The impact of retirement on the healthiness of food purchases *

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Abstract

The paper estimates the causal impact of retirement on the healthiness of food purchases. The identification strategy uses early and full retirement ages as instruments for retirement. Using household-level scanner data, I find that retirement increases fruit and vegetable purchases and overall healthiness of food purchases. I also find indirect evidence that retirement increases the time spent on shopping and food preparation: it increases shopping frequency and shifts purchases to fresh and unprepared food products. This suggests that time constraints might play a role in limiting healthy food consumption.

JEL codes: I12, L66, D12

Keywords: Health behaviors, retirement, consumer behavior, dietary choices

1 Introduction

Obesity is a public health problem, it is a risk factor for many diseases, including heart disease, diabetes, and cancer, and it increases health care expenditures (Cawley and Meyerhoefer, 2012). One of the main causes of obesity is an unhealthy diet (Cutler, Glaeser, and Shapiro, 2003; Bleich, Cutler, Murray, and Adams, 2008; Cawley, 2015). While many factors contribute

*Researcher(s) own analyses calculated (or derived) based in part on data from The Nielsen Company (US), LLC and marketing databases provided through the Nielsen Datasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business. The conclusions drawn from the Nielsen data are those of the researcher(s) and do not reflect the views of Nielsen. Nielsen is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported herein.

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to unhealthy diets, lack of time has been suggested as one of these (Jabs and Devine, 2006; Monsivais, Aggarwal, and Drewnowski, 2014). A major increase in the amount of free time takes place with retirement. Indeed, individuals above the retirement age have lower obesity rates (Flegal, Kruszon-Moran, Carroll, Fryar, and Ogden, 2016). While there exists causal evidence that retirement leads to increases in physical activity (Kämpfen and Maurer, 2016), less is known about the impact of retirement on diet.

In this paper, I study the impact of retirement on the healthiness of diet. In particular, I estimate the causal impact of retirement on fruit and vegetable purchases, more generally, healthy food purchases, and an overall food healthiness index. Identification is complicated because retirement is a choice which might depend on other events, such as health shocks, that lead to changes in diet. To overcome the endogeneity problem, my main empirical strategy uses early and full retirement ages as instruments.

The dataset used in the paper is the Nielsen Homescan Consumer Panel. The dataset includes detailed household-level data of food expenditures and purchased quantities in the U.S. The dataset also includes information about demographic characteristics, including employment status. I use data from the years 2004–2016. The majority of the households remain in the panel for several years, which makes it possible to study within household changes. In the main part of the analysis, I restrict attention to single-person households. Single-person households provide a clean setting as food purchases data is available at the household-level. At the end of the paper, I extend the analysis to all households.

I use two approaches to estimate the impact of retirement on the healthiness of food purchases. My main empirical strategy is an instrumental variables design in a panel data model with household fixed effects. Following previous literature on estimating the impact of retirement on various outcomes, I use early and full retirement benefits eligibility ages as instrumental variables for retirement.[1] As an alternative empirical strategy, I use a panel event-study design.

I find that retirement leads to large increases in the healthiness of food purchases. The results are robust to many alternative specifications and hold when calculated based on either relative product shares or absolute values using either expenditures or quantities. The effect is common for both men and women, low and high education groups, and individuals from low and high-income regions.

[1]Papers using a similar identification strategy include Coe and Zamarro (2011); Kämpfen and Maurer (2016); Godard (2016); Heller-Sahlgren (2017). Previous literature has provided strong evidence that retirement decisions correspond to the Social Security retirement benefits eligibility ages (French, 2005; Kämpfen and Maurer, 2016; Fitzpatrick and Moore, 2018).

Next, to shed light on the mechanism of how retirement might lead to an increase in the healthiness of food purchases, I analyze other changes in purchases and shopping behavior that are associated with retirement. The analysis is motivated, on the one hand, by the evidence that healthy food products, especially fresh fruit and vegetables, are not available in every store, and on the other hand, by the literature showing that store choice is driven mostly by convenience (travel distance) as opposed to prices or variety (Marshall and Pires, 2018). I find indirect evidence that retirement increases the time spent on shopping and food preparation: it increases shopping frequency and shifts purchases to fresh and unprepared food products. This suggests that time constraints might play a role in limiting healthy food consumption as retirement generates a large increase in free time.

The paper contributes to the studies on the impact of retirement on health, and more specifically, on health behaviors.[2] Most closely related are the papers estimating the causal impact of retirement on obesity and related health behaviors. Kämpfen and Maurer (2016), using data from the U.S., found that retirement leads to an increase in physical activity. On the other hand, Godard (2016), using data from many European countries, found that retirement leads to weight gain for men retiring from physically demanding jobs and those who were already at risk of obesity, but not for women. Neither of these studies looks at changes in diet. The impact of retirement on diet quality (among many other outcomes) was analyzed by Eibich (2015), using data from Germany. He measured diet quality using a self-reported survey question of whether the respondent follows a health-conscious diet and did not find that retirement has any significant effect on that measure.[3] All these studies used similar identification strategies to the current paper—early and full retirement ages as instruments for retirement, and either an instrumental variables estimation strategy (Kämpfen and Maurer, 2016; Godard, 2016) or regression discontinuity design (Eibich, 2015). The current paper extends these results by analyzing the impact of retirement on diet using detailed data on purchases.

The paper also relates to the studies on the impact of the opportunity cost of time on health behaviors. Most closely related is the literature studying the impact of unemployment on health behaviors.[4] Ruhm (2000, 2005) found that recessions and higher unemployment

[2]Studies on the impact of retirement on health and health behaviors include Coe and Zamarro (2011); Insler (2014); Eibich (2015); Celidoni, Dal Bianco, and Weber (2017); Heller-Sahlgren (2017); Mazzonna and Peracchi (2017); Fitzpatrick and Moore (2018); Müller and Shaikh (2018); Shai (2018).

[3]There is literature motivated by the permanent income hypothesis analyzing the impact of retirement on food consumption (most notably, Aguiar and Hurst (2005)). The main findings are that expenditures decrease, eating out decreases (especially in fast-food restaurants), but quantity and diet quality does not. In contrast to these studies, I concentrate on the impact on the healthiness of diet.

[4]Other studies have found that an increase in the opportunity cost of time affects negatively health

rates are associated with increases in physical exercise, decreases in obesity, and improvements in diet. The current paper analyzes how the healthiness of diet is affected by retirement, which generates an alternative shock to the opportunity cost of time. My findings support the evidence from time use literature that retirement leads to significant increases in time spent on shopping and cooking (Aguiar and Hurst, 2005; Stancanelli and Van Soest, 2012). The current paper provides indirect evidence that retirement leads to more time spent on grocery shopping and food preparation.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 describes the empirical strategy and presents the main results and robustness analysis, restricting attention to single-person households. Section 4 analyzes other changes in shopping behavior and purchases to understand the possible mechanisms behind the main results. Section 5 extends the analysis to all households. Section 6 concludes.

2 Data

In the paper, the main data source is the Nielsen Homescan Consumer Panel.[5] The panel is representative of the U.S. population. The households in the panel are asked to scan all their grocery purchases bought from any outlet for personal in-home consumption. The dataset includes UPC level information of purchases. In addition to purchases, the dataset has information on household demographic characteristics, including household composition and income, and household heads' employment status and age. The dataset covers thirteen years, 2004–2016.

In the following subsections, I outline the choices made in the construction of the data and describe the variables used in the analysis. Further details are provided in appendix A.

2.1 Sample

Main sample of single-person households. In the main analysis (sections 3 and 4), I focus on single-person households. Single-person households provide a clean setting because the food purchases data is available only at the household-level. Moreover, concentrating on single-person households avoids modeling how retirement of one household member affects

behaviors and children's health (Dehejia and Lleras-Muney, 2004; Miller and Urdinola, 2010).

[5]The dataset is from The Nielsen Company (US), LLC and marketing databases provided by the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business. Information on the access to the data is available at: http://research.chicagobooth.edu/nielsen.

the others. In section 5, I repeat the analysis including all households. I focus my attention on individuals who are 55–74 years old. Most individuals retire while being in the middle of that age group.

Out of the 23,376 single-person households aged 55–74, I exclude households who work part-time (less than 30 hours per week) or move back to employment (about 5,000 households). This is done to focus on the typical straight path from full-time employment to retirement. I also drop from the main sample households who don't regularly report food purchases (as described in appendix A). The final sample consists of 17,005 individuals.

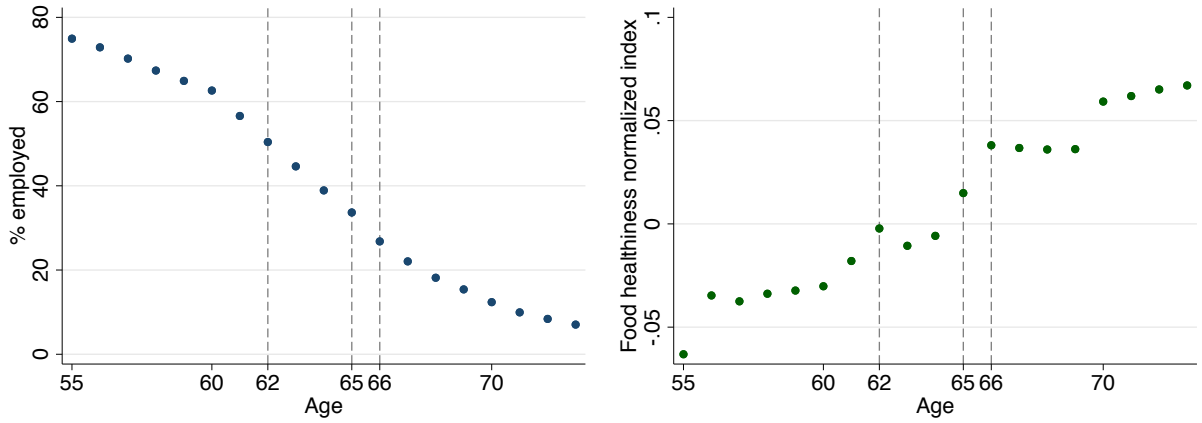
Alternative sample of households of all sizes. In section 5, I extend the analysis to all households that have at least one household head aged 55–74. The analysis concentrates on household heads because there is more detailed data about employment for household heads. There are altogether 80,930 such households. As in the previous sections, I exclude households where either household head works part-time (less than 30 hours per week) or moves back to employment (about 26,000 households). I also drop households that don't regularly report food purchases. The final sample consists of 52,029 households.

2.2 Main explanatory variable of interest: retirement status

Following much of the previous literature that estimates the impact of retirement, I define retirement as when an individual does "not work for pay". There are alternative definitions, for example, that individual has retired when he or she receives a pension (social security benefits) or states that he or she has retired. These alternative measures are not available in my dataset. Moreover, defining retirement as not working has the benefit of being comparable with the previous literature. The caveat of using this definition of retirement is that it cannot distinguish whether an individual is retired or unemployed or out of the labor force. However, the main results in the paper are obtained using instrumental variables (IV), which increase the incentives to retire. The IV method identifies the impact of the move to retirement (or more generally, "not working for pay") that is generated by the instruments. Figure 1a presents age specific employment rates for the individuals in the main sample.[6,7]

[6]Note that in the main sample (single-person households), there are no large gender differences in employment rates (see figure B.1a in appendix B). However, in the case of larger households, female employment rates are slightly lower (figure B.1b in appendix B).

