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How older households manage food insecurity with food production activities

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1. Abstract

Household food insecurity is a concern in the U.S. given the negative effects associated with food insecurity. An interesting finding is that elderly households tend to be more food secure than younger households, even though many are on a fixed income. A relevant question is what might elderly households be doing that is resulting in greater food security? One potential explanation is that in retirement, elderly households can invest in more time-intensive activities that provide greater food security. In this study, we combine time-use diaries with food security surveys to examine whether time spent on food production is associated with lower levels of food insecurity for elderly households. The data show that time spent in meal preparation and eating is increasing with older age cohorts. At the same time, food insecurity is declining steadily with older households. Grocery shopping and non-grocery food shopping do not show any relevant trends. We also compare food insecurity of households that are pre and post retirement eligible to see if food production explains the gap in food insecurity between these household types. We find that time spent on meal preparation and time spent eating explain some of the gap in food insecurity between these households and the results vary by marital status. Finally, we specify a two-stage model to estimate whether time spent on food production causes greater food security. Our specification fails to identify a strong relationship. One potential explanation is that older households in our sample generate bias as we only observe households that still live independently and alone.

2. Executive summary

The incidence of food insecurity among elderly households has been growing in the U.S. This is concerning given the negative health effects associated with food insecurity and the growing numbers of elderly households. At the same time, elderly households tend to be more food secure than younger households, even as they often live with a fixed income. One potential explanation is that elderly households in retirement can invest more time in food production activities that generate greater food security. The focus of this research effort is to explore how food production activities (i.e., meal preparation, eating time, and food shopping) impact food security for elderly households.

To examine this topic, we rely on two U.S. data sets conducted as part of the Bureau of Labor Statistics Current Population Survey (CPS): the American Time Use Survey (ATUS) and the Food Security Supplement (FSS). The ATUS provides a 24-hour recall survey of all activities for one person in a household, including food production activities. The FSS surveys households about their food security status, including numerous other food-related questions. Both data sets are representative of the U.S. population using weights, and respondents can be identified that participate in both surveys. For our analysis, we use the ATUS, FSS, and the matched sample to explore several research questions.

First, we examine how food insecurity changes across age cohorts, from 20 years old to 85 years and older, using the nationally representative FSS. After controlling for state and year differences, we observe a gradual decline in the probability of being food insecure from young households to older. At the same time, we observe that time spent on meal production and eating time increase gradually as well. Time spent grocery shopping and shopping for food (not groceries) are far noisier over time and do not exhibit consistent trends. Using the matched sample, we observe similar trends in time use and food security as well as differences in time use between food secure and insecure households.

We next explore whether these same time-use activities explain the differences in food security, comparing households who are retirement eligible and those who are not retirement eligible. To do this, we estimate a regression of food production activities and numerous covariates on food insecurity, then decompose the estimates of the regressors using a Kitagawa-Oaxaca-Blinder decomposition. Overall, we find that meal preparation and eating time explain some of the gap in food insecurity between these groups. However, these results differ based on marital status. Further, age is the most significant variable explaining the difference in food insecurity between these households. That is, households that get older tend to become more food secure, although the mechanism is not identified.

Finally, we estimate a structural model of food security as a function of time use. To identify causal effects of time use, we use instrumental variables to adjust for the potential endogeneity of time use. Overall, we find no significant effect of time use using our entire sample, nor do we find significant marginal effects of time use analyzing subgroups.

Importantly, our instrumental variables are insufficient to identify any causal effects. This does not mean such time use activities do not impact food production but highlights relevant empirical challenges. In addition, the data we are using may bias our analysis. In particular, the FSS data does not survey households that live in assisted living homes, and we primarily focus on head of households rather than elderly living with family members, which is a much smaller sample. As such, our analysis is impacted by a survivor bias. That is, households in our data set are naturally resilient households. Future studies may need to include all elderly household types (i.e., assisted or communal living) to better study the relationship of time use and food security.

Altogether, our research finds that elderly households become more food secure as they age. At the same time, they invest more time in certain food production activities. Although these activities explain differences in food insecurity between older (retirement eligible) and younger (non-retirement eligible) households, we are unable to establish a causal effect.

3. Introduction

Household food insecurity (FI) presents a major nutritional problem in the U.S. and is associated with numerous adverse health outcomes for children and adults (Gundersen and Ziliak 2015). Limited household income generally reduces food access and therefore increases FI (Nord 2014). As such, we might expect that elderly households would have higher rates of FI as they are often retired or have more restricted incomes. It is therefore puzzling that the rate of FI for elderly households is lower than younger households (Nord 2003; Coleman-Jensen et al. 2016).

Despite these reported findings for elderly households, there is growing concern that the rate of FI will increase as the Baby Boom generation reaches retirement age (Gualtieri and Donley 2016). In fact, from 2001 to 2016, the share of marginal food insecure, food insecure, and very low food secure seniors increased by 27%, 45%, and 100%, respectively (Ziliak and Gundersen 2018). Such large increases in FI are likely to create a major public health challenge if they continue as FI is associated with poorer health outcomes for the elderly (Gundersen and Ziliak 2017). As the elderly cohort continues to grow in numbers, a variety of alternative solutions will be important for addressing FI among the elderly (Everhardt et al. 2018). A relevant question is what have older adults been doing to maintain their FI at lower rates than the overall population? The primary aim of this study is to examine whether engaging in certain food production activities (FP) helps elderly households to manage their food insecurity (FI).

People who are food secure tend to spend more money on food (Coleman-Jensen et al. 2016). As such, we might expect the elderly to lack sufficient resources to be food secure. A remarkable finding in the literature is that although food expenditures decline sharply at retirement, food consumption remains relatively unchanged. Hurst (2008) attributes this largely to retirees spending much more time on food production, such as preparing meals and shopping, than non-retirees. Aguiar and Hurst (2005) explain how retired households substitute time to maintain both the quality and quantity of food they consume. Further, Aguiar and Hurst (2007) show how the elderly increase their shopping time to obtain lower prices for identical products. Even as budget constraints become tighter, retired household have more time to engage in activities that can improve their health, including investing in their meal preparations (Godard 2016). Still, these results do not address how elderly households manage their food security as they continue to age. There are several reasons why this may be a concern.

First, as households get older it becomes more challenging to engage in both physical and cognitive activities. If elderly households become less mobile, they may become less able to manage activities that reduce their food insecurity. To this point, Lee and Frongillo (2001) found that functional impairments in the elderly were significantly related with FI. To exacerbate this problem, retired households with restricted incomes may not be able to substitute away from producing their own meals to paying others to produce meals for them. Second, retired households may lose the incentive to invest in the quality of their diet as their income from pension and retirement benefits is not dependent on their health status (Godard 2016). As a result, we might expect a loss in diet quality in retirement. Further, elderly households may lack the skills necessary to manage their food security into retirement, particularly on restricted incomes, making food production overly taxing. Finally, retired households may face greater depression and social isolation resulting in less investment in food production activities.

As retirement age and life expectancy continue to rise, elderly households may have to manage their food production over more years. Understanding what strategies elderly households are using to manage their food security as they get older, and which strategies are most effective, is vital to identifying potential ways to better support elderly households at risk for FI.

Becker (1965) was the first to identify the importance of time use as an input in household production. Building on this, Vickery (1977) highlights the need of both money and time for households to produce basic needs, such as food and nutrition. To this point, she notes that income-support programs alone are insufficient for providing adequate nutrition. Several authors have continued to investigate time-use as an input for producing nutrition (see Davis 2014 for a summary). Davis and You (2011, 2013) emphasize the importance of time over money in achieving the Thrifty Food Plan, which reflects the cost of a nutritionally adequate, lowest cost market basket.

To date, however, only a few studies have explicitly examined the relationship of FI and FP activities. Beatty et al. (2013) considered how FI affects FP activities using a Current Population Survey (CPS) sample that included all ages. (Importantly, they examined the reverse effect that we are considering). They do not identify a causal model, only the correlation of the two variables. They found that for single households, food insecurity is associated with 20 percent more time in meal preparation and 13 percent less time eating. For married households, food insecurity is associated with 17 percent less time eating and 14 percent less time in grocery shopping. Everhardt (2018) examined whether gardening and other nutritional activities could reduce food insecurity using an intervention approach for a small sample of women. They found that the intervention statistically reduced food insecurity for the treated group.

This research project has three primary objectives that all seek to help better understand households with food-insecure seniors. First, we aim to describe how food insecurity (FI) and food production activities change as elderly households age. Second, we compare how FP help to explain FI across different types of elderly households. Finally, we estimate how time spent on specific FP affects FI of elderly households.

4. Research Methods

Objective 1: Describe how food insecurity (FI) and food production activities (FP) change as elderly households age.

To better understand the relationship of FP and FI, we examine how FP and FI change for elderly households as they get older. Similar to Aguiar and Hurst (2007), we estimate a linear specification:

$$(1)\ y_{it} = \alpha + \gamma Age\ cohorts + \delta_s + \phi_t + \varepsilon_{it},$$

where the dependent variable (*y*) is FI or FP for each person *i* in year *t*. Following Beatty et al. (2013), FP is calculated as the *total time* spent per day doing food production activities, including: meal preparation, grocery shopping, non-grocery food shopping, and eating time. For this analysis, FI will be measured using a discrete indicator for being food secure or food insecure, where food insecure combines households that have low and very low food security. *Age cohorts* are dummy variable indicators identifying 5-year age cohorts from age 20 to 85 and older[1]. δ_s and ϕ_t identify state and year effects and ε_{it} is an error term.

For FI, we estimate equation (1) as a logit model and then predict the probability of being food insecure for each age cohort. For FP, we estimate equation (1) using ordinary least squares and then predict time use for each age cohort.[2] For both the FI and FP estimates, we plot the predicted values over age cohorts to demonstrate the change in FI and time use as households get

[1] The Current Population Survey data used in this study top codes age 85 and older as 85.

