Organic Consumers: A Demographic Portrayal of Organic Vegetable Consumption within the United States

Rachael L. Dettmann and Carolyn Dimitri
University of Minnesota, USA; USDA Economic Research Service, USA

cdimitri@ers.usda.gov

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Summary

The organic market sector is one of the fastest growing food sectors in the United States with growth rates in organic food sales averaging 18% per year between 1998 and 2005. The largest segment within the organic market is fresh produce, comprising 36% of retail sales in 2005. To date, no published studies utilize consumer purchase information to understand which demographic factors influence the purchase of organic vegetables. This analysis focuses on aggregate vegetable purchases, along with the top three organic vegetables procured by consumers in the 2004 AC Nielsen Homescan panel dataset: pre-packaged salads, carrots, and spinach. We approach our research questions in two phases. First, the probability a consumer purchases organic vegetables is estimated in a logistic model framework. Second, a Heckman two-stage model is utilized to depict the relationship of organic vegetable expenditures as a ratio of total household vegetable expenditures. Throughout both rounds of analysis, race, education level and household income consistently influence the odds of purchasing organic vegetables.

Introduction

Organic is the fastest growing food sector in the United States, with growth rates in retail sales averaging 18% per year between 1998 and 2005. Currently organic sales comprise 2.5% or $13.8 billion of the $550 billion food industry within the United States (NBJ, 2006).[2] The largest segment within the organic market is fresh produce, comprising 36% of retail sales in 2005. Organic fresh produce is an important category because it is considered a 'gateway' product, meaning consumers often enter the organic market by first purchasing organic produce and widening their sector purchases from there (Hartman, 2001). Sales of organic produce are expected to grow at an average rate of 7.7% between 2006 and 2010 (NBJ, 2006).

Growth in organic food sales is fueled both by growing consumer demand for organic food and greater accessibility in retail outlets. Consumer demand for variety, convenience and quality for fresh produce – both organic and conventional – has exploded. As a result, new varieties have been introduced, and retailers now offer many organic fresh produce items year-round. Similar to the conventional produce sector, growing consumer demand for convenient products has translated to booming sales of organic precut produce, and in turn, more packaged and branded products are available. Conventional supermarkets have noticed the growing popularity of organic products, and have added organic fruits and vegetables to their shelves. These retail trends – i.e., increased marketing of organic products through conventional supermarkets and large retail outlets in addition to the

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[1] The views expressed here are those of the authors, and may not be attributed to the Economic Research Service or the U.S. Department of Agriculture.

[2] Organic is defined as products not grown, or processed with prohibited substances and are produced/regulated by the USDA National Organic Program (United States Department of Agriculture. 2002).

traditional venues of specialty stores – have made organic produce accessible to more consumers.

As the organic market grows, one may speculate about what kinds of consumers are buying organic food, and in this case, organic fresh vegetables. Understanding the demographic factors that influence the likelihood that a consumer will purchase organic vegetables or the demographic factors that influence the share of household income spent on organic vegetables can help guide retail markets in gaining a better understanding of the most profitable customer bases to market organic products.

To date, most characterizations of organic consumers result from industry studies, with the most notable conducted by the Hartman Group. Results of their recent surveys indicate that half of those who frequently buy organic food have incomes below $50,000, and that African-Americans, Asian-Americans and Hispanics use more organic products than the general population (Howie, 2004.) In 2004, 42% of organic consumers had incomes below $40,000 (Barry, 2004.) The most recent Hartman study (2006) indicates that Asians and Hispanics were the ethnic groups (when considering Asians, Hispanics, Whites, and Blacks) most likely to have purchased organic products in the previous three months, while core consumers (defined by the Hartman Group as consumers committed to an organic lifestyle) were most likely to be Hispanic and African-American (Baxter, 2006.)