[7]Note that for each age group the employment rate is a few percentage points lower than in the U.S. Current Population Survey. The difference comes mainly from the fact that the main sample in the paper excludes part-time employed (see figure B.2 in appendix B that shows the difference with part-time employed).



(a) Percentage employed

(b) Food healthiness index

Figure 1: Employment and food healthiness across age

Note: Sample includes single-person households aged 55–74 in the main sample, which is constructed as described in subsection 2.1.

2.3 Instruments: social security retirement ages

Following the previous literature (e.g. Coe and Zamarro (2011); Kämpfen and Maurer (2016); Godard (2016); Heller-Sahlgren (2017)), I use eligibility for retirement benefits as instruments for retirement. Specifically, I use the Social Security retirement age cutoffs of early retirement age (62) and full retirement age (65–66 depending on the year of birth). The early retirement age is the earliest age when an individual may choose to start to receive retirement benefits. The early retirement age is set to 62 and has remained constant over time. The full retirement age is the age when an individual may start to receive the full retirement benefits. The earlier one starts to receive the benefits, the more the amount is reduced, which gives incentives to wait. The full retirement age has been increased over time. For anyone born in 1937 or earlier, the full retirement age equals 65. For those born in 1960 or later, the full retirement age equals 67. For those born in between these years, the full retirement age increases yearly by two months, except for those born in 1943–1954, for whom it equals 66. Note that for the individuals currently retiring, their full retirement age has not yet reached 67. More specifically, in the sample, for those who have reached their full retirement age, their full retirement age is no later than at 66 years of age.

2.4 Outcome variables

2.4.1 Main outcome variables

In the main analysis, I measure the healthiness of food purchases using mostly the outcomes constructed based on expenditure shares of food product groups as defined in the USDA Thrifty Food Plan. A similar approach of measuring the healthiness of diet has been used in the related literature (e.g. Volpe, Okrent, and Leibtag (2013); Handbury, Rahkovsky, and Schnell (2015); Oster (2018)). For further details of the construction of the measures see appendix A.

The first outcome measure is the expenditure share of fruits and vegetables. The second outcome measure is the expenditure share of healthy foods. Healthy foods include fruits, vegetables, whole grain products, low-fat dairy products, fish, poultry, eggs, and nuts. The remaining food categories are classified as unhealthy.

The third outcome measure is a food healthiness index, an expenditure score that measures how much the household's grocery purchases deviate from the expenditure shares recommended by the USDA Thrifty Food Plan. The measure was constructed by Volpe, Okrent, and Leibtag (2013) and has been used in subsequent literature (for example, Handbury, Rahkovsky, and Schnell (2015)). The index is calculated as an inverse of summed up squared penalties for purchasing relatively too much unhealthy foods or too little healthy foods. Specifically, for household i in quarter t the food healthiness index equals:

$$Index_{it} = \left[\sum_{j \in J_H} \mathbf{1}[s_{itj} < s_{itj}^{TFP}] \cdot \left(s_{itj} - s_{itj}^{TFP}\right)^2 \quad + \sum_{j \in J_{UH}} \mathbf{1}[s_{itj} > s_{itj}^{TFP}] \cdot \left(s_{itj} - s_{itj}^{TFP}\right)^2 \right]^{-1} \quad (1)$$

where s_{itj} is the household's actual expenditure share of product category j and s_{itj}^{TFP} is the corresponding expenditure share in the USDA Thrifty Food Plan (TFP); J_H denotes the set of product categories that are healthy and J_{UH} those that are unhealthy. I normalize the index so that it is easier to interpret the estimation results.

Figure 1b presents the average food healthiness normalized index across age. The figure shows an overall increase in food healthiness and highlights large jumps at ages 62, 65, and 66 when individuals reach their early or full retirement ages. Figure B.3 in appendix B presents similar graphs for fruits and vegetables and healthy foods expenditure shares.

In addition to expenditure shares, I use the absolute values of quantities and expenditures of fruit and vegetables and healthy and unhealthy foods. I also calculate an analogous food healthiness index based on quantities as opposed to expenditures. To measure the quantity

of food purchases I transform the reported quantitities of purchased food products to ounces. For some products, for example, eggs and some fruits and vegetables, the dataset does not include information about their weight. In the case of these products, I make an assumption about the typical weight of the product.

For all the outcome measures I use information only on products with UPCs (barcodes). In the Nielsen panel, only a subset of households is asked to record products without UPCs. These products without UPCs are non-packaged items from categories such as fruit, vegetables, meats, and baked goods. To take advantage of a bigger sample of households and make purchases of all households comparable, I don't analyze products without UPCs. Because fresh fruit and vegetables are sometimes sold unpackaged without UPCs, the constructed measures of fruit and vegetable purchases provide lower bounds on all fruit and vegetable purchases.

Table 1 presents descriptive statistics of the main sample of single-person households. For the sample of all households, descriptive statistics are presented in table B.1 in appendix B.

2.4.2 Other characteristics of shopping behavior

To analyze other changes in behavior when the household retires (in section 4), I construct three types of measues. These characterize shopping frequency, and purchases of fresh versus storable products and prepared versus unprepared foods.

First, for each household and quarter I calculate various measures of shopping frequency. The first measure is the average number of days per week when the household was shopping at any type of store. The second measure is the average number of days per week shopping in grocery and discount stores. The third measure is the average number of days per week buying fresh fruits and vegetables.

Second, for each household I calculate quarterly purchased quantity (in ounces) and expenditures of fresh versus frozen or canned vegetables. From these measures I exclude potatoes because there is limited variation in whether potatoes are bought fresh, frozen, or canned, and I would like to avoid the results being driven by only potatoes. Note that as above, products without UPCs are excluded. Again, as fresh vegetables are sometimes sold unpackaged without UPCs, the constructed measure provides a lower bound on all fresh vegetables purchases. Note that when analyzing fresh versus frozen or canned vegetable purchases, the sample is slightly smaller, because I restrict attention to households who are purchasing vegetables. Table 1 shows that in this data, fresh vegetables account for, on average, about 40% of all vegetables expenditures and quantity.

Third, I classify all food products as either unprepared or prepared. I use the classification of unprepared foods based on Park and Capps (1997) (or what Okrent and Kumcu (2016) call basic ingredients). The unprepared foods are raw or minimally processed foods used in producing a meal or snack that are generally composed of a single ingredient, such as flour, rice, grains, dried beans, milk, cream, butter and margarine, shortening and oil, eggs, fresh meat, poultry, seafood, fruits, and vegetables. Since other parts of the analysis focused specifically on fruits and vegetables, I calculate two measures for unprepared foods—either with or without fruits and vegetables.

Table 1: Summary statistics

Variable	Mean	SE	Observations
Panel A: Demographic characteristics			
Retired	0.56	0.50	262916
Age	62.99	5.65	262916
Income	40197.50	26850.96	262916
Female	0.71	0.45	262916
College	0.38	0.49	262916
Panel B: Purchases, main variables			
Expenditure share of fruits and vegetables	0.13	0.09	262916
Expenditure share of healthy foods	0.26	0.13	262916
Food healthiness normalized index	-0.00	1.00	262916
Expenditure of fruits and vegetables	46.21	43.50	262916
Expenditure of healthy foods	90.57	69.17	262916
Expenditure of unhealthy foods	264.21	159.96	262916
Quantity of fruits and vegetables	598.28	546.44	262916
Quantity of healthy foods	1135.40	892.04	262916
Quantity of unhealthy foods	2762.85	2139.47	262916
Panel C: Other characteristics of shopping behavior			
Shop. freq. at any type of store	1.96	1.11	262916
Shop. freq. at grocery and discount stores	1.32	0.77	262916
Shop. freq. of fresh fruits and vegetables	0.32	0.31	262916
Fresh vegetables expenditure share	0.43	0.34	238506
Fresh vegetables quantity share	0.35	0.33	237844
Unprepared food expenditure share	0.14	0.08	262916
... excluding fruits and vegetables	0.09	0.06	262916

Note: A unit of observation is a household-quarter pair. Sample includes single-person households aged 55–74 in the main sample, which is constructed as described in subsection 2.1.

2.5 Additional data

To analyze household heterogeneity in section 3.3, I use county level median household income from the U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE) Program for the year 2012. I divide all households in the sample into two groups based on whether they live in a county with a higher or lower median income.

3 The impact of retirement on the healthiness of food purchases

In this section, first, I describe the main empirical strategy which obtains the instrumental variables estimator in a panel data model with household fixed effects. I will then present the main results and robustness analysis. Finally, as an alternative empirical strategy, I will also present results in the event study framework and conduct placebo tests.

3.1 Main empirical strategy

Using household-level quarterly data I estimate the following panel data regression with household fixed effects and instrumental variables:

$$Y_{it} = \beta Retired_{it} + HouseholdFE_i + YearQuarterFE_t + \alpha X_{it} + \varepsilon_{it} \tag{2}$$

The outcome variable (Y) is a measure of healthiness of food purchases. The coefficient of interest is β which measures the impact of retirement ($Retired$). Regressions include household fixed effects ($HouseholdFE$), indicator variables for each time period ($YearQuarterFE$), and time-varying household characterists (X). The indicator variables for each time period are included to control for aggregate time trends, macroeconomic shocks, and seasonal changes in purchases. Household fixed effects are included to control for household-specific time-invariant characteristics. In the main specification, the time-varying household characteristics include age and age squared. In robustness analysis, I use alternative sets of time-varying household characteristics. First, I exclude all time-varying household characteristics, second, in addition to age and age squared, I also include income. Across all specificiations, standard errors are clustered at the household-level.

I use instruments to address the concern that retirement could be endogenous to food purchases. For instruments I use indicator variables of whether the individual is above the

early and full retirement age, respectively. I allow retirement age thresholds to have a different impact by gender.

3.2 Main results

Table 2 presents the main results with three different outcome variables and in each case with and without instruments. The outcome variables are the logit transformation of expenditure shares of fruits and vegetables (columns 1 and 2) and healthy foods (columns 3 and 4), and food healthiness normalized index (columns 5 and 6). Logit transformation of an expenditure share, $ln(S/(1-S))$, rescales the share S from the $(0,1)$ interval to the real line.

The parameter estimates indicate that retirement leads to an increase in the expenditure share of fruits and vegetables (column 2) and healthy foods (column 4) and to an increase in the food healthiness index (column 6). Across the three outcome variables, the estimates with instruments indicate a much larger effect than without instruments. First-stage estimates are presented in table 3.

