age adults in households with 2+ members		Working age adults, 2+ household members, with children[1]		Older adults, 2+ household members[1]	
	2007-08	2009-10	2007-08	2009-10	2007-08	2009-10
Number of family meals per week	5.91	6.22	5.80	6.29*	8.25	9.13**
Number of family meals prepared at home each week	5.33	5.73*	5.35	5.77*	7.60	8.48*
Minutes preparing dinner and cleaning up per week	414.69	419.24	444.60	456.21	449.38	437.10
Observations family meals	2,801	2,973	1,790	1,837	1,103	952
Observations cook/clean time	2,963	3,114	1,807	1,844	1,128	962

Notes: Weighted means reported; tests of difference of 2009-10 from 2007-08, *=p<0.10; **=p<0.05.

[1]Changes between 2007-08 and 2009-10 are not statistically different from those observed among all working age adults living in 2+ person households.

Source: Author's estimates using data from the 2007-10 National Health and Nutrition Examination Survey, Flexible Consumer Behavior Survey.

Discussion

The question of how recessions affect health has been widely studied, with most previous research focusing on mortality rates. This report contributes to the discussion by looking at how health-related behaviors—specifically eating patterns and diet quality—changed during and immediately following the Great Recession among working-age adults. Although the three rounds of survey data in this analysis do not correspond exactly to the beginning and end dates of the recession, the analysis and discussion above point to some important findings related to the impact of the recession on food intake behavior.

Initial estimates of changes in caloric intake and FAFH meals suggest that FAFH calories declined nearly 20 percent between 2005-06 and 2009-10, while the frequency of consuming FAFH meals declined about 15 percent. However, once changes in age and other demographic characteristics that are unrelated to the recession are controlled for, the estimated decline in FAFH calories is only about 15 percent, while the number of meals from FAFH declined 11 percent. These changes are relatively large, given that the share of food expenditures on FAFH and of calories from FAFH have consistently increased since the 1970s and that the share of food expenditures on FAFH declined less than 1 percentage point during earlier small recessions (ERS, 2012). The fact that a decline in FAFH consumption was only observed among working-age adults and not the older cohort suggests that the recession was a large factor in influencing where working-age adults obtained their food. However, the fact that conditioning on household income did not affect the estimated change in FAFH consumption over the period suggests that the recession effect was not mainly through income, but through other channels, such as increased time available for shopping and preparing food at home.

The improvements observed in diet quality are consistent with previous research that suggests that recessions can have a positive effect, on average, for some individual health outcomes. Results of the regression analysis, which separated the effect that FAFH meals have on diet quality from other (unobserved) factors that changed between 2005-06 and 2007-08 and 2009-10, indicate that most of the improvements in diet quality were not due the decline in FAFH consumption. The quality of at-home and away-from-home foods also improved, perhaps due to an increase in consumer focus on nutrition in selecting foods. Whether or not these changes are a result of the recession or due to other factors cannot be determined with the data. However, the fact that improved diet quality was observed among older, presumably retired adults, and that they, too, reported greater attention to nutrition information, suggests that this nutrition improvement in the working-age cohort is not simply a result of higher unemployment.

A slight increase in the number of meals consumed overall, along with the reduced FAFH consumption, means that more meals were prepared at home. Data from the Consumer Behavior Module indicate that between 2007-08 and 2009-10, more of these at-home meals were consumed with the family. This increase in family meals, especially meals cooked at home, may have additional positive benefits besides the immediate effect on diet quality and related health.

As the U.S. economy continues to improve, unemployment falls, and working adults spend more time at their jobs, FAFH consumption is likely to increase to its prerecession levels and may even continue its gradual increase over time. However, diet quality may not decline if consumers continue to pay closer attention to the nutritional quality of the food they consume. The 2010 Affordable Care Act mandates that restaurant chains with more than 20 locations list the caloric content of each standard menu item, which would make it easier for consumers to identify lower calorie and

otherwise healthier choices when eating away from home. The majority of adults reported that they would use nutrition labels when the labels become available in restaurants. Research also suggests that improvements in FAFH choices may occur through changes in consumer behavior, as well as changes in the foods available in restaurants. Restaurants are likely respond to the menu-labeling requirement by reformulating their standard menu to improve the quality of meals offered (Bruemmer et al., 2012), just as food manufacturers responded to the recommendations in the *2005 Dietary Guidelines* to increase consumption of whole grains (Mancino et al., 2008). When intake data for 2011 and more recent years become available, and after the national menu-labeling rules are finalized and implemented, we may see further improvements in the quality of FAFH.