[2] We also estimate the FP models using a negative binomial specification, but the results do not change significantly.

older. To account for different household structures and the effect this has on food production, we separately estimate models for single-headed households, which includes people who are divorced and widowed, and married couples.

Objective 2: Compare how FP are related to FI across different types of elderly households

The purpose of this objective is to understand if and how time spent on food-related activities contributed to the gap in FI between households that are retirement eligible and those that are not retirement eligible.[3] The reason for this distinction is that households eligible for retirement can receive benefits, both federal and private, without penalty. And although they can continue to work, there is often a concerted effort made to reduce time spent working, which frees up time for other activities. To compare FI between retirement eligible and non-eligible households, we start with the linear relationship specification:

(2) $FI_{it} = \alpha + \beta X_{it} + \gamma Age\ cohorts + \delta FP + \delta_s + \phi_t + \varepsilon_{it}$,

where *X* is a vector of household characteristics, *FP* are the food production time use activities, and *FI* is measured using the raw score of the number of affirmative responses to the food security survey, which can range from 0 to 18. This provides us an approximation of the intensity of food insecurity.

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[3] We define retirement eligible based on age and birth year requirements for standard retirement age. Specifically, people that were age 65 or older before 2008, and people that were 66 or older after 2007 are retirement eligible.

After we estimate equation (2) separately for non-retirement eligible households (group A) and retirement-eligible households (group B), we use a Kitagawa-Oaxaca-Blinder decomposition to decompose the difference in the mean values of the dependent variable as:

(3) $\Delta E(FI) = E(FI^A) - E(FI^B) = E(Z^A)'\theta^A - E(Z^B)'\theta^B$,

where Z and θ represent the variables and coefficients in equation (2), respectively. Equation (3) can be expanded and rearranged to arrive at the threefold decomposition:

(4) $\Delta \underline{FI} = \left(\underline{Z^A} - \underline{Z^B}\right)'\theta^B + \underline{Z^B}'(\theta^A - \theta^B) + \left(\underline{Z^A} - \underline{Z^B}\right)'(\theta^A - \theta^B)$.

The first term on the right-hand side, referred to as the endowment effect, explains how the characteristics of both groups explain the difference in FI. The second term, the coefficient effect, explains how the returns to the characteristics explain the difference in FI. For both these terms, the counterfactual is defined in terms of group B (retirement-eligible households) relative to group A (non-retirement eligible households). For example, the endowment effect is interpreted as what would happen to FI for retirement-eligible households if they had the same endowment as non-retirement eligible households. With the coefficient effect, we determine what would happen to FI for retirement-eligible households if they had the same returns to their endowment as non-retirement eligible households. The final term on the right-hand side, the interaction effect, explains how FI for retirement-eligible households would be different if we simultaneously changed both the endowment and returns.

Objective 3: Estimate how time spent on specific FP affects FI of elderly households.

The objective of this section is to assess the causal impact of food production activities (meal preparation and eating time) on food insecurity. We construct instruments based on local weather conditions of those who responded to the ATUS and FSS and use those to identify the effect of food production activities on food insecurity. While FP is measured over a single day, FI is measured over a longer time horizon (30 days or 12 months). Other research (Pinkston and Stewart 2009; Courtemanche, Pinkston and Stewart, 2021; Hersch, 2009) suggests that when studying a long-term outcome like FI, the estimated OLS coefficients in (2) cannot be interpreted as a causal relationship. In other words, there is a mismatch in the outcomes' period of interest (i.e., FI over one year), and the period when the covariate of interest takes place (i.e., FP) (Frazis and Stewart 2012).

We follow one of the approaches proposed by Frazis and Stewart (2012) to resolve this issue. Consider the following decomposition of the *k*-th *FP* activity for individual *i* at time *t*:

(5) $FP_{kit} = M_{ki} + \omega_{kit}$,

where M_{ki} is the long-run (over *T* time periods) average of FP_k or $M_{ki} = E_T(FP_{kit})$ and ω_{kit} represents its deviation from M_{ki}. Assume that the random deviation ω_{kit} is uncorrelated with M_{ki}. Note that the statistic M_{ki} is an estimate of the average long-run time allocated to FP_k from a sample of individuals and period *t* specific data. M_{ki} is unknown to the researcher. Frazis and Stewart suggest that one can use an instrumental variables approach to isolate M_{ki} as long as two conditions hold: the instruments are uncorrelated with both unobserved drivers of FI and the random term ω_{kit}, and they are predictors of long-term *FP* M_{ki}. The proposed IV approach permits identification of the long-run relationship between FP and FI and correct for any reverse causality between them.

Consider weather as a possible instrument for FP It is plausible that same-day short-run weather conditions affect short-run time allocation (e.g., Connolly 2008).[4] However, averages of prior weather conditions may be more useful to capture variation in the long-run average of food production activities, and uncorrelated with individual and time-period specific shocks ω_{kit}. To that end, we compile population-weighted daily weather measurements at either the county or the metropolitan statistical area (MSA) level and merge them with the FI and food activities dataset.[5] The weather variables include: the average hours of daylight, maximum temperature and the average amount of precipitation recorded in the month of December 2003, the first year of the CPS-FSS used.

Following Courtemanche, Pinkston and Stewart (2021) we augment our weather instruments using additional moment conditions that exploit the heteroscedastic nature of the error terms (Lewbel 2012). We refer the readers to previous literature illustrating the technical details of this approach (Baum and Lewbel, 2020; Baum, Lewbel Schaffer and Talavera, 2012; Courtemanche, Pinkston and Stewart 2021; Lewbel 1997, 2012). Briefly, Lewbel's (2012) instrumentation works as follows: under the assumption of errors' heteroscedasticity, one can create additional identifying instruments as a combination of the included instrument in the main equation (or a subset of them, Z) and the errors of a first stage regression of the suspected endogenous variable on Z (let's say $\widehat{e_2}$) as $(Z - \underline{Z})\widehat{e_2}$, where $\underline{Z}$ is the sample average of Z. This

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[4] For example, Connolly (2008) shows that workers substitute work during a rainy day for leisure on a sunny day (and vice-versa).

[5] We use gridded population from Landscan (https://landscan.ornl.gov/) to weight the weather measurements in the county to provide a better estimate of human exposure to weather.

approach can be applied when no external instruments are available or to improve the efficiency of a standard IV estimator which uses external instruments.

We use Baum and Schaffer's STATA module IVREG2H (Baum, Lewbel, Schaffer and Talavera, 2012; Baum and Schaffer, 2020) to estimate our model. To detect issues related to weak identification, we use Cragg-Donald F statistics (Cragg and Donald 1993) and the critical values of the statistics reported in the IVREG2H output (originally, from Stock and Yogo (2005)). Sargan-Hansen type statistics are used to evaluate the overall validity of the IVs, under the null of the overidentifying instruments being uncorrelated with the errors from the main equation; for this analysis, we will report values of Hansen's J-statistics (Hansen, 1982). As the conditions for the validity of Lewbel's approach have only been proven for the case of one endogenous regressor (Baum and Lewbel, 2019) we include Meal Preparation and Eating Time one at the time, and the models carrying each of these variables are estimated separately.

5. Data

This research project uses the Bureau of Labor Statistics' Current Population Survey (CPS) from 2003 – 2018 in conjunction with the American Time Use Survey (ATUS) and Food Security Supplement (FSS). Both data sets were obtained from IPUMS (Flood et al. 2020, Hofferth et al. 2020). The ATUS provides a 24-hour diary of all activities by survey respondents, including activities related to food acquisition production. We focus on four key activities: meal preparation, grocery shopping, purchasing food (not groceries), and eating time. The FSS includes an eighteen-item questionnaire that classifies respondents' level of food security as: food secure, low food secure, and very low food secure (Coleman-Jensen et al 2021).

Both the ATUS and FSS draw a subsample from the CPS so records can be linked across surveys. By combining the ATUS and FSS subsamples, we identify specific time-use activities of households along with their level of FI Further, the CPS provides an extensive list of socio-demographic variables. Because of the timing of the surveys, the FSS surveys for households in year t are matched with ATUS surveys in year t + 1. To focus on household decision makers, the matched sample includes respondents who identify as a household head or spouse of a household head. In Table 1, we see there are anywhere from 6 – 11 thousand ATUS survey households each year and 87 – 115 thousand FSS survey households each year. Roughly 2 – 4 thousand households are in both surveys each period for a total sample of 53,491 matched households.

There are two key challenges with the ATUS data. First, the data only report time use for the survey respondent, but no other members of the households. In the case of married couples, spousal time use is likely to be a significant factor to consider. Following a similar approach to You and Davis (2019) we use observed survey responses to impute time use behavior for non-survey respondent spouses. First, we estimate the probability of person *i* engaging in some activity *j* on day *d*, using the data for the respondents *r* such that we obtain: $Pr^r\left(t_{ijd} > 0|X\right)$, where *t* is time in the activity and *X* are covariates. Then we predict non-zero time spent on activities by survey respondents for each day: $E^r\left(t_{ijd}|t_{ijd} > 0, X\right)$. Importantly both Pr^r and E^r are gender specific. Then using these estimates, we calculate spousal time use as: $E^s\left(t_{ijd}|X\right) = Pr^r\left(t_{ijd} > 0|X\right) \times E^r\left(t_{ijd}|t_{ijd} > 0, X\right)$, where *s* is the unobserved spouse of the same gender as the observed survey respondent. That is, we estimate unobserved spousal behavior using observed behavior of the same married gender. We sum the calculations for each day of the week to obtain one week of time use activities for each married household.