Table 2: Impact of retirement on the healthiness of food purchases: FE and IV estimates

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
Retirement	0.083***	0.676***	0.057***	0.398***	0.089***	0.489***
	(0.020)	(0.176)	(0.012)	(0.107)	(0.017)	(0.147)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.246	-2.246	-1.187	-1.187	-0.000	-0.000
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. In columns 1–2, the outcome variable is the logit transformation $ln(S/(1-S))$ of fruits and vegetables expenditure share S. Analogously, in columns 3–4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5–6, the outcome variable is the food healthiness normalized index. Sample includes single-person households aged 55–74 in the main sample, which is constructed as described in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

The magnitudes of the estimated effects of retirement on the healthiness of food purchases are large. To put the size of the effect into context, suppose we compare the impact of

retirement to that of having a college education. Individuals with college education purchase healthier food (see pooled OLS estimates in table B.2 in appendix B). While FE estimates show that the effect of retirement is less than half the size of having a college education, the IV estimates show effects that are two to four times the size of having a college education.

Table 3: First-stage regression. Dependent variable: indicator for being retired

	Retired
Female above early retirement age	0.044***
	(0.007)
Female above full retirement age	0.077***
	(0.008)
Male above early retirement age	0.053***
	(0.011)
Male above full retirement age	0.046***
	(0.012)
Age	0.017*
	(0.009)
Age squared	-0.000**
	(0.000)
Year-quarter FE	Yes
Household FE	Yes
Kleibergen-Paap rk Wald F-statistic	42.954
Households	17005
Households-quarters	262916

Note: A unit of observation is a household-quarter pair. The table presents estimates from a fixed effects panel data regression. Dependent variable is an indicator variable for being retired. *Female above early retirement age* is an indicator variable for being both female and above the early retirement age (at least 62 years old). *Female above full retirement age* is an indicator variable for being both female and above the full retirement age (which depends on the year of birth). Analogous definitions of retirement eligibility cutoffs are used for men. Sample includes single-person households aged 55–74 in the main sample, which is constructed as described in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

3.3 Robustness

Robustness of the results is analyzed in table 4 and in tables B.3–B.14 in appendix B. The robustness analysis addresses the following set of possible concerns: (1) control variables, (2) the set of food categories, (3) the sample of households, and (4) outcome variables.

The first concern is about the household-specific time-varying control variables. I start by analyzing whether the results depend on the specific functional form of how age affects

food purchases. In panel A of table B.3, I re-estimate regressions from table 2 excluding age and age squared. The results remain the same, which provides reassurance that the dependence on age is not driving the estimates. In the main regressions, household income was not included. Hence, while the level of income is taken into account by households' fixed effects, the changes are not accounted for. In general, we expect a change in income to affect food purchases, but mostly when the change is unexpected. In this sample, the main change in income happens when a person retires. These changes are not unexpected and hence, most likely, don't much affect purchases. Panel B of of table B.3 presents estimates from the same regressions with logarithm of income included. Results remain the same. The first-stage estimates for both panel A and B are presented in table B.4.

Table B.5 addresses the concern that the results might be driven by a single food group. In the main analysis, potatoes and juice are both large product categories which are included in fruits and vegetables purchases and therefore also in healthy foods purchases. On the other hand, soda is a large category in the unhealthy food group. To check that the results are not driven by these single categories, table B.5 re-estimates the regressions in table 2 excluding potatoes (panel A), juice (panel B), and soda (panel C). Results remain the same.

Table B.6 re-estimates the regressions in table 2 using different samples of households. In panel A, the sample excludes part-time employed households (working 30–34 hours a week).[8] Panel B relaxes the assumption of restricting the sample to those reporting food purchases regularly. In panel C, the sample is restricted to households who remain in the sample for at least three years. In all these cases, results remain the same. The first-stage estimates are presented in table B.7.

The final set of estimates addresses the concern about the specific form of outcome variables. The main analysis used outcome variables constructed from expenditure shares. There are benefits of analyzing the shares because the dataset doesn't include all food purchases, specifically, it doesn't include food consumption at restaurants. While food purchases for at home consumption are likely to increase with retirement, category-specific expenditure shares are more likely to remain the same. However, in the following part, I analyze alternative outcome variables.

Panel A of table 4 presents estimates from regressions where the outcome variables are the absolute value of expenditure on fruits and vegetables (columns 1 and 2), healthy foods (columns 3 and 4), and unhealthy foods (columns 5 and 6). The estimates show that

[8] As subsection 2.1 describes, households that worked less than 30 hours per week were excluded from the main sample.

retirement leads to an increase in the expenditures on fruits and vegetables and healthy foods, while there is no meaningful increase in the purchases of unhealthy foods. Panel B presents the estimates from regressions where the outcome variables are quantities. If we are concerned that expenditures reflect changes in prices, e.g. retired people buy cheaper products, then analyzing quantities alleviates the concern. Therefore, it is reassuring that the results with quantity (in panel B) are similar. Table B.8 in appendix A re-estimates the regressions in table 4 using logarithm of expenditures and quantities to make sure that the results are not driven by large values. The results remain similar.

Table 4: Impact of retirement on food expenditures and quantities

	Fruits & vegetables		Healthy foods		Unhealty foods	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Expenditures ($ per quarter)					
Retirement	2.446***	20.893***	3.913***	28.913***	-1.052	16.194
	(0.753)	(6.480)	(1.193)	(10.105)	(2.486)	(20.295)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	46.214	46.214	90.568	90.568	264.213	264.213
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916
	Panel B: Quantity (ounces per quarter)					
Retirement	45.271***	279.221***	74.212***	299.660**	89.160***	335.693
	(8.904)	(81.517)	(14.673)	(124.446)	(32.468)	(280.301)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	598.276	598.276	1135.398	1135.398	2762.853	2762.853
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Outcome variables are either expenditures measured in dollars (in panel A) or quantities measured in ounces (panel B). Outcome variables measure purchases of fruits and vegetables (columns 1 and 2), healthy foods (columns 3 and 4), and unhealthy foods (columns 5 and 6). Sample includes single-person households aged 55–74 in the main sample, which is constructed as described in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

The main analysis used logit transformation of the expenditure shares. The benefit of the transformation is to get outcome variables that are rescaled from the $(0, 1)$ interval to the real line. But it could be more informative to look at the results with non-transformed

expenditure shares. The results from these regressions are presented in Table B.9 and these are in essence similar to the main results.

The main analysis used a food healthiness index constructed with gender-specific recommended expenditure shares that remained constant across age. For robustness, I recalculate the index using gender and age-group specific recommended expenditure shares. Table B.10 shows that the effect of retirement is now even larger compared to the estimates from the main specification.

Heterogeneous effects by gender, education, and location. The result that retirement leads to healthier food purchases is common across different demographic groups. Appendix B presents estimates from the same regression as in table 2, but with samples separated by gender (table B.11), levels of education (college versus no college in table B.12), and county level median income (table B.13). In all these groups, retirement leads to healthier food purchases. Only in the case of food healthiness index in the case of men, the IV estimate of the impact of retirement is not statistically significant. However, the magnitude of the estimated coefficient in the sample of men is very similar to that estimated in the sample of women. Note also that the sample of men is small and the first-stage estimation with this sample is rather weak. First-stage estimates with all the samples are presented in table B.14.

3.4 Event study approach

In this part, I present results from event study regressions. The goal is to estimate the impact of retirement separately for each quarter before and after retiring takes place. I use the same controls as in regression (2), but I don't use any instruments. I estimate the following event study regression:

$$Y_{it} = \sum_{q=-16}^{17} \beta_q \mathbf{1}[QuarterToRetirement_{it} = q] + HouseholdFE_i + YearQuarterFE_t + \alpha X_{it} + \varepsilon_{it} \quad (3)$$

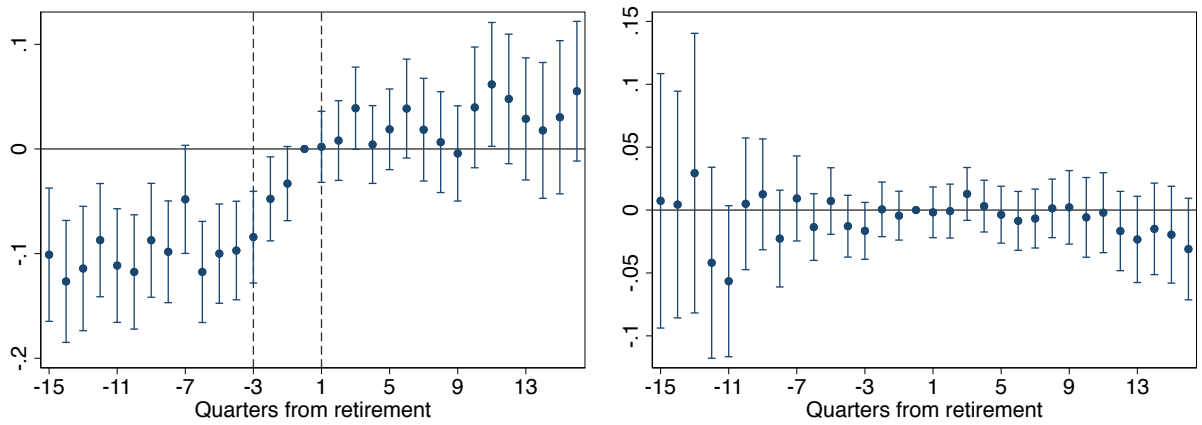
where $\mathbf{1}[QuarterToRetirement = q]$ is an indicator variable for a given quarter before and after retirement, such that, $q = 0$ is the last quarter of employment. The outcome variable (Y) is a measure of the healthiness of food purchases, controls include household fixed effects ($HouseholdFE$), indicator variables for each time period ($YearQuarterFE$), and time-varying household characterists (X).

I estimate the regression using the same main sample that was used above. In this sample, there are three groups of households: some retire while in the sample, others have retired before entering the sample, and the third group never retires while in the sample. In the event study framework, identification of the main parameters of interest β-s comes from the households who retire while in the sample. But to help to identify time period fixed effects I keep the other two groups also in the sample. I assign them to be more than four years from retirement either at quarter $q = -16$ (if employed) or at quarter $q = 17$ (if retired). In this way, these households will never be used to estimate the treatment effects presented on the following figure.

Figure 2a presents point estimates and 90-percent confidence intervals of β-s from regression (3) where the outcome variable is the healthiness index. It shows treatment effects four years before retirement and four years after. Quarter zero ($q = 0$) is the base group in the estimation, hence, the treatment effects are measured relative to $q = 0$. The estimates are somewhat noisy, but show that the healthiness of purchases is larger after retirement than before.[9] As expected, the estimates, in terms of magnitude, are comparable to the results from the panel data fixed effects regressions without instruments (column 5 in table 2). The estimates from similar regressions where outcome variables are the logit transformation of expenditure share of fruits and vegetables and of healthy foods are presented on figure B.4 in appendix B.