Consumer surveys provide insight into consumer behavior; however more reliable information about preferences can be obtained by examining consumer purchases, which reflect what people actually do versus what they say they do. To date, no published studies utilize consumer purchase information to understand the demographic factors that influence the purchase of organic fresh produce. This paper is one of the first efforts to use purchase data to characterize organic consumers. We rely on AC Nielsen Homescan data, which has demographic information and food purchase information for a national panel of 41,000 households for the year 2004. The AC Nielsen Homescan panel is a nationwide panel of households that scanned their food purchases (from all retail outlets) at home. Data includes detailed product characteristics, quantity and expenditures for each food item purchased by each household. For the purpose of organic research, the Homescan data provide the richest information currently available because it captures the purchasing patterns for each household, including both sales in conventional and natural product channels, as well as provides demographic information about each household in the panel.

This analysis focuses on aggregate organic vegetable purchases, along with the top three organic vegetables purchased by consumers in the Homescan panel dataset: pre-packaged salads, carrots, and spinach. We approach our research questions in two phases. We first model the odds of a consumer purchasing organic vegetables relative to purchasing conventional vegetables in a logistic model framework. We next model the share of organic vegetables by relying on the Heckman two-stage model, since we argue that consumers make two related decisions: consumers first decide whether to buy organic, and once this decision is made, they next decide how much of their budget to devote to organic vegetables.

The paper proceeds as follows. We first review the related literature, and next describe the dataset and methodology. The econometric models and results are portrayed, followed by the conclusion.

Background

Several studies have attempted to portray organic consumers through willingness to pay surveys or by collecting purchase and demographic information from shoppers (usually the researchers spend one day at a store collecting data). Many of these studies suggest that the typical organic household is a younger household in which females do the shopping, and that smaller and higher income households are the most likely purchasers of organic produce (Govindasamy and Italia, 1990) and organic apples (Loureiro, McCluskey, and

Mittlehammer, 2001). Households knowledgeable about alternative agriculture are more likely to purchase organic produce (Govindasamy and Italia, 1990) and those concerned about the environment are more likely to purchase organic apples (Loureiro, McCluskey, and Mittlehammer, 2001). Those concerned about food safety are more likely to buy organic produce (Govindasamy and Italia, 1990) and organic apples (Loureiro, McCluskey, and Mittlehammer, 2001). Those who enjoy trying new products are more likely to purchase organic produce (Govindasamy and Italia, 1990). Households with children under 18 are more likely to purchase organic produce (Thompson and Kidwell, 1998) and organic apples (Loureiro, McCluskey, and Mittlehammer, 2001). Consumers with children are willing to pay less for organic potatoes (Loureiro and Hine, 2001) and more likely than other households to purchase organic apples (Loureiro, McCluskey, and Mittlehammer, 2001).

Willingness to pay surveys provide insight into consumer behavior, and for many economic issues, are an excellent way to proceed. However, more reliable information about preferences can be obtained by examining consumer purchases, which reflect what people actually do versus what they say they do. The first studies making headway in this direction made use of Information Resources (IRI) scanner data, which contained purchase information from select conventional grocery stores in different regions of the country. These studies focused on calculating how quantity demanded responds to changes in organic and conventional prices. Frozen organic vegetables, organic milk, and organic baby food all exhibited high price elasticity of demand, meaning that the quantity purchased responds greatly to price changes (Glaser and Thompson 2000; Thompson and Glaser 2001). For some frozen vegetables, there was little crossover between purchases of organic and conventional products, so that changes in prices of either commodity had no significant impact on quantities purchased (Glaser and Thompson 1999). For other products (milk and baby food), the conventional and organic products are substitutes, so that increases in the price of the conventional product result in consumers' purchasing a greater quantity of the organic products (Glaser and Thompson 2000; Thompson and Glaser 2001).