The second concern is that both married and single households only report time use for one day of the week. As such, we are not clear if zero time reported indicates that the survey respondent did not do the activity at all or if the survey respondent happened to not do the activity on the day they were surveyed. An example is grocery shopping, where most people do some grocery shopping, but not necessarily every day. Again, we use observed household time use of survey respondents to impute time use of the other six days of the week for all households. We do this separately for married and single households. Specifically, imputed time use by day is calculated as: $E^r(t_{ijd}|X) = Pr^r(t_{ijd} > 0|X) \times E^r(t_{ijd}|t_{ijd} > 0, X)$. This results in 6 predictions for the unobserved days of the week. We then sum the 1 observed day of the week with the predicted 6 other days of the week.

Objective 1 relies on the FSS and ATUS data separately to estimate equation (1) and the matched FSS and ATUS data to estimate equation (2). Objectives 2 and 3 rely solely on the matched data sets. Both the FSS and ATUS are designed to be representative of the non-institutionalized U.S. population. Accordingly, we weight these samples. The matched data set does not have prescribed weight to make the data representative. For our analysis in Objective 1, we use an unweighted sample and a weighted sample, using the FSS weights since the dependent variable is the food insecurity indicator. Objectives 2 and 3 use the unweighted matched data.

Given that only a fraction of the FSS is matched to the ATUS and that the matched sample is not constructed to be representative of the U.S. population, we compare key demographic variables across the samples to determine the generalizability of our results (Table 2). First, we compare all 3 data sets, by marital status, across the entire sample (age 20 – 85+). The FSS and ATUS data are based on the household member that responds to the survey. The matched sample is based on the household head who responded to *both* the ATUS and FSS surveys.

The composition of the three data sets appears relatively similar based on observed characteristics, and each highlights relevant differences between married and single households as well. The average age is similar across all samples, except the single ATUS households which are younger. Married respondents are more likely to be male, whereas single respondents are more likely to be female. The presence of children, family size and racial and ethnic percentages are similar across all groups, as is the share of retired households.

The share of food-insecure households is similar between the FSS and matched sample for both married and single households.[6] The shares of households below the poverty line in the FSS are similar to both the married and single households in the matched sample. Educational attainment and income levels follow similar patterns, and most households live in metro areas.

Time use is also relatively similar between the matched sample and the ATUS sample. Households in the matched sample (both single and married) spend more time grocery and non-grocery shopping than overall ATUS respondents. Importantly, the low values for grocery and non-grocery shopping are due to the inclusion of households reporting zero shopping time in their time-use diaries. We further provide summary statistics for households that report being retired using the same data sets and marital status indicators (Appendix 1).

6. Results

Objective 1

[6] We categorize all households that have low or very low food security as food insecure.

Food Security Supplement Data

We estimate equation (1) with food insecurity as the dependent variable using a logit specification, controlling for state and year fixed effects and age cohorts. We then plot the predicted food insecurity for each age cohort (Figure 1). The cohorts on the x-axis begin at age 20 – 25 for cohort 1 and increase at 5-year increments to age 85+ at cohort 13. As can be seen (top panel), the probability of food insecurity decreases over each age cohort at a steady rate. Further, the confidence intervals suggest the decline is statistically different across cohorts. While this general trend has been documented in previous work (Ziliak and Gundersen 2018), our result provides a greater contrast over time and across household types. Comparing married and single households (bottom panel), we see that the early decline is largely driven by married households, suggesting some food security benefits of marriage. Single households grow in their food insecurity from age 20 until cohort 5 (age 40 – 45) and then become less food insecure over time. Importantly, food insecurity does not seem to be driven by retirement eligibility.

We conduct similar analysis disaggregating by educational attainment (Figure 2). For both single and married households, having higher education (a bachelor's degree or higher) provides protection against FI. At the same time, single households still exhibit an increase in FI across younger age cohorts, whereas married households with lower educational attainment show a consistent decline in risk of FI. We also disaggregate households by poverty status (Figure 3). Again, single households face greater risk of FI and as would be expected, with single households below the poverty line experiencing a much higher risk of FI. The effect of poverty is much more persistent, however, as the risk of FI for households below the poverty line stays consistent until they reach 50 – 55 years of age.

More relevant to our study, Figures 1 – 3 demonstrate two key features about elderly FI. First, the rate of FI declines significantly into retirement across all groups, even those with low education or facing poverty. Second, across all these different groups, the elderly population appears to be more resilient to FI relative to younger households.

American Time Use Survey Data

We then estimate equation (1) with our food production variables as the dependent variable using ordinary least squares and plotting the predicted weekly time use for each activity in minutes. Time spent on meal preparation (Figure 4, top left panel) reveals households peak in their meal prep in their mid 30's and again after retirement. Importantly, the time spent in meal prep declines significantly for the 85+ cohort, perhaps an indication of increasing physical challenges. When we divide the sample into married (bottom left panel) and single households (bottom right panel), we see that both groups increase in their meal preparation time as they head into retirement and beyond. This trend could indicate that increased meal preparation results in greater food security as an investment strategy or that it is required to maintain food security as households get older. More importantly, if households are dependent on meal prep for food security, then suddenly become less capable of meal prep, this could have an impact on their food security. These data also show that married households spend more time on meal preparation in all age groups, which has different implications for policy across household types.

We see that across all households, time spent eating increases but then declines significantly for the last cohort (Figure 5). Again, this decline in eating time is no longer present when we disaggregate the data into married and single households. For both single and married households, we see a steady increase in time spent eating as households get older. This could be that households have limited physical capabilities and require more time. Alternatively, it could also indicate greater access to meals, or fewer restrictions on limiting mealtime, as is the case with work lunch breaks. In either case, this suggests an important correlation between time spent eating and food security.

Time spent grocery shopping increases around retirement age; however, the confidence intervals are larger than time spent on other activities (Figure 6). This is likely because the imputation for grocery shopping results in a large number of zeros due to the low tendency for daily shopping trips. When we disaggregate the data by household type, we see that grocery shopping increases primarily in single households. This is a similar result to Aguiar and Hurst (2008), who find that older households spend more time shopping after retirement while looking exclusively at male household heads. Importantly, this could indicate that older households need more shopping time to maintain their food security. This can be a potential risk factor if mobility becomes limited with age.

Finally, we find that time spent on food purchases (not grocery shopping) increases slightly over time but has large variation within cohorts (Figure 7). This does not indicate that such food purchases do not impact household food security. However, with such variance, it may be unlikely to be a significant factor.

Matched Data

We next examine the matched data, i.e., households that were in both the FSS and ATUS samples. With respect to meal preparation time, we see similar trends in both the single and married households as we did with the ATUS sample (Figure 8, top left and bottom left panels). Specifically, the time spent preparing meals increases steadily for singles and increases after retirement for married households. We further disaggregate these data by food secure and food insecure households to examine what role meal preparation might have in maintaining food security (top right and bottom-right panels). For single households, meal preparation takes up a significantly larger amount of time for food-insecure households in almost every age group. This could represent the fact that lower-income households must substitute away from buying meals (i.e., more expensive prepared meals) to preparing their own food. For married households, there is less evidence of food-insecure households spending more time on meal prep, particularly once these households reach retirement age.

The trends for eating time for single and married households in the matched sample are also similar to the ATUS data (Figure 9, top left and bottom left panels). Again, time spent eating increases with age for singles and married households. After disaggregating the data into food secure and insecure households, we see that eating time is significantly higher for food-secure households, both single and married (top right and bottom-right panels). As previously discussed, this may indicate access to enough food, i.e., not having to skip meals.

Time spent grocery shopping is noisier in the matched sample than the ATUS sample (Figure 10, top left and bottom left panels). In particular, there are no discernable trends over age cohorts, for either single or married households. Further, time spent grocery shopping is not statistically different for food secure and food insecure households (top right and bottom right panels). Similar to the ATUS data, time spent on non-grocery food purchases reveals no trends over age cohorts or between food insecure and food secure households (Figure 11).

Objective 2

Kitagawa-Oaxaca-Blinder decomposition results

We specify equation (2) using 2 sets of covariates. The first set contains the four-time use variables and indicators for race (white, black, and Native American, including mixed race) and Hispanic. The second set contains the first set of variables as well as education, children in the household, family size, employment status, income level, and a metro indicator. Since we are examining the correlation between time use and FI, the first specification provides a simple analysis of how they are related. The second set of analyses allows us to see how this relationship changes as we condition on additional covariates.

We first present the results from the aggregate decomposition in Table 3 using limited covariates (Basic model) and the complete set of covariates (Full model). The first row shows the estimated food security raw score for the households that are not eligible for retirement. The second row shows the same for households that are eligible for retirement and the third row calculates the difference between the groups. As can be seen in single households, the not eligible households answer about 0.75 more food security questions affirmatively and married households answer about 0.28 more food security questions affirmatively.

The key differences emerge when we look at endowments, coefficients, and interactions. The endowment variable is significant for all models. This result suggests that if retirement eligible households had the same endowments as not eligible households, they would be more food insecure. Likewise, if retirement eligible households had the same returns to their endowments (i.e., coefficients), then they would also be more food insecure. Finally, changing *both* endowments and coefficients simultaneously (i.e., interaction) would result in lower levels of food insecurity. Altogether, these preliminary models suggest that households before and after retirement eligibility use their resources differently to manage their levels of food insecurity.

We next disaggregate the decomposition to examine how specific covariates are associated with FI. Many other covariates are significant in the full model, suggesting the full model may be the preferred specification. Across all household types and model specifications, the endowment of meal preparation time has a negative result, suggesting that if retirement eligible households had the same meal prep time as non-retirement eligible households, they would be less food insecure (Table 4). If we think of meal prep as an equilibrium outcome to a household production model, this could suggest that these households are constrained by limited financial resources into doing more meal prep. That is, they have to meal prep at home rather than purchase food away from home or ready to eat meals. Only for single households with the basic model specification do we see a significant coefficient and interaction effect for meal prep. The coefficient effect suggests that if retirement eligible households had the same returns to meal prep as non-retirement eligible households, they would be more food insecure. This suggests a greater efficiency from meal prep for retirement eligible households. At the same time, if both endowments and coefficients changed simultaneously, the risk of food insecurity would decrease. In effect, the loss in efficient use of meal prep time (i.e., coefficients) is offset by the reduced reliance on meal preparation (i.e., endowments).