Placebo tests. We may be concerned that there is some mechanical reason we observe this response. To alleviate the concern, I use the sample of individuals who don't retire during their period in the sample (that is, they are either employed or already retired, but their status doesn't change). For these individuals, I randomly generate a retirement date within their sample period. Figure 2b presents results from the same event study regression with the randomly generated retirement dates. It is reassuring to see that the results show no increase in the healthiness of purchases with "fake" retirement. Figure B.5 in appendix B presents estimates from similar placebo regressions where outcome variables are the logit transformation of expenditure share of fruits and vegetables and of healthy foods.

[9]Note that in the survey, employment is recorded at yearly frequency, therefore, the exact quarter when retirement took place isn't known. The dashed lines on figure 2a mark the interval when retirement must have taken place.



(a) Event study

(b) Placebo test

Figure 2: Event study and placebo test: normalized healthiness index

Note: The graphs present point estimates and confidence intervals of the effect of retirement in up to four years before and after retirement estimated from regression (3). All estimates are relative to the base which is quarter 0. In addition to household fixed effects, all regressions include indicators for a given quarter before or after retirement, year-quarter dummies, age, and age squared. Dependent variable is the normalized food healthiness index. Panel (a) presents estimates from a regression using data of real retirement timing, while panel (b) using data of randomly drawn "fake" retirement. On panel (a), the sample includes single-person households aged 55–74 in the main sample, which is constructed as described in subsection 2.1. On panel (b), the sample excludes households that retired while in the sample. 90% confidence intervals are presented using standard errors clustered by household.

4 Other changes in behavior when retiring

To shed light on the mechanism of how retirement might lead to an increase in the healthiness of food purchases, in this section I discuss other changes in the shopping behavior and purchases that are associated with retirement. First, I present evidence of increases in shopping frequency at retirement. Then I analyze switching from storable to fresh products and from prepared to unprepared products. All these provide indirect evidence that retirement leads individuals to spend more time on shopping and food preparation.

Shopping frequency. To be able to eat fresh food, one has to buy it rather often, because fresh food, especially fresh fruits and vegetables, is not easily storable. In this part, I estimate the same panel data fixed effects model with and without instruments (regression 2), where outcome variables are various measures of shopping frequency. The first measure is the average number of days per week when the household was shopping at any type of store. The second measure is the average number of days per week shopping in grocery and discount

stores. I look specifically at grocery and discount stores, because these stores (as opposed to convenience stores, drug stores, or warehouse clubs) tend to have a larger selection of fresh and healthy foods. The third measure is the average number of days per week buying fresh fruits and vegetables.

Table 5 shows that retirement leads to an increase in shopping frequency measured by the average number of days per week when the household visited any type of store (columns 1–2), grocery or discount stores (3–4), and bought fresh fruits and vegetables (columns 5–6). As expected, retirement increases shopping frequency during weekdays, as shown in table B.15 in appendix B. The estimates on shopping frequency on one hand support the evidence from the previous section that retired households simply buy more fresh fruits and vegetables. On the other hand, the estimates show that retirement leads households to spend more time on shopping for fresh fruits and vegetables.

Table 5: Impact of retirement on the frequency of shopping trips

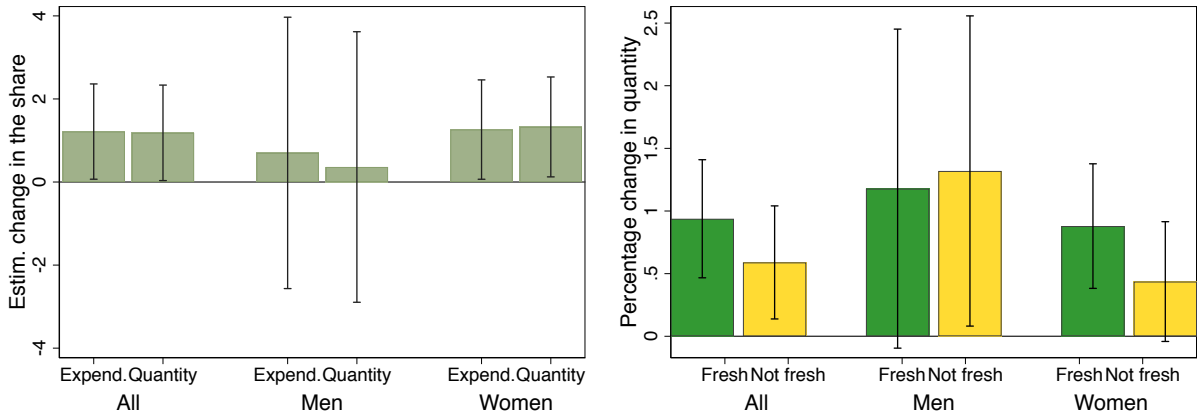
	Average number of days per week with shopping trips					
	Any type of store		Grocery & discount stores		Fresh fruits & vegetables	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
Retirement	0.161***	0.362***	0.107***	0.208**	0.029***	0.132***
	(0.018)	(0.135)	(0.013)	(0.101)	(0.006)	(0.047)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	1.957	1.957	1.320	1.320	0.321	0.321
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Outcome variable is the average number of days per week when household made purchases in any type of store (columns 1 and 2), grocery or discount stores (column 3 and 4), purchased fresh fruits or vegetables (column 5 and 6). Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Switching from storable products to fresh products. Motivated by the finding of increased shopping frequency, I analyze switching from storable to fresh products. I restrict attention to vegetables, where fresh products compared to storable ones (frozen or canned) are more time consuming in the following two ways. First, fresh vegetables compared to frozen and canned vegetables have a considerably shorter shelf life and hence need to be

bought more often. Second, fresh vegetables typically require more time for preparation (like washing, peeling, and cutting).

Figure 3 presents point estimates and 90-percent confidence intervals from panel data fixed effects regressions with instrumental variables from tables B.16 and B.17 in appendix B. In figure 3a, the outcome variable is the logit transformation of either expenditure or quantity share of fresh vegetables in all vegetable purchases. In figure 3b, the outcome variable is the logarithm of the quantity of either fresh vegetables (green bar) or canned/frozen vegetables (yellow bar). Figure 3 shows that retirement leads to an increase in the share of fresh vegetables purchases. The figure also shows some evidence of gender differences suggesting that the effect of switching to fresh vegetables is driven by women.



(a) Change in the share of fresh vegetables (b) Perc. change in the quantity of vegetables

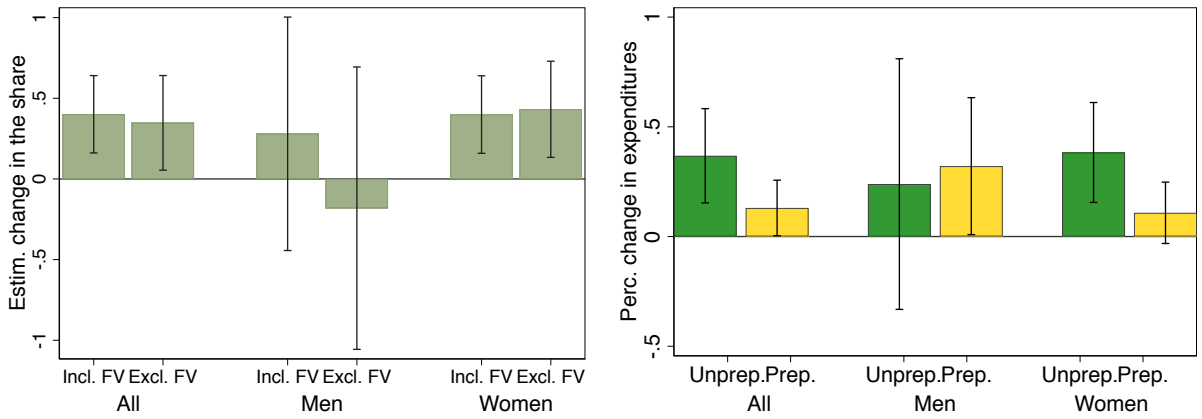
Figure 3: Estimated change in the purchases of fresh versus frozen and canned vegetables

Note: The graphs present point estimates (bar) and 90% confidence intervals (line) from panel data fixed effects regressions with instrumental variables from tables B.16 and B.17 in appendix B. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. On figure 3a, the outcome variable is the logit transformation $ln(S/(1-S))$ of either expenditure or quantity share, S, of fresh vegetables in all vegetable purchases. On figure 3b, the outcome variable is the logarithm of the quantity of either fresh vegetables (green bar) or canned/frozen vegetables (yellow bar). 90% confidence intervals are calculated using standard errors clustered by household.

Switching from prepared to unprepared products. Another group of food products requiring more preparation time is unprepared products. In this part, I analyze whether retirement leads to a relative increase in purchases of unprepared food products.

Figure 4 presents point estimates and 90-percent confidence intervals from panel data fixed effects regressions with instrumental variables from tables B.18 and B.19 in appendix B. In

figure 4a, the outcome variable is the logit transformation of expenditure share of unprepared food either with or without fruits and vegetables. In section 2, fruits and vegetables were included in the list of unprepared food products. But we already saw above that retirement leads to an increase in purchases of fruits and vegetables. Therefore, it is interesting to test whether retirement increases unprepared food share even without fruits and vegetables. In figure 4b, the outcome variable is the logarithm of expenditure on either unprepared (green bar) or prepared (yellow bar) food products. Figure 4 shows that retirement leads to an increase in the share of unprepared food purchases. The estimates suggest that the effect of switching from prepared to unprepared food is driven by women.



(a) Change in the share of unprepared food (b) Perc. change in food expenditures

Figure 4: Estimated change in the purchases of prepared versus unprepared food

Note: The graphs present point estimates (bar) and 90% confidence intervals (line) from panel data fixed effects regressions with instrumental variables from tables B.18 and B.19 (panel B and C) in appendix B. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. On figure 4a, the outcome variable is the logit transformation $ln(S/(1-S))$ of expenditure share, S, of unprepared food either with or without fruits and vegetables. On figure 4b, the outcome variable is the logarithm of the expenditure on either unprepared, excluding fruits and vegetables, (green bar) or prepared (yellow bar) food products. 90% confidence intervals are calculated using standard errors clustered by household.

5 Generalizability of the findings to larger households

The analysis of single-person households provides clean results, because the outcome variables of food purchases are measured only at the household-level and the retirement decision is not affected by other household members' behavior. However, it is also interesting to see whether the results generalize to larger households. In this section, I extend the sample to all

households that have at least one household head in the age group 55–74.

When analyzing the impact of retirement on purchases in larger households, one has to first decide how to define retirement. In my preferred specification, I define retirement as the number of household heads being retired. I restrict attention to household heads, because for other members there is less information about their labor market status. In this specification, the variable *Retired* takes values 0, 1, or 2. Instruments will be the same four variables as in the previous sections: indicator variables for male or female household head being above the early or full retirement age. First-stage estimates are presented in column 1 in table B.20 in appendix B.