Despite future potential for gains in diet quality, less than half of all adults report having tried to implement the MyPyramid plan, and there was no change between 2007-08 and 2009-10. This suggests that there may be room to expand efforts to increase adoption of the *Dietary Guidelines* to improve diet quality further. The USDA may be able to capitalize on consumers' increased awareness of the importance of nutrition when it rolls out the *2015 Dietary Guidelines.*

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Appendix table A.1

Full regression results

	% Calories from fat		% Calories from saturated fat		Cholesterol (mg)		Fiber (g)	
	FAFH meals and snacks not included	w/ FAFH meals and snacks	FAFH meals and snacks not included	w/ FAFH meals and snacks	FAFH meals and snacks not included	w/ FAFH meals and snacks	FAFH meals and snacks not included	w/ FAFH meals and snacks
Year 07	-0.136	-0.111	-0.179	-0.172	2.777	3.641	-0.081	-0.111
	(0.371)	(0.363)	(0.147)	(0.146)	(9.571)	(9.510)	(0.614)	(0.615)
Year 09	-1.148***	-0.975**	-0.678***	-0.631***	-26.758***	-23.059***	1.036**	0.921*
	(0.374)	(0.364)	(0.146)	(0.144)	(6.787)	(6.928)	(0.497)	(0.500)
Meals	0.417**	0.133	0.137**	0.061	37.041***	31.992***	2.667***	2.812***
	(0.188)	(0.190)	(0.065)	(0.066)	(5.784)	(6.034)	(0.181)	(0.179)
Snacks	-0.072	0.030	0.006	0.030	15.992***	15.998***	1.355***	1.381***
	(0.095)	(0.096)	(0.038)	(0.037)	(2.438)	(2.434)	(0.099)	(0.107)
Friday	0.510*	0.124	0.027	-0.078	2.002	-6.267	-0.508	-0.251
	(0.296)	(0.300)	(0.134)	(0.132)	(7.175)	(7.233)	(0.324)	(0.304)
Weekend	0.797***	0.587**	0.189*	0.133	47.478***	43.329***	-0.551*	-0.426
	(0.245)	(0.247)	(0.104)	(0.101)	(5.104)	(5.182)	(0.321)	(0.306)
Age	0.059***	0.065***	0.013**	0.014**	-0.094	0.040	0.007	0.003
	(0.011)	(0.011)	(0.005)	(0.005)	(0.295)	(0.295)	(0.013)	(0.013)
Male	0.085	-0.067	-0.046	-0.087	132.066***	128.760***	3.780***	3.883***
	(0.231)	(0.249)	(0.107)	(0.111)	(5.202)	(5.518)	(0.278)	(0.278)
Black	-0.058	-0.030	-0.658***	-0.651***	42.017***	42.506***	-1.122***	-1.136***
	(0.343)	(0.338)	(0.134)	(0.133)	(6.479)	(6.379)	(0.323)	(0.332)
Hispanic	-2.373***	-2.309***	-1.266***	-1.249***	22.809**	23.689**	2.474***	2.452***
	(0.336)	(0.332)	(0.137)	(0.133)	(10.207)	(10.310)	(0.491)	(0.488)
Other race	-2.698***	-2.531***	-1.403***	-1.358***	4.990	8.905	-0.005	-0.130
	(0.685)	(0.678)	(0.276)	(0.272)	(17.391)	(16.930)	(0.569)	(0.565)
Married	0.159	0.192	-0.195	-0.185	2.743	4.038	1.141***	1.094***
	(0.270)	(0.266)	(0.130)	(0.130)	(5.672)	(5.863)	(0.297)	(0.298)
Educ. HS	0.637	0.356	0.125	0.050	-14.886	-20.113**	-0.938**	-0.785*
	(0.461)	(0.467)	(0.188)	(0.186)	(9.900)	(9.966)	(0.408)	(0.407)
Educ. AA	1.361***	1.056**	0.155	0.072	-9.214	-15.520*	1.118***	1.312***
	(0.390)	(0.400)	(0.168)	(0.168)	(9.341)	(9.219)	(0.398)	(0.404)
Household size	-0.045	-0.022	0.019	0.025	-0.508	-0.002	-0.262**	-0.278**
	(0.085)	(0.083)	(0.039)	(0.040)	(2.558)	(2.543)	(0.111)	(0.112)
Meals FAFH		1.623***		0.433***		29.410***		-0.853***
		(0.135)		(0.062)		(4.696)		(0.170)
Snacks FAFH		-0.350*		-0.079		4.726		-0.290
		(0.195)		(0.076)		(5.055)		(0.226)
Constant	29.601***	29.003***	10.638***	10.476***	94.564***	82.201***	3.220***	3.599***
	(0.870)	(0.855)	(0.364)	(0.371)	(24.246)	(23.663)	(0.897)	(0.924)
Observa-tions	9,839	9,839	9,839	9,839	9,839	9,839	9,839	9,839
R-squared	0.030	0.049	0.026	0.034	0.103	0.113	0.140	0.145

Table A.2
Sample sizes for consumer behavior questions reported in table 6

	Born 1946-85		Born before 1946	
	2007-08	2009-10	2007-08	2009-10
Agree/disagree born fat	2,686	2,950	1,172	1,009
Use Nutrition Facts Panel	2,699	2,959	1,200	1,024
Use package health claims	2,695	2,960	1,197	1,022
Use restaurant nutrition info	2,581	2,804	1,083	936