The endowment of eating time is positive across all household types and model specifications. This suggests that if retirement eligible households reduced their eating time to match non-retirement eligible households, their food insecurity would increase. Again, assuming a household equilibrium, this suggests that reducing eating time would have a detrimental effect on older households. It may be the case that time spent eating reflects having enough to eat. The returns to eating time are significant only in the basic model but suggest that retirement eligible households would have lower food insecurity if they had the same returns to eating time as non-retirement eligible households. This could suggest that while older households allocate more time for eating, there are diminishing returns to such effort. Also, the interaction term is a positive effect in the basic models. Altogether, this suggests that a reduction in eating time and an increase in the returns to eating time would lead to greater food insecurity.

Neither grocery shopping nor non-grocery food shopping are significant in any of the model specifications. This could indicate that households have sufficient time to shop before and after retirement and that other factors matter more for managing food security. Alternatively, it could be that households that lack resources to shop have other sources for obtaining groceries.

Objective 3

The estimated coefficients of the linear probability model are reported in Table 5 (OLS). We focus on meal preparation (columns 2-5) and eating time (columns 6-9) as food production activities. Given that the results discussed above indicate that 65 years of age identifies a likely structural break in the relationship between FP and FI, we focus on respondents younger than 65 years of age, and 65 and above.[7]

The results indicate that the only subsample where we find support for our identification strategy is that of all households (top panel) and households 65 years and younger (middle panel), for models estimated with Lewbel (columns 4 and 8) and both weather and Lewbel IVs (columns 5 and 9). Yet, in all cases, we fail to find a statistically significant effect of meal

[7] Due to space limitations, we do not report results for the married and single-household subsamples. Note that we lose about 15% of our matched FSS-ATUS samples due to the absence of geographic identifiers.

preparation time and eating time on the probability of being food insecure. We note that given the relatively small value of the Cragg-Donald statistic (compared to some of the critical values reported in Stock and Yogo 2005), those "null" effects may be a product of weak instruments.

For both the full sample and that of younger households (less than 65 years of age), our estimates are likely to be affected by measurement error and endogeneity bias, given the large values of Hansen J statistic (particularly in the full sample) when Lewbel IVs are used. The models estimated using only the weather IVs (columns 3 and 7) show null results also for these subsamples despite the weak IVs that may induce considerable bias (>30%) and highly inaccurate inference (>25%). We are uncertain whether stronger IVs would lead to a different outcome. In summary, we cautiously claim that we find no evidence that food preparation activities have a causal link to FI for older households. However, we can make no such claim about the other subsamples of the data.

7. Discussion

Previous reports suggest concern that an ever growing and aging Baby Boom generation could result in greater FI among elderly households (Gualtieri and Donley 2016). Although there is some evidence of increasing intensity of FI among elderly households (Ziliak and Gundersen 2018), our results suggest the general trend across age cohorts is one of declining rates of FI. Further, this decline in FI is found even with households that have low education or face poverty. Aguiar and Hurst (2007) find that certain elderly households can maintain diet quality on a budget by engaging in more grocery shopping as they get older. We do not find a similar trend in grocery shopping time increasing across age cohorts. However, we do find that time spent on meal preparation increases for both food secure and food insecure households as they age. Such effort is consistent with substituting more expensive food away from home to preparing food at home. Similarly, we find time spent eating grows consistently across older cohorts, which may be an indication of having sufficient meals and time to eat rather than work.

Using a decomposition method, we find further support for our findings that eating time and meal preparation time explain differences in food security between retirement eligible and non-retirement eligible households. At the same time, age is far more important in explaining the difference in FI between the two groups. This suggests that the sample we are examining is unique in that the households have found ways to obtain adequate nutrition, which is part of the reason they are still a part of our older cohorts. Further research on households that receive in-home care and are not in our sample might be informative.

The results of our structural model suggest our identification strategy was not sufficient to estimate a causal effect of food production activities on household FI. Previous work by Beatty et al. (2013) found FI is associated with more meal preparation and less eating time (single households), and less eating time and grocery shopping (married households). Alternatively, our model suggests both eating time and meal preparation time reduce FI for households under 65, but the statistical strength of our instrumental variables is questionable. We find no statistical relationship between time use and FI for households over 65.

Altogether, the results of this research effort suggest that there is a relationship between food production activities and food security as households get older. At the same time, our analysis faces several challenges that may limit our results. First, our time use data only includes one household member over a 1-day period. Imputing the other days of the week or time use of other household members generates measurement error which may bias our results. Additionally, using our matched sample, we lose a large number of observations. Further, it is not clear what bias our matching process generates. Finally, and most significantly, our analysis of CPS data only includes elderly households that live independently and do not include those in assisted living or that receive consistent home care. As such, the group we evaluate may be more resilient and less likely to face food insecurity.

There are also challenges to identifying the causal mechanism by which food production affects food security in a household. A key problem is that unobservable factors are associated with time use and food security, resulting in endogeneity bias. Additionally, it may be the case that food insecurity directly impacts what activities a household engages in. Such reverse causality can also generate bias. We attempt to address this endogeneity using a series of instrumental variable approaches based on weather as well as exogenous variation. However, our approach fails to adequately ameliorate these concerns, leaving us uncertain about the causal effect of time use on food security.

8. Conclusions

We use nationally representative data to evaluate how households manage FI as they get older. We observe several patterns across older households. First, as age cohorts get older, we see a declining trend in the rate of food insecurity. At the same time, we see increases in how much time these households spend in meal preparation and eating time. We also observe that these trends vary by household structure (married vs. single).

We match our FI household data with data on household time use to evaluate how time spent on food production changes as households get older. We observe a relationship between meal preparation and eating time and food security status. Further, time use appears to vary based on a household's food security status. Exploring the link between food production activities and food security further, we decompose the effect of time use on food security. Comparing households that are eligible and non-eligible for retirement, we find food production activities explain some of the difference in food insecurity between these groups.

We use this same matched data to estimate a structural model of food security on food production activities. However, we are unable to confirm any causal effects. This is partially due to having instrumental variables that are insufficient for identification.

Overall, our results highlight that as households get older, they not only become less food insecure, but their food production activities change significantly as well. Yet, it is still not entirely clear how these factors, time use and food insecurity, are related.

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Tables

Table 1. Sample sizes by data source and year

	ATUS Data		FSS Data		Matched ATUS and FSS	
Year	**Observations**	**%**	**Observations**	**%**	**Observations**	**%**
2003	-	-	114,871	6.87	3,788	7.08
2004	10,089	7.45	117,326	7.01	3,883	7.26
2005	9,075	6.7	115,387	6.9	3,813	7.13
2006	9,014	6.66	112,314	6.71	3,442	6.43
2007	8,719	6.44	109,542	6.55	3,663	6.85
2008	8,981	6.63	105,582	6.31	3,769	7.05
2009	9,312	6.88	109,471	6.54	3,860	7.22
2010	9,319	6.88	108,018	6.46	3,591	6.71
2011	8,862	6.55	105,073	6.28	3,429	6.41
2012	8,989	6.64	105,389	6.3	3,221	6.02
2013	8,124	6	100,332	6	3,207	6
2014	8,323	6.15	103,236	6.17	3,092	5.78
2015	7,759	5.73	94,568	5.65	2,840	5.31
2016	7,612	5.62	97,240	5.81	2,870	5.37
2017	7,295	5.39	87,584	5.23	2,485	4.65
2018	7,034	5.2	87,117	5.21	2,538	4.74
2019	6,851	5.06	-	-	-	-
Total	135,358	100	1,673,050	100	53,491	100

ATUS Data come from the American Time Use Survey
FSS Data come from the Food Security Supplement of the Current Population Survey
Matched Data merge ATUS and FSS data based on household in both samples

Table 2. Summary statistics by data source and marital status.

	FSS Sample		Matched Sample		ATUS Sample	
Variables	**Married**	**Single**	**Married**	**Single**	**Married**	**Single**
Age	50.59	49.53	48.48	53.79	49.96	39.29
Female	0.40	0.59	0.42	0.63	0.50	0.53
Child	0.53	0.27	0.61	0.23	0.45	0.35
Family size	3.13	1.78	3.27	1.53	3.21	2.80
Black	0.08	0.18	0.08	0.20	0.08	0.18
White	0.85	0.76	0.86	0.76	0.86	0.76
Hispanic	0.12	0.12	0.12	0.11	0.14	0.17
Employed	0.66	0.58	0.68	0.56	0.67	0.59
Retired	0.20	0.22	0.17	0.28	0.17	0.13
HS grad	0.44	0.50	0.40	0.48	0.44	0.48
Associate's grad	0.10	0.09	0.10	0.10	0.09	0.07
BA grad	0.22	0.18	0.26	0.19	0.22	0.14
Adv degree	0.14	0.09	0.16	0.11	0.10	0.05
Annual income						
No income reported	0.08	0.08	0.06	0.06	0.06	0.06
< $25k	0.11	0.37	0.10	0.39	0.11	0.28
$25k - $60k	0.30	0.34	0.29	0.36	0.31	0.34
$60k - $100k	0.25	0.13	0.28	0.13	0.26	0.18
> $100k	0.26	0.08	0.27	0.06	0.26	0.14
Metro	0.83	0.85	0.82	0.82	0.82	0.85
Food insecure	0.08	0.17	0.08	0.16		
Below poverty line	0.19	0.36	0.19	0.39		
WIC	0.00	0.00	0.00	0.00		
SNAP	0.04	0.13	0.04	0.12		
Meal prep (weekly minutes)			441.95	202.61	453.75	144.11
Eat time (weekly minutes)			843.21	370.94	832.41	294.48
Groc shop (weekly minutes)			7.71	6.99	7.09	4.86
Non groc shop (weekly minutes)			1.29	1.21	1.21	1.13
Observations	338,635	325,661	13,384	20,116	65,172	70,186