Table 6: Impact of retirement on the healthiness of food purchases: all households

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
Retired	0.034***	0.121***	0.031***	0.077***	0.068***	0.552***
	(0.006)	(0.033)	(0.004)	(0.022)	(0.007)	(0.042)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.122	-2.122	-1.161	-1.161	0.000	0.000
Households	52029	52029	52029	52029	52029	52029
Households-quarters	831768	831768	831768	831768	831768	831768

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. *Retired* takes values 0, 1, or 2 depending on how many household heads have retired. In addition to household fixed effects, all regressions include year-quarter dummies, average age and age squared of household heads, indicator for children, and indicator variables for each household size (except 2-person household, which is the base group). In columns 1–2, the outcome variable is the logit transformation $ln(S/(1-S))$ of fruits and vegetables expenditure share S. Analogously, in columns 3–4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5–6, the outcome variable is the food healthiness normalized index. Sample consists of households with at least one household head aged 55–74 that belong to the alternative sample of households of all sizes, which is constructed as described in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Table 6 presents results from the same regressions as in table 2 re-estimated in the sample of all households aged 55–74. The results are qualitatively similar—retirement leads to significantly healthier food purchases. In the case of the food healthiness index, a household head retirement increases healthiness of food purchases by about half a standard deviation. This is similar to the result from only single-person households. In the case of fruits and vegetables' and healthy foods' expenditure shares, the effects are smaller in magnitude

compared to single-person households. A household head retirement leads to an increase in the expenditure share of fruits and vegetables that is about the same magnitude as having at least one household head with a college degree (see table B.21 in appendix B). In the case of expenditure share of healthy foods, the effect is about half the size of having a college education.

In appendix B, I repeat the analysis with alternative specifications. Table B.22 presents results from the same regressions when excluding single-person households from the sample. The effects are qualitatively similar but smaller in magnitude. Table B.23 presents estimates with an alternative definition of retirement. Specifically, in households with two household heads, I define being retired as a single variable taking value 0.5 if only one household head is retired and 1 if both household heads are retired. In households with a single household head, the variable takes value 1 if the household head has retired and zero otherwise. As expected, the coefficient estimates are larger in magnitude. First-stage estimates of all these regressions are presented in table B.20 in appendix B.

6 Conclusions

This paper analyzes the impact of retirement on the healthiness of diet. I find that retirement increases fruit and vegetable purchases and overall healthiness of food purchases. As shopping and cooking healthy food requires time and retirement generates a large increase in available time, I speculate that time constraints might play a role in limiting healthy food consumption. I find evidence that retirement increases time spent on shopping and food preparation.

In this paper, I focused on the impact of retirement on broad categories of food purchases, like fruits and vegetables and broadly defined healthy foods. The same data and methods can be used to estimate the impact on purchases of more detailed food groups, calories, and nutrients. It could also be used to further understand the role of local supply conditions (types of stores and available food products) in determining the extent of changes in food purchases at retirement.

However, the analysis faces several limitations. First, the dataset does not include information on food consumption in restaurants. If retirement leads households to eat more at home compared to eating out, the impact on the healthiness of overall food consumption may be different. Indeed, previous research shows that retirement decreases food consumption at restaurants, but the effect comes almost exclusively from fast-food restaurants (Aguiar and Hurst, 2005). This implies that the positive impact of retirement on the healthiness of overall

food consumption could be even larger because fast-food tends to be unhealthy. Second, the dataset does not include any health measures, nor information on BMI or obesity. It would be interesting to see whether changes in diet actually translate into corresponding changes in weight. Finally, it should be noted that the instrumental variables estimates measure the local average treatment effect on compliers, those who retire because of Social Security early and full retirement ages. The results cannot be extrapolated to others who retire because of other reasons. For example, if retirement is triggered by a job loss, then it generates an unexpected decrease in income, which could limit healthy food consumption.

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A Online Appendix: Dataset construction

In this Appendix, I describe the construction of the dataset from the Nielsen Homescan consumer panel from years 2004–2016.

Aggregation of purchases to food product categories. First, I aggregate food products into 52 product categories used by USDA Quarterly Food at Home Price Database (QFAHPD) based on Todd, Mancino, Leibtag, and Tripodo (2010). Second, I further aggregate these categories into 24 broader product categories in the USDA Thrifty Food Plan (TFP) using the mapping in Volpe and Okrent (2012). I exclude one category – water – from all the analysis.

Defining healthy and unhealthy food categories. I classify the TFP product categories into healthy or unhealthy following Volpe, Okrent, and Leibtag (2013) and Handbury, Rahkovsky, and Schnell (2015). Specifically, in the only two product categories, where their classifications differ, I follow Handbury, Rahkovsky, and Schnell (2015) and classify cheese and meat categories as unhealthy.

Food healthiness index. To construct the food healthiness index defined by equation 1 in section 2, I use recommended individual expenditure shares from the USDA Thrifty Food Plan in Carlson, Lino, Juan, Hanson, and Basiotis (2007). The recommended individual expenditure shares are gender and age-group specific.

For multi-person households, I calculate the recommended household-level expenditure shares as a weighted average of the individual shares: $s_i^{TFP} = \sum_k w_k s_k^{TFP}$. For each household member k, the weight w_k is based on the OECD equivalence scale:

$$w_{Adult} = \frac{\frac{1+(n_{Adults}-1)\times 0.5}{n_{Adults}}}{1 + (n_{Adults} - 1) \times 0.5 + n_{Children} \times 0.3} \tag{4}$$

$$w_{Child} = \frac{0.3}{1 + (n_{Adults} - 1) \times 0.5 + n_{Children} \times 0.3} \tag{5}$$

In the main analysis, for single-person households I use gender-specific recommended expenditure shares that are kept constant across age. Specifically, for everyone in the sample (individuals aged 55–74), I use shares recommended for the age group 55–70 in order to avoid generating a discrete jump at age 71. In the robustness analysis, I present estimates where

the food healthiness index is recalculated using gender and age-group specific recommended shares. The results are very similar.

Sample of households. I restrict attention to households with food purchases and with at least one household head aged 55–74 in a given year. I exclude households where a household head works less than 30 hours per week or moves back to employment. As is common in the literature using scanner data, I use a minimum purchase requirement. Namely, I exclude households who don't report food purchases in at least five of the TFP food groups each quarter. In robustness analysis, I relax the requirement and results remain similar.

Household demographic characteristics. Information on demographic characteristics, including employment status, is collected once a year in the Fall prior to the year when purchases are recorded. In the quarterly analysis, I use employment status with one quarter lead (one quarter ahead to the quarter of the purchases data). However, the results are similar if contemporaneous employment status was used.

In the dataset, household income is reported using intervals. In the analysis, I use an income measure that corresponds to the mid-point of the reported income interval. Except for the highest income group, for which the mid-point cannot be calculated as no highest level is reported. For that group I assume that their household annual income equals 115,000 dollars, which is consistent with the current income distribution.

For each household, I construct a variable indicating whether at least one of the household heads has graduated from college. In the analysis in subsection 3.3, I would like to divide households into two groups based on graduating from college. In doing that, it makes sense to keep for each household the education variable constant over time. Therefore, for each household head, I use the lowest reported education level across years. Note that using the lowest level as opposed to the contemporaneous level does not change much because in the age group 55–74, education level, typically, remains constant over the years.

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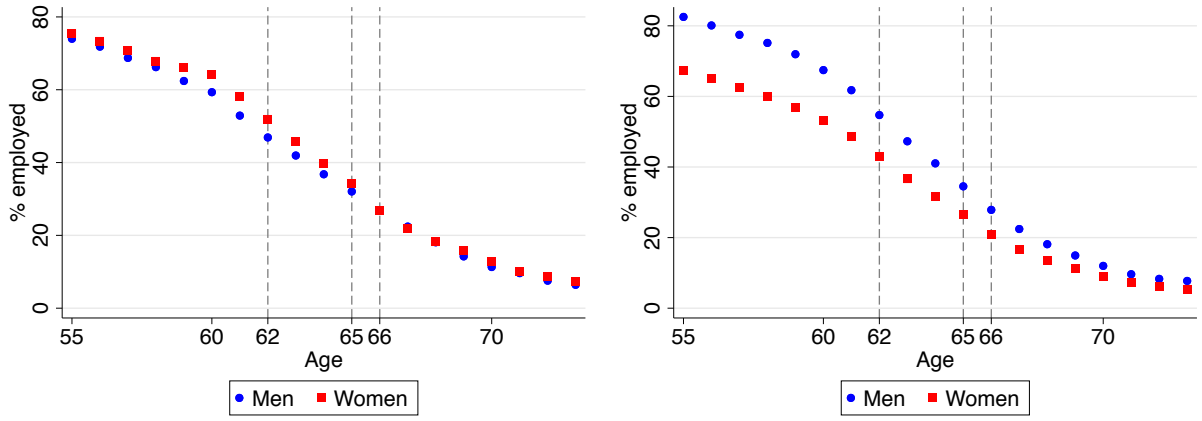
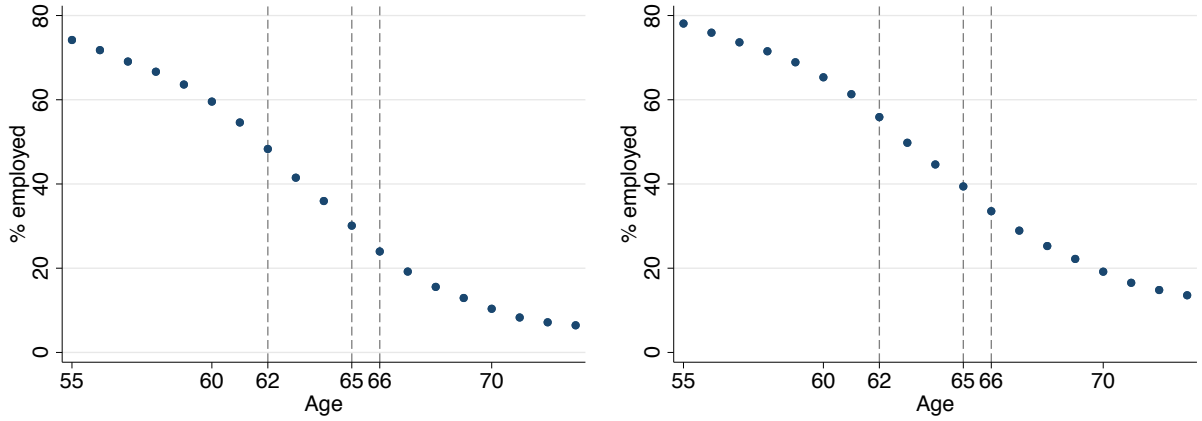
B Online Appendix: Additional figures and tables



(a) Single-person households (b) All

Online Appendix Figure B.1: Percentage employed by age and gender

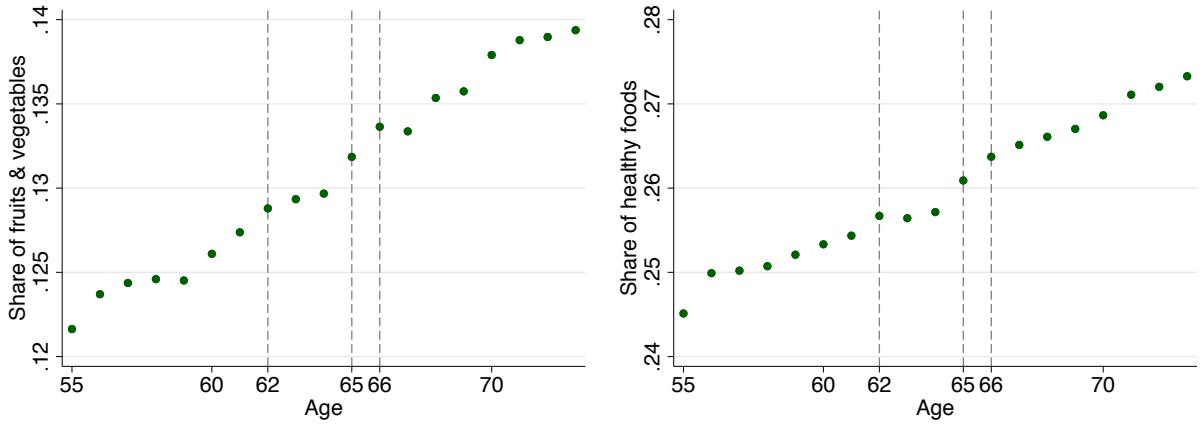
Note: On panel (a), the sample consists of single-person households. On panel (b), the sample consists of households of all sizes, the graph describes employment status of household heads.



(a) Excluding part-time employed (b) Including part-time employed

Online Appendix Figure B.2: Percentage employed across age

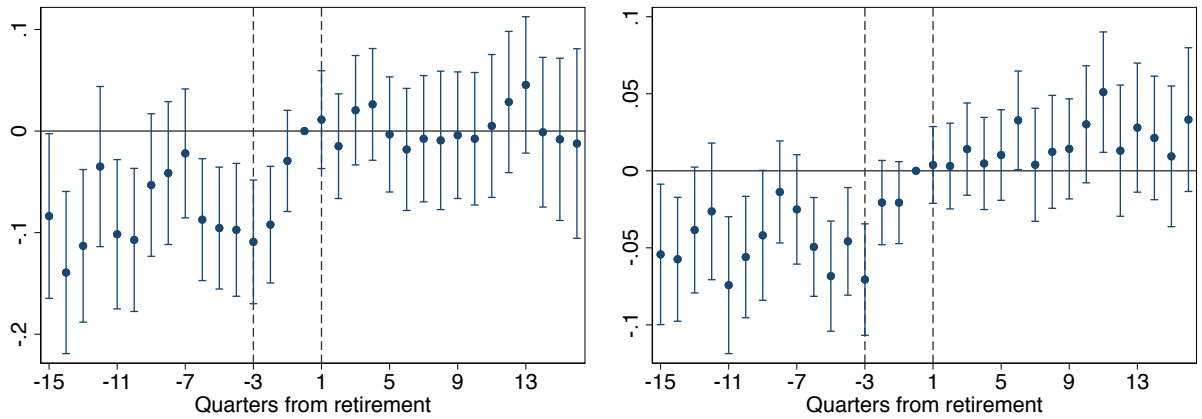
Note: On panel (a), sample includes households with at least one of the household head aged 55–74 that belong to the alternative sample of households of all sizes, which is constructed as descibed in subsection 2.1. On panel (b), the same sample is extended to include part-time employed. The graphs describe employment status of household heads.



(a) Fruits and vegetables (b) Healthy foods

Online Appendix Figure B.3: Expenditure share of fruits and vegetables and healthy foods across age

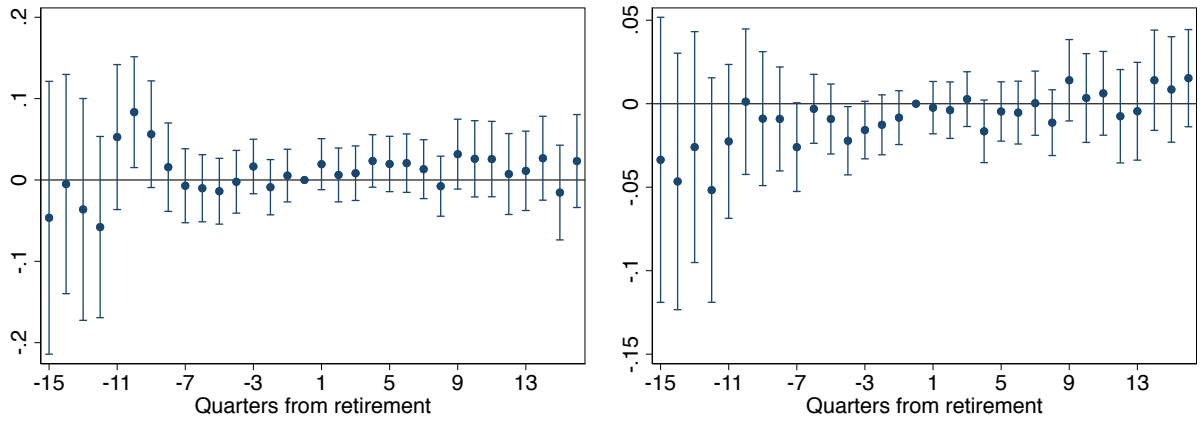
Note: Sample consists of single-person households.



(a) Share of fruits and vegetables (b) Share of healthy foods

Online Appendix Figure B.4: Event study

Note: The graphs present point estimates and confidence intervals of the effect of retirement in up to four years before and after retirement estimated from regression (3). All estimates are relative to the base which is quarter 0. In addition to household fixed effects, all regressions include indicators for a given quarter before or after retirement, year-quarter dummies, age, and age squared. Dependent variable is logit transformation of the expenditure share of either fruits and vegetables (panel (a)) or healthy foods (panel (b)). The sample includes single-person households aged 55–74 in the main sample, which is constructed as described in subsection 2.1. 90% confidence intervals are presented using standard errors clustered by household.



(a) Share of fruits and vegetables

(b) Share of healthy foods

Online Appendix Figure B.5: Placebo

Note: In the dataset, used in the estimation, retirement dates are randomly drawn. The graphs present point estimates and confidence intervals of the effect of "fake" retirement in up to four years before and after "fake" retirement estimated from regression (3). All estimates are relative to the base which is quarter 0. In addition to household fixed effects, all regressions include indicators for a given quarter before or after retirement, year-quarter dummies, age, and age squared. Dependent variable is logit transformation of the expenditure share of either fruits and vegetables (panel (a)) or healthy foods (panel (b)). The sample includes single-person households aged 55–74 in the main sample, except the households that actually retired while in the sample. 90% confidence intervals are presented using standard errors clustered by household.

Online Appendix Table B.1: Summary statistics, all households

Variable	Mean	SE	Observations
Panel A: Demographic characteristics			
Number of household heads retired (0-2)	0.88	0.76	831768
Average age of household heads	61.85	6.48	831768
Income	57377.26	32362.74	831768
Female	0.90	0.30	831768
College	0.41	0.49	831768
Children	0.07	0.26	831768
Household size	2.04	1.01	831768
Panel B: Purchases, main variables			
Expenditure share of fruits and vegetables	0.13	0.08	831768
Expenditure share of healthy foods	0.26	0.11	831768
Food healthiness normalized index	0.00	1.00	831768

Note: A unit of observation is a household-quarter pair. Sample includes households with at least one of the household head aged 55–74 that belong to the alternative sample of households of all sizes, which is constructed as descibed in subsection 2.1.

Online Appendix Table B.2: Demographic characteristics and healthiness of food purchases

	Logit transformation of expenditure share of fruits & vegetables	healthy foods	Food healthiness normalized index
	(1)	(2)	(3)
Log. income	0.151***	0.095***	0.100***
	(0.012)	(0.008)	(0.010)
College	0.176***	0.200***	0.178***
	(0.018)	(0.013)	(0.018)
Female	0.233***	0.116***	-0.102***
	(0.022)	(0.016)	(0.019)
Age	0.026	0.006	0.002
	(0.025)	(0.017)	(0.021)
Age squared	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Year-quarter FE	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Mean dep. var.	-2.246	-1.187	-0.000
Households	17005	17005	17005
Households-quarters	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data pooled OLS model. In column 1, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In column 2, the outcome variable is the logit transformation of healthy foods expenditure share. In column 3, the outcome variables is the food healthiness normalized index. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.3: Robustness: Impact of retirement on food purchases, alternative controls

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: No time-varying household-specific controls					
Retirement	0.084***	0.646***	0.057***	0.366***	0.089***	0.415***
	(0.020)	(0.175)	(0.012)	(0.106)	(0.017)	(0.144)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.246	-2.246	-1.187	-1.187	-0.000	-0.000
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916
	Panel B: Age and income included					
Retirement	0.087***	0.700***	0.058***	0.411***	0.092***	0.506***
	(0.020)	(0.182)	(0.012)	(0.111)	(0.017)	(0.151)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.246	-2.246	-1.187	-1.187	-0.000	-0.000
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies. In panel B, regressions include also age, age squared, and logarithm of income. In columns 1 and 2, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In columns 3 and 4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5 and 6, the outcome variable is the food healthiness normalized index. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.4: Robustness, first-stage: Alternative controls

	Panel A	Panel B
	(1)	(2)
Female above early retirement age	0.046***	0.043***
	(0.007)	(0.006)
Female above full retirement age	0.073***	0.075***
	(0.008)	(0.007)
Male above early retirement age	0.055***	0.047***
	(0.011)	(0.010)
Male above full retirement age	0.042***	0.048***
	(0.012)	(0.011)
Age		0.019**
		(0.009)
Age squared		-0.000**
		(0.000)
Log. income		-0.161***
		(0.007)
Year-quarter FE	Yes	Yes
Household FE	Yes	Yes
Kleibergen-Paap rk Wald F-statistic	44.375	44.516
Households	17005	17005
Households-quarters	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a fixed effects panel data regression. Dependent variable is an indicator variable for being retired. *Female above early retirement age* is an indicator variable for being both female and above the early retirement age (at least 62 years old). *Female above regular retirement age* is an indicator variable for being both female and above the regular retirement age (which depends on the year of birth). Analogous definitions of retirement eligibility cutoffs are used for men. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.5: Robustness: Impact of retirement on food purchases, dependence on specific products

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Potatoes excluded			
Retirement	0.079***	0.611***	0.058***	0.363***	0.087***	0.476***
	(0.022)	(0.188)	(0.012)	(0.111)	(0.017)	(0.148)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.401	-2.401	-1.245	-1.245	-0.000	-0.000
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916
			Panel B: Juice excluded			
Retirement	0.109***	0.706***	0.060***	0.377***	0.089***	0.488***
	(0.021)	(0.195)	(0.012)	(0.110)	(0.017)	(0.147)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.484	-2.484	-1.277	-1.277	-0.000	-0.000
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916
			Panel C: Soda excluded			
Retirement	0.079***	0.674***	0.051***	0.389***	0.067***	0.449***
	(0.020)	(0.177)	(0.012)	(0.107)	(0.017)	(0.148)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.159	-2.159	-1.083	-1.083	-0.000	-0.000
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. In columns 1 and 2, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In columns 3 and 4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5 and 6, the outcome variable is the food healthiness normalized index. Each panel excludes one product category from all purchases: potatoes (panel A), juice (panel B), soda (panel C). Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.6: Robustness: Impact of retirement on food purchases, alternative samples