Note: Observations count people who identify as head of household or spouse

ATUS sample comes from the American Time Use Survey

FSS sample comes from the Food Security Supplement of the Current Population Survey

Matched sample merges ATUS and FSS data based on household in both samples

Table 3. Overall decomposition of food security differences between elderly households that are retirement eligible and non-retirement eligible

	Single		Married	
Overall	Basic	Full	Basic	Full
Not eligible	1.327***	1.327***	0.547***	0.547***
Eligible	0.578***	0.578***	0.268***	0.268***
Difference	0.750***	0.750***	0.279***	0.279***
Endowments	0.937***	1.046***	0.376**	0.593***
Coefficients	0.669***	1.082***	0.0222	0.325***
Interaction	-0.856***	-1.378***	-0.119	-0.639***

* p<0.05, ** p<0.01, *** p<0.001

Table 4. Detailed decomposition of food security differences between elderly households that are retirement eligible and non-retirement eligible

	Endowments				Coefficients				Interaction			
	Single		Married		Single		Married		Single		Married	
Variables	Basic	Full	Basic	Full	Basic	Full	Basic	Full	Basic	Full	Basic	Full
Meal prep	-0.129***	-0.0461*	-0.0414***	-0.0208*	0.657***	0.172	0.158	-0.135	-0.176***	-0.0461	-0.0148	0.0126
Groc shop	0.00150	0.000933	-0.0000248	-0.0000251	0.00321	0.00680	0.00137	0.00279	-0.000312	-0.000660	0.0000338	0.0000687
Non groc	0.000910	0.00230	0.000393	0.000842	-0.00398	0.00118	-0.00638	-0.00287	-0.00448	0.00133	-0.00474	-0.00213
Eat time	0.114***	0.0387*	0.145***	0.0478*	-0.784***	0.0543	-1.756***	-0.523	0.0849***	-0.00587	0.191***	0.0568
Age	0.908***	1.119***	0.262*	0.407***	1.845***	2.492***	0.746*	0.858**	-0.746***	-1.007***	-0.295*	-0.339**
White	-0.00602	0.000631	-0.00109	-0.000760	0.510***	0.404**	-0.0213	-0.139	-0.0415***	-0.0329**	0.000111	0.000721
Black	0.0185*	0.0148*	-0.00896*	-0.00868*	0.0961**	0.0720*	-0.0105	-0.0221	0.0249**	0.0187*	0.00275	0.00579
Native amer	0.00145	0.00112	-0.000827	-0.000754	0.0175**	0.0141**	0.00562*	0.00414	0.00530	0.00427	0.00244	0.00180
Hispanic	0.0275**	0.0167*	0.0211**	0.0146**	-0.00344	-0.0104	-0.00169	-0.0171	-0.00365	-0.0110	-0.000774	-0.00784
Education												
HS		0.0148***		0.0103		0.0623		0.0334		-0.00753		-0.00505
BA		-0.0201***		-0.0129*		-0.0238*		-0.0143		-0.0173*		-0.00574
Adv degree		-0.00411*		-0.00303		-0.0250***		-0.00581		-0.00658**		-0.000892
Child		0.0672*		0.128		0.0146*		-0.0238		0.0626*		-0.160
Family size		0.0384		0.101		0.00356		0.136		0.00170		0.0799
Employed		-0.0968**		0.0189		-0.0573***		-0.0339**		-0.242***		-0.111**
Metro		-0.00186		0.00114		0.129*		0.0234		0.00891		0.00150
Annual income												
< $25k		-0.0987***		-0.0463***		0.359***		0.201***		-0.103***		-0.107***
$25k - $60k		0.00578*		-0.00262		0.0594*		0.172***		0.0116*		-0.0576***
$60k - $100k		-0.00426		-0.0166*		-0.00244		0.00805		-0.00259		0.00450
> $100k		-0.00321		-0.0242*		-0.00397		-0.00532		-0.00420		-0.00586
Constant					-1.668***	-2.640***	0.907*	-0.192				

* p<0.05, ** p<0.01, *** p<0.001

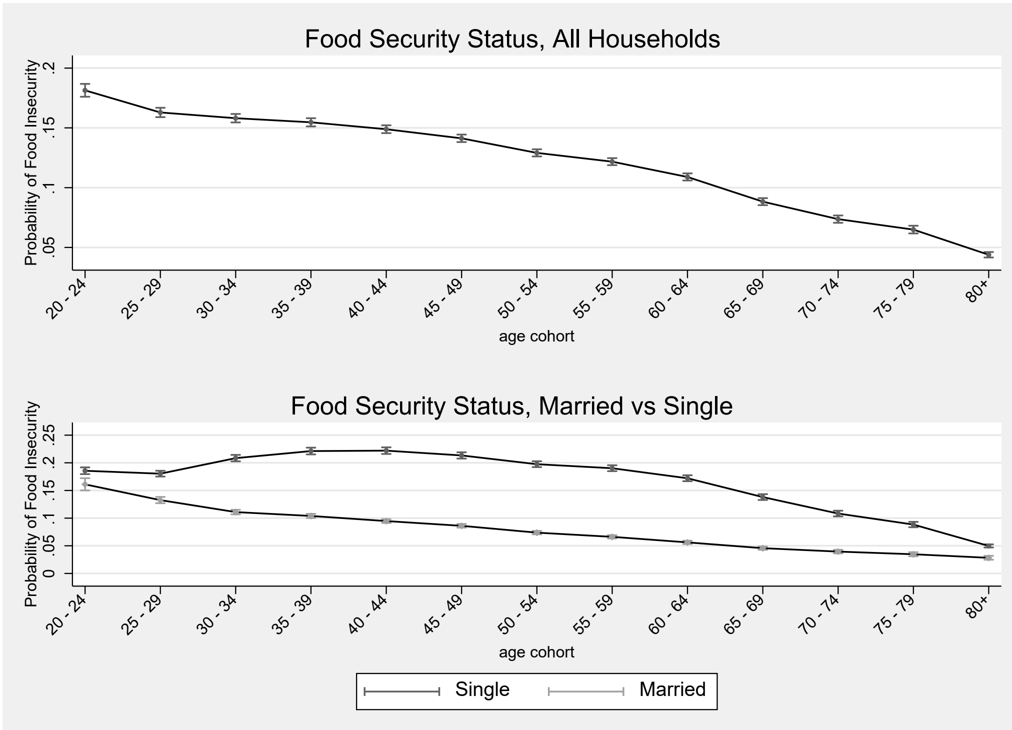
Table 5. Estimated food production activities parameters by elderly status on food insecurity. Sample obtained matching CPS, ATUS and weather data (at the MSA or County-level). Lower panels contain results for younger than 65 and older than 65.

	Meal Preparation								Eating Time							
Matched Sample + Weather Data: All (N=28405)																
	OLS		Weather IVs	Lewbel IVs		Weather + Lewbel IVs			OLS		Weather IVs	Lewbel IVs		Weather + Lewbel IVs		
Estimate	-0.0016	*	0.0147	-0.0075	***	-0.0074	***		-0.0063	***	0.0024	-0.0044	***	-0.0044	***	
	(0.0009)		(0.0445)	(0.0019)		(0.0019)			(0.0006)		(0.0339)	(0.0012)		(0.0012)		
J statistic			1.35	139		141					1.470	165.000		166.000		
d.f. J statistic			2	82		85					2	82		85		
P-value J			0.5080	0.0001		0.0001					0.479	0.000		0.000		
Cragg-Donald Wald F statistic			3.928	105.091		101.612					3.201	116.975		112.987		
Maximal IV relative bias			>30%	<5%		<5%					>30%	<5%		<5%		
Maximal IV size			>25%	<15%		<15%					>25%	<15%		<15%		
Matched Sample + Weather Data: Younger than 65 (N= 21202)																
Estimate	-0.0023	**	0.0039	-0.0085	***	-0.0085	***		-0.0088	**	-0.0129	-0.0046	***	-0.0046	***	
	(0.0011)		(0.0528)	(0.0024)		(0.0024)			(0.0008)		(0.0474)	(0.0018)		(0.0018)		
J statistic			0.973	109		110					0.910	120.000		121.000		
d.f. J statistic			2	82		85					2	82		85		
P-value J			0.6150	0.0256		0.0361					0.634	0.004		0.007		
Cragg-Donald Wald F statistic			2.827	63.991		61.912					2.679	106.922		103.18		
Maximal IV relative bias			>30%	<5%		<5%					>30%	<5%		<5%		
Maximal IV size			>25%	<20%		<20%					>25%	<20%		<20%		
Matched Sample + Weather Data: 65 and older (N=7202)																
Estimate	-0.0007		0.0573	0.0010		0.0010			-0.0019	*	0.0181	-0.0002		-0.0001		
	(0.0018)		(0.0752)	(0.0029)		(0.0029)			(0.0011)		(0.0343)	(0.0015)		(0.0015)		
J statistic			0.645	80.4		82					1.060	56.400		57.600		
d.f. J statistic			2	82		85					2	82		85		
P-value J			0.7240	0.5310		0.5720					0.589	0.986		0.990		
Cragg-Donald Wald F statistic			1.585	53.841		52.012					1.864	52.642		50.858		
Maximal IV relative bias			>30%	<5%		<5%					>30%	<5%		<5%		
Maximal IV size			>25%	>25%		>25%					>25%	>25%		>25%		

Note: Standard errors in parenthesis. *, **, and *** indicate a parameter statistically different from 0 at the 10%, 5%, and 1% significance level, respectively. Control variables' coefficients omitted for brevity.