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Sample excludes part-time employed					
Retirement	0.083***	0.701***	0.055***	0.436***	0.093***	0.474***
	(0.021)	(0.184)	(0.013)	(0.112)	(0.018)	(0.154)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.244	-2.244	-1.188	-1.188	-0.000	-0.000
Households	16010	16010	16010	16010	16010	16010
Households-quarters	244748	244748	244748	244748	244748	244748
	Panel B: Sample does not exclude households with few purchases					
Retirement	0.104***	0.780***	0.068***	0.426***	0.098***	0.462***
	(0.022)	(0.201)	(0.014)	(0.131)	(0.017)	(0.143)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.343	-2.343	-1.241	-1.241	-0.039	-0.039
Households	18181	18181	18181	18181	18181	18181
Households-quarters	283632	283632	283632	283632	283632	283632
	Panel C: Sample excludes households with less than 3 years					
Retirement	0.080***	0.737***	0.057***	0.422***	0.088***	0.519***
	(0.020)	(0.178)	(0.012)	(0.108)	(0.017)	(0.149)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.225	-2.225	-1.171	-1.171	0.012	0.012
Households	9226	9226	9226	9226	9226	9226
Households-quarters	219948	219948	219948	219948	219948	219948

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. In columns 1 and 2, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In columns 3 and 4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5 and 6, the outcome variable is the food healthiness normalized index. The sample includes single-person households aged 55–74 in the main sample with the following modifications. In panel A, the sample excludes part-time employed households (working 30–34 hours per week). In panel B, the sample relaxes the minimum purchase requirement, such that, it includes households who bought in at least two product categories each quarter. In panel C, the sample is restricted to households who remain in the sample for at least three years. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.7: Robustness, first-stage: Alternative samples

	Panel A	Panel B	Panel C
	(1)	(2)	(3)
Female above early retirement age	0.043***	0.044***	0.044***
	(0.007)	(0.006)	(0.007)
Female above full retirement age	0.077***	0.077***	0.079***
	(0.008)	(0.008)	(0.008)
Male above early retirement age	0.052***	0.049***	0.055***
	(0.011)	(0.010)	(0.011)
Male above full retirement age	0.051***	0.043***	0.046***
	(0.012)	(0.011)	(0.012)
Age	0.031***	0.015*	0.017*
	(0.009)	(0.009)	(0.009)
Age squared	-0.000***	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)
Year-quarter FE	Yes	Yes	Yes
Household FE	Yes	Yes	Yes
Kleibergen-Paap rk Wald F-statistic	41.075	45.208	41.763
Households	16010	18181	9226
Households-quarters	244748	283632	219948

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a fixed effects panel data regression. Dependent variable is an indicator variable for being retired. *Female above early retirement age* is an indicator variable for being both female and above the early retirement age (at least 62 years old). *Female above regular retirement age* is an indicator variable for being both female and above the regular retirement age (which depends on the year of birth). Analogous definitions of retirement eligibility cutoffs are used for men. The sample includes single-person households aged 55–74 in the main sample with the following modifications. In column 1, the sample excludes part-time employed households (working 30–34 hours per week). In column 2, the sample relaxes the minimum purchase requirement, such that, it includes households who bought in at least two product categories each quarter. In column 3, the sample is restricted to households who remain in the sample for at least three years. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.8: Robustness: Impact of retirement on logarithm of food expenditures and quantities

	Fruits & vegetables		Healthy foods		Unhealthy foods	
	w/o IV	IV	w/o IV	IV	w/o IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Logarithm of expenditures ($ per quarter)					
Retirement	0.074***	0.583***	0.061***	0.417***	0.006	0.073
	(0.016)	(0.142)	(0.012)	(0.109)	(0.009)	(0.079)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	3.453	3.453	4.244	4.244	5.406	5.406
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916
	Panel B: Logarithm of quantity (ounces per quarter)					
Retirement	0.105***	0.748***	0.094***	0.406***	0.034***	0.129
	(0.020)	(0.180)	(0.014)	(0.124)	(0.011)	(0.094)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	5.907	5.907	6.706	6.706	7.680	7.680
Households	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Outcome variables are the logarithm of either expenditures measured in dollars (panel A) or quantities measured in ounces (panel B). Outcome variables measure purchases of fruits and vegetables (columns 1 and 2), healthy foods (columns 3 and 4), and unhealthy foods (columns 5 and 6). Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.9: Robustness: Impact of retirement on food purchases, expenditure shares

	Expenditure share of			
	fruits & vegetables		healthy foods	
	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)
Retirement	0.005***	0.041***	0.009***	0.049***
	(0.001)	(0.012)	(0.002)	(0.017)
Year-quarter FE	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes
Mean dep. var.	0.130	0.130	0.258	0.258
Households	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Outcome variables are the expenditure shares of fruits and vegetables (columns 1 and 2) or healthy foods (columns 3 and 4). Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.10: Robustness: Impact of retirement on food purchases. Dependent variable: age and gender specific food healthiness normalized index

	Food healthiness normalized index	
	FE	FE-IV
	(1)	(2)
Retirement	0.119***	2.226***
	(0.017)	(0.221)
Year-quarter FE	Yes	Yes
Household FE	Yes	Yes
Mean dep. var.	-0.000	-0.000
Households	17005	17005
Households-quarters	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. The outcome variable is the food healthiness normalized index calculated using gender and age-group specific recommended expenditure shares. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.11: Impact of retirement on food purchases, by gender

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Women			
Retirement	0.077***	0.501***	0.062***	0.308***	0.094***	0.489***
	(0.022)	(0.178)	(0.013)	(0.111)	(0.018)	(0.151)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.184	-2.184	-1.160	-1.160	-0.036	-0.036
Households	12345	12345	12345	12345	12345	12345
Households-quarters	187184	187184	187184	187184	187184	187184
			Panel B: Men			
Retirement	0.094**	1.392**	0.043*	0.769**	0.075**	0.510
	(0.042)	(0.547)	(0.024)	(0.312)	(0.036)	(0.429)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.399	-2.399	-1.252	-1.252	0.090	0.090
Households	4660	4660	4660	4660	4660	4660
Households-quarters	75732	75732	75732	75732	75732	75732

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. In columns 1 and 2, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In columns 3 and 4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5 and 6, the outcome variable is the food healthiness normalized index. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. The sample is restricted to either women (panel A) or men (panel B). Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.12: Impact of retirement on food purchases, by education

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Education: college					
Retirement	0.070**	0.767**	0.043**	0.539***	0.081***	0.892***
	(0.031)	(0.316)	(0.019)	(0.193)	(0.031)	(0.317)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.121	-2.121	-1.051	-1.051	0.140	0.140
Households	6342	6342	6342	6342	6342	6342
Households-quarters	101044	101044	101044	101044	101044	101044
	Panel B: Education: no college					
Retirement	0.092***	0.605***	0.066***	0.323**	0.094***	0.293*
	(0.026)	(0.210)	(0.015)	(0.128)	(0.019)	(0.157)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.324	-2.324	-1.272	-1.272	-0.087	-0.087
Households	10663	10663	10663	10663	10663	10663
Households-quarters	161872	161872	161872	161872	161872	161872

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. In columns 1 and 2, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In columns 3 and 4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5 and 6, the outcome variable is the food healthiness normalized index. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. The sample is restricted to either those with at least college education (panel A) or those without (panel B). Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.13: Impact of retirement on food purchases, by median household income of the county

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: County income: above median					
Retirement	0.041	0.452**	0.036**	0.263**	0.081***	0.395**
	(0.027)	(0.230)	(0.016)	(0.130)	(0.023)	(0.181)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.236	-2.236	-1.152	-1.152	0.030	0.030
Households	8495	8495	8495	8495	8495	8495
Households-quarters	134880	134880	134880	134880	134880	134880
	Panel B: County income: below median					
Retirement	0.134***	0.888***	0.082***	0.498***	0.098***	0.460**
	(0.029)	(0.280)	(0.018)	(0.175)	(0.025)	(0.222)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.256	-2.256	-1.223	-1.223	-0.032	-0.032
Households	8510	8510	8510	8510	8510	8510
Households-quarters	128036	128036	128036	128036	128036	128036

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. In columns 1 and 2, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In columns 3 and 4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5 and 6, the outcome variable is the food healthiness normalized index. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. The sample is restricted to either those from counties above median income (panel A) or below median income (panel B). Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.14: First-stage, by demographic characteristics

	Gender		College		Income	
	Women	Men	Yes	No	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Female above early retirement age	0.044***		0.041***	0.046***	0.044***	0.041***
	(0.006)		(0.011)	(0.008)	(0.009)	(0.009)
Female above full retirement age	0.078***		0.072***	0.081***	0.091***	0.063***
	(0.008)		(0.014)	(0.009)	(0.011)	(0.011)
Male above early retirement age		0.050***	0.049***	0.053***	0.027**	0.084***
		(0.010)	(0.016)	(0.014)	(0.013)	(0.017)
Male above full retirement age		0.043***	0.044***	0.044***	0.056***	0.034**
		(0.011)	(0.017)	(0.016)	(0.017)	(0.016)
Age	0.016	0.016	0.012	0.016	0.026**	0.006
	(0.011)	(0.018)	(0.016)	(0.011)	(0.013)	(0.013)
Age squared	-0.000*	-0.000	-0.000	-0.000	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk Wald F-statistic	68.735	16.729	13.152	30.381	24.195	20.335
Households	12345	4660	6342	10663	8495	8510
Households-quarters	187184	75732	101044	161872	134880	128036

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a fixed effects panel data regression. Dependent variable is an indicator variable for being retired. *Female above early retirement age* is an indicator variable for being both female and above the early retirement age (at least 62 years old). *Female above regular retirement age* is an indicator variable for being both female and above the regular retirement age (which depends on the year of birth). Analogous definitions of retirement eligibility cutoffs are used for men. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. The sample is restricted to either women (column 1) or men (column 2); those with college degree (column 3) or without (column 4), those from counties with above median income (column 5) or below median income (column 6). Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.15: Probability of shopping in grocery or discount stores by day of week

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Fixed effects estimates						
Retirement	0.033***	0.052***	0.050***	0.046***	0.032***	-0.053***	-0.052***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	0.173	0.174	0.178	0.174	0.197	0.213	0.210
Households	17005	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916	262916
	Fixed effects, instrumental variables estimates						
Retirement	0.049**	0.103***	0.099***	0.084***	0.037	-0.041	-0.122***
	(0.024)	(0.026)	(0.026)	(0.025)	(0.029)	(0.030)	(0.029)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	0.173	0.174	0.178	0.174	0.197	0.213	0.210
Households	17005	17005	17005	17005	17005	17005	17005
Households-quarters	262916	262916	262916	262916	262916	262916	262916

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with instrumental variables (panel B) or without (panel A). In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Outcome variable is the probability of household purchasing in grocery or discount stores in a given day of week from Monday (column 1) to Sunday (column 7). For each day of week and household-quarter pair, the probability is calculated as the number of days with shopping trips divided by the total number days that quarter. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.16: Dependent variable: Logit transformation of the share of fresh vegetables in all vegetables purchases

	All		Men		Women	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Expenditure share of fresh vegetables					
Retirement	0.019	1.215*	0.116	0.701	-0.028	1.263*
	(0.077)	(0.697)	(0.173)	(1.986)	(0.082)	(0.727)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-0.991	-0.991	-1.436	-1.436	-0.823	-0.823
Households	15681	15681	4182	4182	11499	11499
Households-quarters	238506	238506	65487	65487	173019	173019
	Panel B: Quantity share of fresh vegetables					
Retirement	-0.005	1.184*	0.047	0.362	-0.033	1.327*
	(0.077)	(0.699)	(0.173)	(1.980)	(0.082)	(0.731)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-1.512	-1.512	-1.891	-1.891	-1.369	-1.369
Households	15634	15634	4168	4168	11466	11466
Households-quarters	237844	237844	65280	65280	172564	172564

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. Dependent variable is the logit transformation of the share of fresh vegetables in all vegetables purchases, calculated using either expenditures (panel A) or quantities (panel B). In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. The sample is restricted in columns 3 and 4, to men, and in columns 5 and 6, to women. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.17: Dependent variable: Logarithm of quantity of fresh or frozen/canned vegetable purchases

	All		Men		Women	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Logarithm of fresh vegetables quantity					
Retirement	0.166***	0.938***	0.155**	1.179	0.169***	0.880***
	(0.033)	(0.287)	(0.069)	(0.774)	(0.036)	(0.302)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	3.010	3.010	2.690	2.690	3.137	3.137
Households	15634	15634	4168	4168	11466	11466
Households-quarters	255948	255948	72764	72764	183184	183184
	Panel B: Logarithm of frozen and canned vegetables quantity					
Retirement	0.189***	0.590**	0.180***	1.319*	0.194***	0.437
	(0.032)	(0.274)	(0.066)	(0.753)	(0.035)	(0.291)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	3.996	3.996	3.837	3.837	4.058	4.058
Households	15634	15634	4168	4168	11466	11466
Households-quarters	255948	255948	72764	72764	183184	183184

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. Dependent variable is the logarithm of the quantity (measured in ounces) of fresh vegetables (panel A) or frozen and canned vegetables (panel B). In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. The sample is restricted in columns 3 and 4, to men, and in columns 5 and 6, to women. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.18: Dependent variable: Logit transformation of the share of unprepared food in all grocery purchases

	All		Men		Women	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Share of unprepared food					
Retirement	0.121***	0.401***	0.113***	0.280	0.123***	0.399***
	(0.016)	(0.146)	(0.033)	(0.440)	(0.017)	(0.146)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.093	-2.093	-2.242	-2.242	-2.033	-2.033
Households	17005	17005	4660	4660	12345	12345
Households-quarters	262916	262916	75732	75732	187184	187184
	Panel B: Share of unprepared food without fruits and vegetables					
Retirement	0.167***	0.348*	0.137***	-0.181	0.180***	0.432**
	(0.021)	(0.178)	(0.044)	(0.532)	(0.023)	(0.181)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.714	-2.714	-2.825	-2.825	-2.669	-2.669
Households	17005	17005	4660	4660	12345	12345
Households-quarters	262916	262916	75732	75732	187184	187184

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. Dependent variable is the logit transformation of the expenditure share of unprepared food, where fruits and vegetables are either included (panel A) or excluded (panel B). In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. The sample is restricted in columns 3 and 4, to men, and in columns 5 and 6, to women. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.19: Dependent variable: Logarithm of expenditures on prepared and unprepared food

	All		Men		Women	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Log. of unprepared food expenditures					
Retirement	0.111***	0.453***	0.070**	0.478	0.129***	0.445***
	(0.014)	(0.126)	(0.028)	(0.349)	(0.016)	(0.132)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	3.626	3.626	3.545	3.545	3.659	3.659
Households	17005	17005	4660	4660	12345	12345
Households-quarters	262916	262916	75732	75732	187184	187184
	Panel B: Log. of unprepared food expenditures without fruits and vegetables					
Retirement	0.135***	0.368***	0.076**	0.239	0.160***	0.383***
	(0.015)	(0.131)	(0.030)	(0.347)	(0.018)	(0.138)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	3.095	3.095	3.069	3.069	3.105	3.105
Households	17005	17005	4660	4660	12345	12345
Households-quarters	262916	262916	75732	75732	187184	187184
	Panel C: Log. of prepared food expenditures					
Retirement	0.007	0.130*	-0.023	0.321*	0.020*	0.108
	(0.009)	(0.077)	(0.017)	(0.190)	(0.011)	(0.085)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	5.640	5.640	5.675	5.675	5.625	5.625
Households	17005	17005	4660	4660	12345	12345
Households-quarters	262916	262916	75732	75732	187184	187184

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. Dependent variable is the logarithm of expenditures (measured in dollars) of unprepared food (panel A), unprepared food excluding fruits and vegetables (panel B), or prepared food (panel C). In addition to household fixed effects, all regressions include year-quarter dummies, age, and age squared. Sample includes single-person households aged 55–74 in the main sample, which is constructed as descibed in subsection 2.1. The sample is restricted in columns 3 and 4, to men, and in columns 5 and 6, to women. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.20: First-stage regression, all households. Dependent variable: Retired

	(1)	(2)	(3)
Female above early retirement age	0.076***	0.078***	0.038***
	(0.005)	(0.006)	(0.003)
Female above full retirement age	0.081***	0.068***	0.046***
	(0.005)	(0.007)	(0.004)
Male above early retirement age	0.110***	0.105***	0.031***
	(0.006)	(0.006)	(0.004)
Male above full retirement age	0.117***	0.118***	0.033***
	(0.007)	(0.007)	(0.004)
Age	0.034***	0.038***	0.031***
	(0.005)	(0.005)	(0.003)
Age squared	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
Other controls	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes
Household FE	Yes	Yes	Yes
Kleibergen-Paap rk Wald F-statistic	259.316	200.840	124.644
Households	52029	40234	52029
Households-quarters	831768	594376	831768

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a fixed effects panel data regression. In columns 1–2, dependent variable takes values 0, 1, or 2 depending on how many household heads have retired. In column 3, in the case of households with two household heads, dependent variable takes value 0.5 if only one household head is retired and 1 if both; in households with a single household head, it takes value 1 if the household head has retired and zero otherwise. *Female above early retirement age* is an indicator variable for being both female and above the early retirement age (at least 62 years old). *Female above regular retirement age* is an indicator variable for being both female and above the regular retirement age (which depends on the year of birth). Analogous definitions of retirement eligibility cutoffs are used for men. *Age* is the average age of household heads and analogously for *Age squared*. *Other controls* include an indicator for children and dummy variables for each household size (base group is 2-person household). Sample consists of households with at least one household head aged 55–74 that belong to the alternative sample of households of all sizes, which is constructed as described in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.21: Demographic characteristics and healthiness of food purchases, all households

	Logit transformation of expenditure share of fruits & vegetables	healthy foods	Food healthiness normalized index
	(1)	(2)	(3)
Log. income	0.147***	0.109***	0.139***
	(0.006)	(0.004)	(0.006)
College	0.148***	0.179***	0.207***
	(0.008)	(0.006)	(0.009)
Female	0.202***	0.108***	-0.097***
	(0.019)	(0.014)	(0.018)
Children	-0.065***	-0.084***	-0.048***
	(0.012)	(0.010)	(0.015)
Age	0.004	0.002	0.089***
	(0.007)	(0.005)	(0.008)
Age squared	0.000*	0.000**	-0.001***
	(0.000)	(0.000)	(0.000)
Year-quarter FE	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Household size FE	Yes	Yes	Yes
Mean dep. var.	-2.122	-1.161	0.000
Households	52029	52029	52029
Households-quarters	831768	831768	831768

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data pooled OLS model. In column 1, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In column 2, the outcome variable is the logit transformation of healthy foods expenditure share. In column 3, the outcome variables is the food healthiness normalized index. Sample consists of households with at least one household head aged 55–74 that belong to the alternative sample of households of all sizes, which is constructed as described in subsection 2.1. *Age* is the average age of household heads and analogously for *Age squared*. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.22: Impact of retirement on the healthiness of food purchases, all households except single-person households

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
Retired	0.024***	0.069**	0.024***	0.052**	0.053***	0.381***
	(0.006)	(0.033)	(0.004)	(0.024)	(0.008)	(0.044)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.071	-2.071	-1.151	-1.151	0.095	0.095
Households	40234	40234	40234	40234	40234	40234
Households-quarters	594376	594376	594376	594376	594376	594376

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. *Retired* takes values 0, 1, or 2 depending on how many household heads have retired. In addition to household fixed effects, all regressions include year-quarter dummies, average age and age squared of household heads, an indicator for children, and indicator variables for each household size (except 2-person household, which is the base group). In columns 1 and 2, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In columns 3 and 4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5 and 6, the outcome variable is the food healthiness normalized index. Sample consists of households with at least one household head aged 55–74 that belong to the alternative sample of households of all sizes except single-person households. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.

Online Appendix Table B.23: Impact of retirement on the healthiness of food purchases, all households, alternative definition of retirement

	Logit transformation of expenditure share of fruits & vegetables		Logit transformation of expenditure share of healthy foods		Food healthiness normalized index	
	FE	FE-IV	FE	FE-IV	FE	FE-IV
	(1)	(2)	(3)	(4)	(5)	(6)
Retired	0.060***	0.311***	0.051***	0.203***	0.103***	1.474***
	(0.011)	(0.084)	(0.007)	(0.058)	(0.011)	(0.117)
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	-2.122	-2.122	-1.161	-1.161	0.000	0.000
Households	52029	52029	52029	52029	52029	52029
Households-quarters	831768	831768	831768	831768	831768	831768

Note: A unit of observation is a household-quarter pair. Each column presents estimates from a panel data fixed effects model either with or without instrumental variables. In households with two household heads, *Retired* takes value 0.5 if only one household head is retired and 1 if both. In households with a single household head, *Retired* takes value 1 if the household head has retired and zero otherwise. In addition to household fixed effects, all regressions include year-quarter dummies, average age and age squared of household heads, an indicator for children, and indicator variables for each household size (except 2-person household, which is the base group). In columns 1 and 2, the outcome variable is the logit transformation of fruits and vegetables expenditure share. In columns 3 and 4, the outcome variable is the logit transformation of healthy foods expenditure share. In columns 5 and 6, the outcome variable is the food healthiness normalized index. Sample consists of households with at least one household head aged 55–74 that belong to the alternative sample of households of all sizes, which is constructed as described in subsection 2.1. Standard errors are clustered by household. *** Indicates significance at the 1 percent level, ** at 5 percent level, * at 10 percent level.