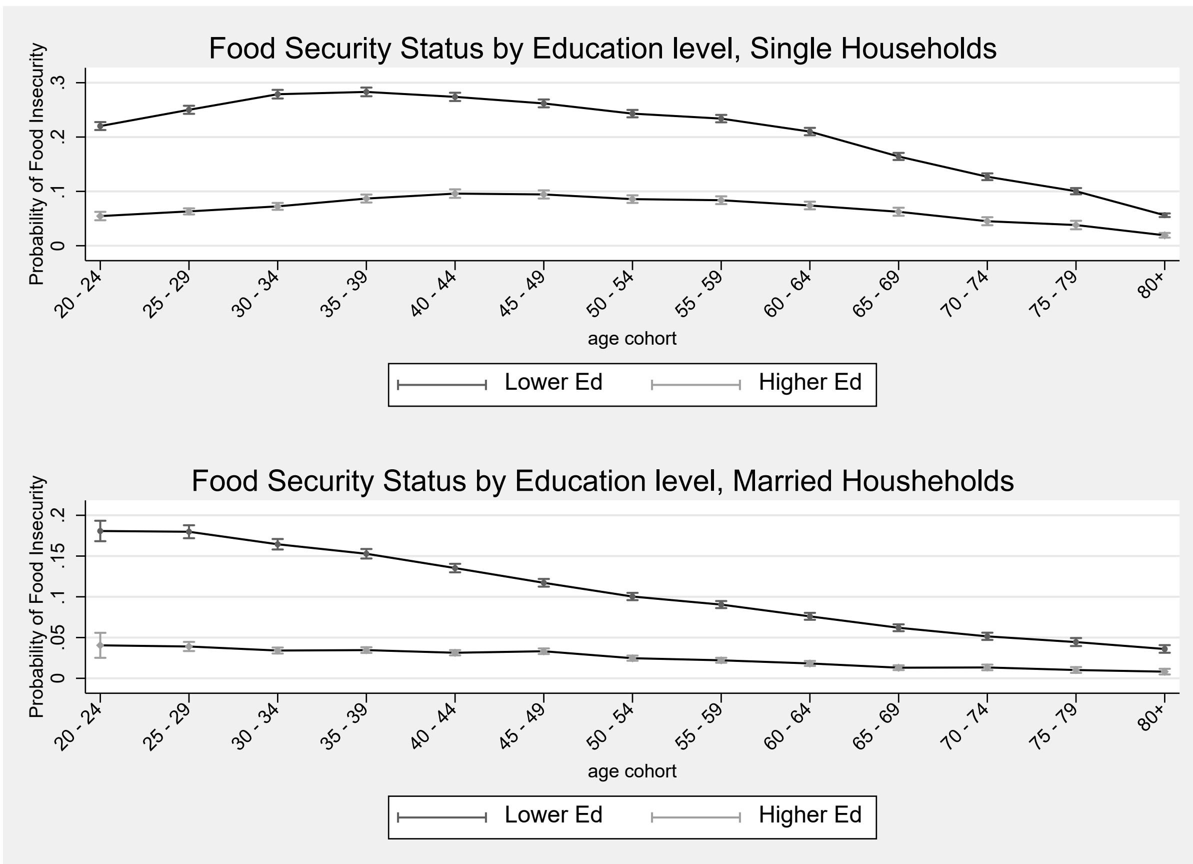
Figures

Figure 1. Predicted food security status by age cohort.



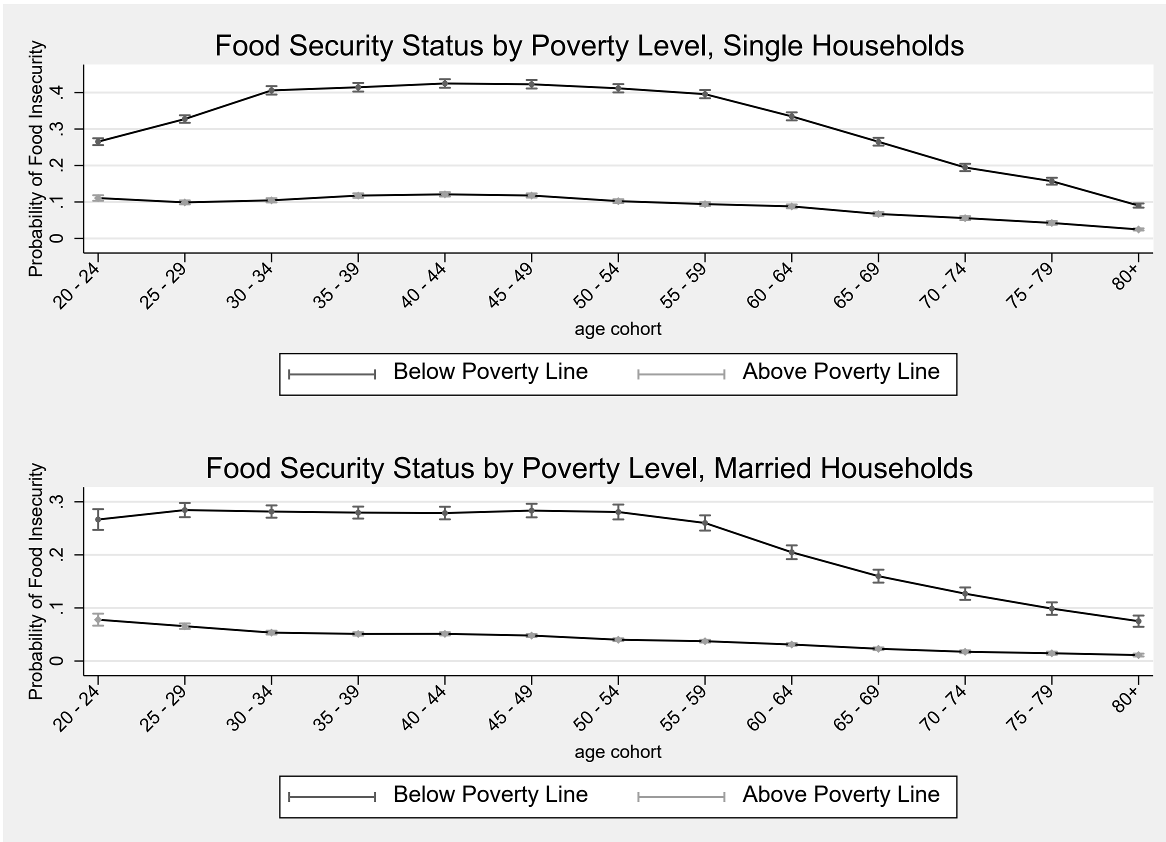
Source: Current Population Survey, Food Security Supplement

Figure 2. Food security status by household type and education level using FSS data



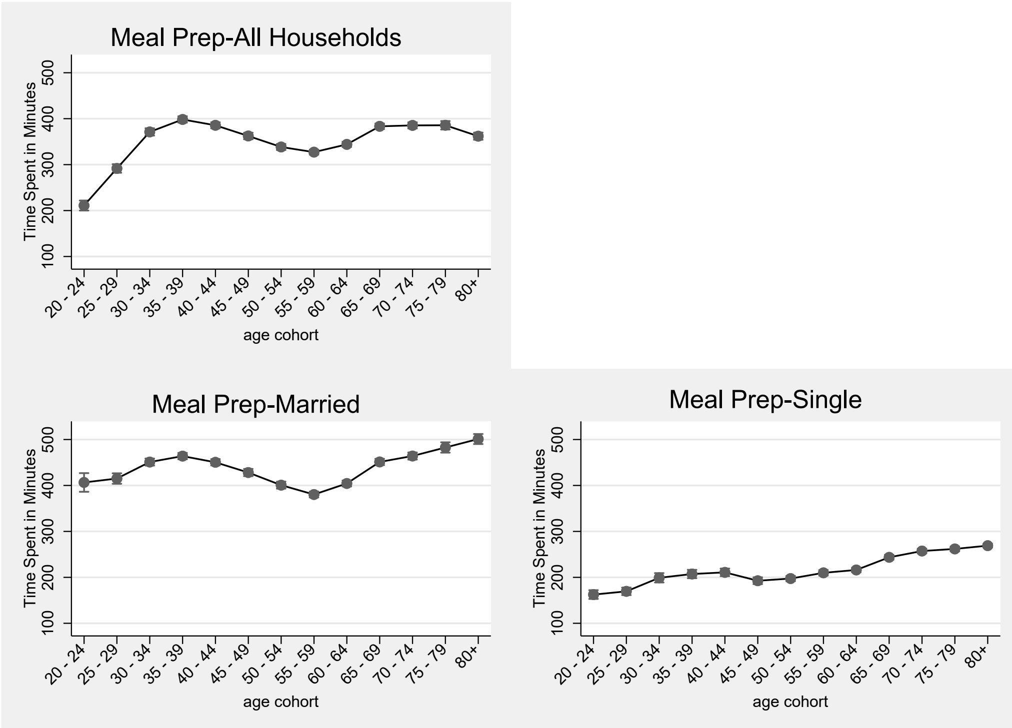
Source: Current Population Survey, Food Security Supplement

Figure 3. Food security status by household type and poverty status using FSS data



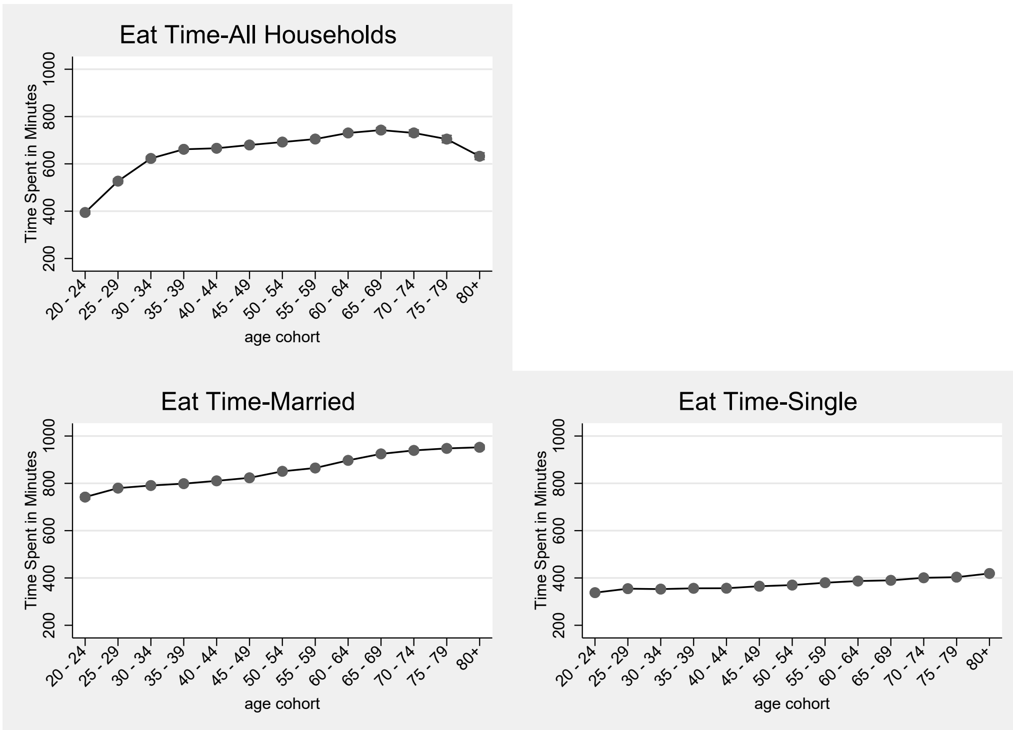
Source: Current Population Survey, Food Security Supplement

Figure 4. Predicted meal preparation time by age cohort.



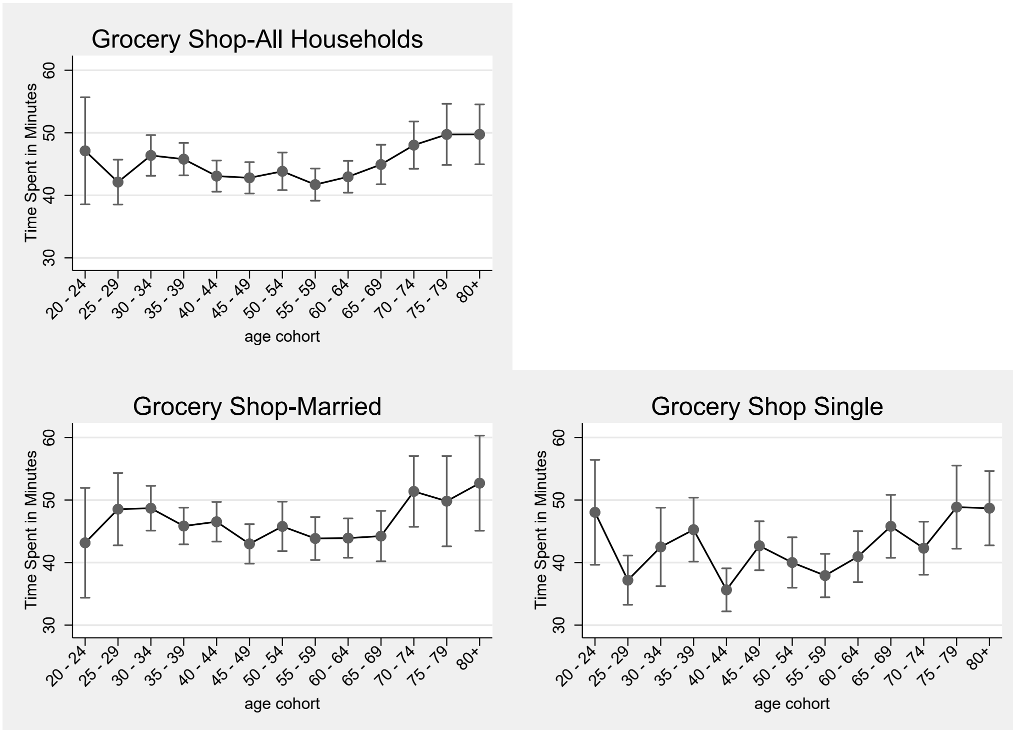
Source: Current Population Survey, American Time Use Survey

Figure 5. Predicted eating time by age cohort.



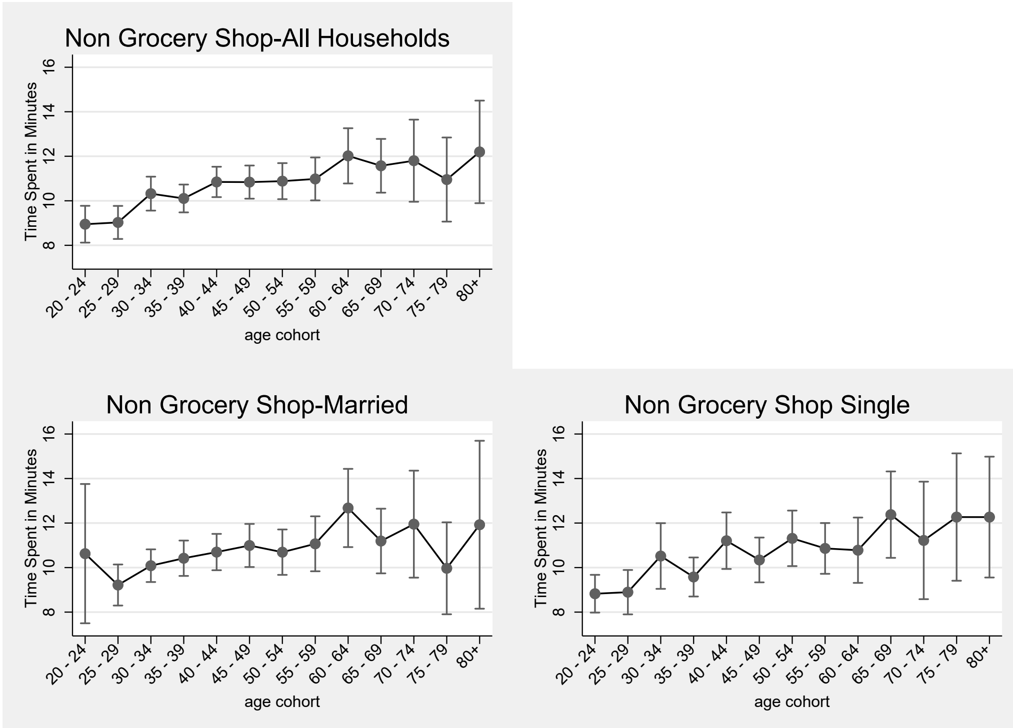
Source: Current Population Survey, American Time Use Survey

Figure 6. Predicted grocery shopping time by age cohort.



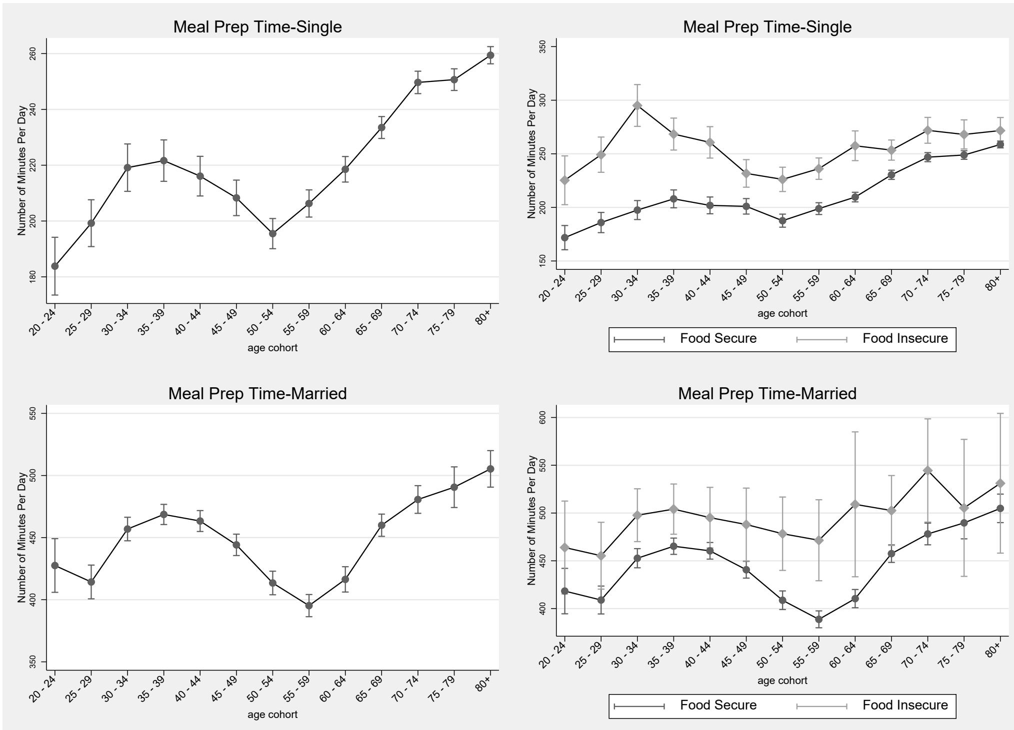
Source: Current Population Survey, American Time Use Survey

Figure 7. Predicted food purchases (not groceries) time by age cohort.



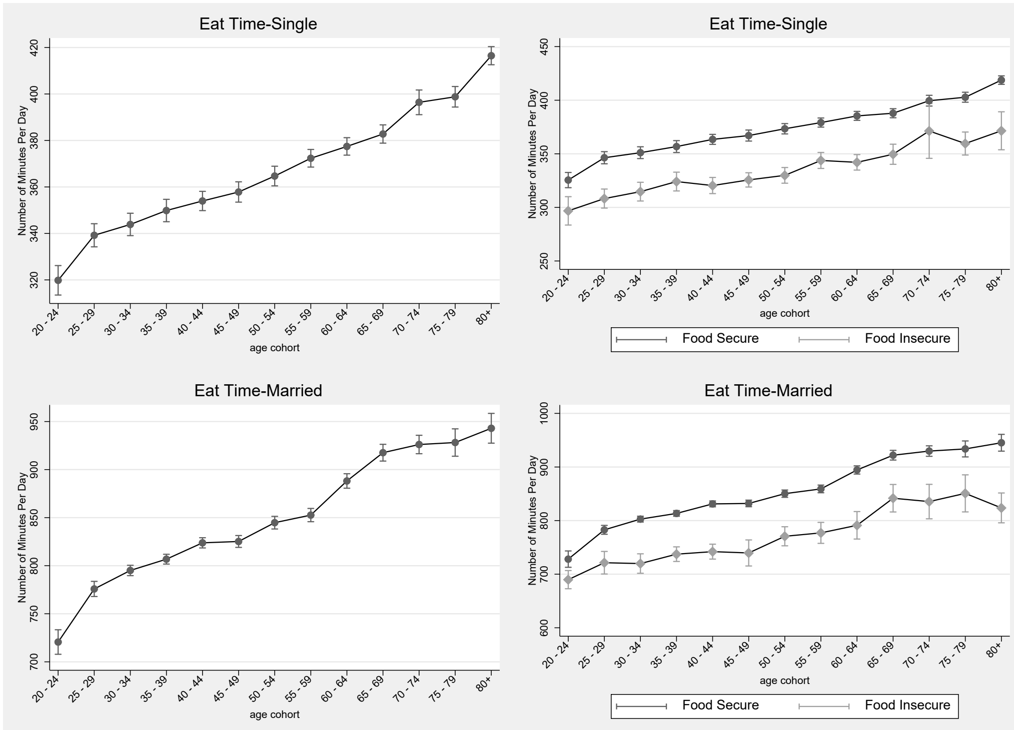
Source: Current Population Survey, American Time Use Survey

Figure 8. Predicted meal preparation time by age cohort and food security status.



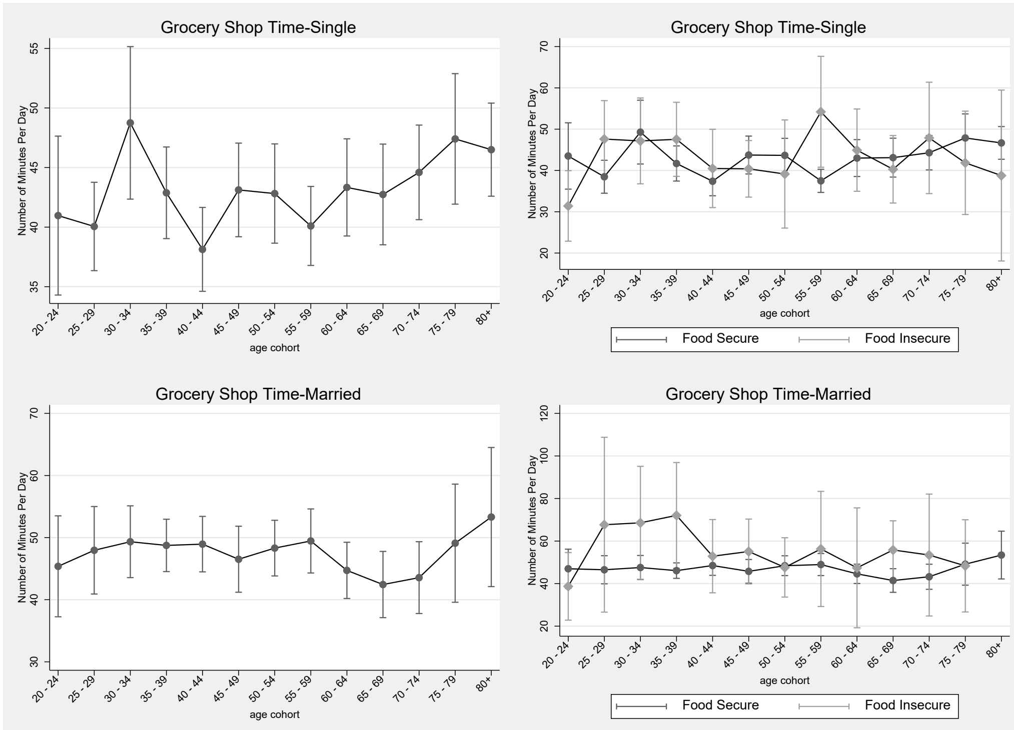
Source: Own matching of American Time Use Survey and Food Security Supplement

Figure 9. Predicted eating time by age cohort and food security status.



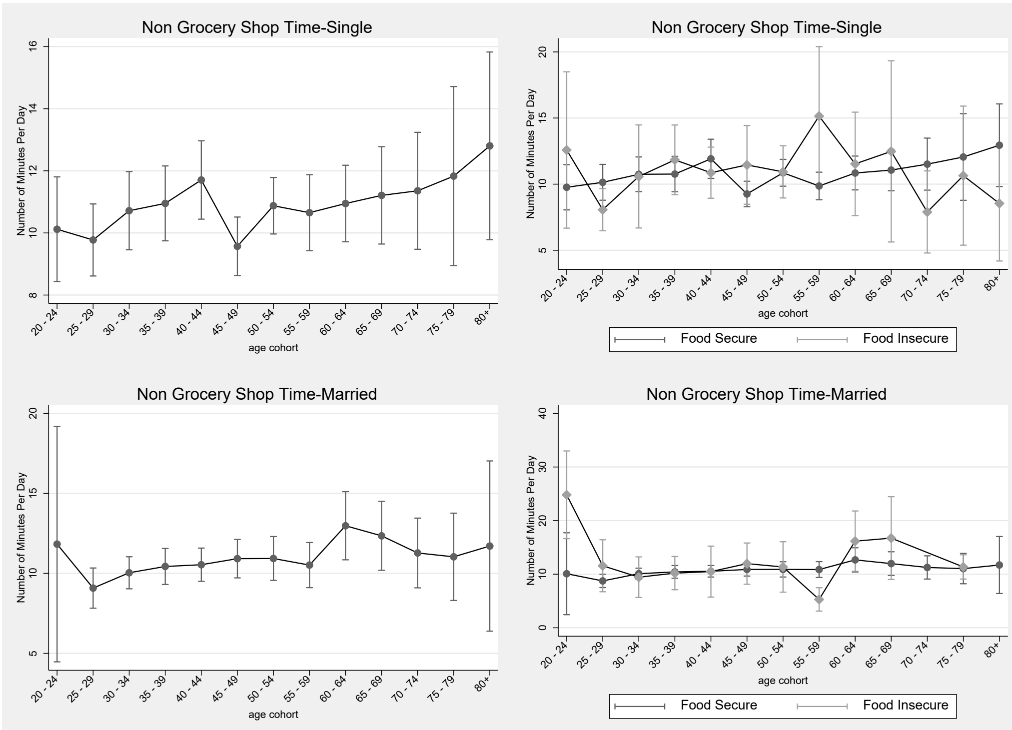
Source: Own matching of American Time Use Survey and Food Security Supplement

Figure 10. Predicted grocery shopping time by age cohort and food security status.



Source: Own matching of American Time Use Survey and Food Security Supplement

Figure 11. Predicted non-grocery shopping time by age cohort and food security status.



Source: Own matching of American Time Use Survey and Food Security Supplement

APPENDIX 1. Summary statistics for retired households by data source, marital status

	FSS Sample		Matched Sample		ATUS Sample	
variables	**Married**	**Single**	**Married**	**Single**	**Married**	**Single**
Age	70.073	73.971	69.807	73.821	70.794	74.186
Female	0.356	0.707	0.358	0.712	0.494	0.709
Child	0.128	0.134	0.108	0.061	0.040	0.050
Family size	2.252	1.310	2.225	1.156	2.241	1.480
Black	0.062	0.121	0.121	0.174	0.074	0.147
White	0.893	0.843	0.853	0.804	0.894	0.828
Hispanic	0.056	0.058	0.081	0.067	0.061	0.062
Employed	0.000	0.000	0.000	0.000	0.004	0.001
Retired	1.000	1.000	1.000	1.000	1.000	1.000
HS grad	0.496	0.522	0.485	0.522	0.521	0.541
Associate's grad	0.076	0.071	0.083	0.077	0.076	0.068
BA grad	0.174	0.123	0.185	0.133	0.163	0.112
Adv degree	0.123	0.080	0.128	0.088	0.085	0.064
Annual income						
No income reported	0.107	0.115	0.089	0.081	0.085	0.077
< \$25k	0.184	0.454	0.172	0.492	0.175	0.443
\$25k - \$60k	0.393	0.314	0.416	0.327	0.418	0.339
\$60k - \$100k	0.188	0.079	0.190	0.069	0.198	0.098
> \$100k	0.128	0.039	0.134	0.030	0.124	0.042
Metro	0.799	0.810	0.772	0.791	0.786	0.805
Food insecure	0.038	0.083	0.040	0.084		
Below poverty line	0.202	0.378	0.227	0.426		
WIC	0.000	0.000	0.000	0.000		
SNAP	0.019	0.070	0.017	0.077		
Meal prep (weekly minutes)			495.321	252.353	514.906	272.722
Eat time (weekly minutes)			924.839	400.666	923.233	397.425
Groc shop (weekly minutes)			8.015	7.535	8.291	8.580
Non groc shop (weekly minutes)			0.824	0.638	0.792	0.706
Observations	66,835	74,942	2,238	5,539	9,270	13,777

Note: Observations count people who identify as head of household or spouse
ATUS sample comes from the American Time Use Survey
FSS sample comes from the Food Security Supplement of the Current Population Survey
Matched sample merges ATUS and FSS data based on household in both samples