Data Description

This paper relies on the 2004 ACNielsen Homescan dataset, unique in that it records household grocery purchases from a wide variety of retail outlets, along with household demographic information for 41,000 households. Every time a household purchased groceries, they scanned their purchases into the Homescan database by using an ACNielsen scanner kept in their home. The design of the ACNielsen dataset constrained the analysis to pre-packaged organic items, that is, those with UPC codes. Random weight produce purchases were not identifiable as organic in the dataset, since ACNielsen does not distinguish between organic and conventional products for random weight items. One possible way to incorporate the random weight purchases would have been to sort through the data to identify which random weight products were organic, but this would have introduced a significant amount of error.

From the full dataset, we selected 38,947 households that purchased prepackaged vegetables during 2004. Several datasets were created: one aggregated organic and conventional purchases (on a dollar basis) of all prepackaged vegetables, which as 33,004 households. The other three datasets consist of purchase data for pre-packaged salads (26,227 households), carrots (26,424 households) and spinach (6,384 households), the top three purchased organic vegetable categories within the Nielson Homescan dataset.[3] In the

[3] Pre-made salad mixes comprised 43% of organic vegetable purchases, while carrots and spinach made up 22.5% and 3.3% of purchases. It should be noted fresh lettuce was actually the third highest category for organic vegetable purchases (7%). However, this

aggregate dataset, we defined an organic household as one that made at least one organic vegetable purchase during 2004. In the salad, carrot and spinach datasets, an organic household was defined as a household that made at least one purchase of organic salads, carrots or spinach, respectively, within the year. Future work will examine differences between frequent and occasional purchasers of organic vegetables, salad, carrots and spinach.

ACNielsen reports demographic information (education level, age, racial composition, presence of children under six years of age) for both the female and the male head of household. Based on the assumption that females make the majority of grocery purchases within a household, we defined the head of household as the woman if a female was present in the household; otherwise, the male was considered the head of household.

The education, race, and age variables reflect those of the head of household. Head of household education level is broken into four categories: high school graduate or less education, some college education, college degree, and post college education. Age of the head of household is grouped into three categories of less than thirty, between 30 and 49 and greater than 49. Race of the head of household is defined as Caucasian, African American, Asian, Hispanic, and other.

Households are grouped into two categories: those with and without children less than six years old. ACNielsen classifies household income into categories, ranging from a low of under $5,000 a year to a high of over $100,000 per year. This analysis uses the midpoint of each range, with $2,500 as the lowest income. For the top income category, income above $100,000 a year, we used 167,252, which is the national weighted average of income above 100,000, based on the Census. For each respective dataset, we created a dummy variable denoting whether a household bought organic carrots, organic lettuce, organic spinach, or within the aggregated dataset, vegetables in general.

The final variable created is organic share, which accounts for the share of household vegetable expenditures devoted to organic vegetables. Organic shares were calculated by taking household expenditures spent on organic vegetables and dividing the value by total household expenditures on vegetables (summed organic and conventional vegetables). This procedure was also done for the spinach, salad and carrot datasets individually by taking expenditures for each vegetable category and dividing them by total vegetable expenditures.

The data set is a stratified random sample. The sample was selected based on both demographic and geographic targets. Stratification was done to ensure that the sample matches the U.S. Census. The household was the primary sampling unit and there was no intentional clustering. The weight assigned to each household reflects the demographic distribution within strata. All analysis relies on both the projection factor (ACNielsen sample weights) and strata to estimate proportions, means, and standard errors.

Methodology

Two sets of analysis were conducted. The first examines which demographic factors influence the probability a household will purchase organic vegetables (both aggregate and individual categories); we use a logistic model to analyze this question. The second examines the two stage decision process: do I purchase organic vegetables? If so, what share of vegetable expenditures do I devote to organic vegetables? In this case, we use the Heckman two-stage model to understand which demographic factors influence the share of household expenditures spent on organic vegetables.

The first stage of the Heckman model is a probit model, called the selection equation, which examines the household's choice to buy organic vegetables as a function of different

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category was arguably closely related to pre-made salads and spinach was used as a replacement category.

demographic factors. The first stage produces the inverse mills ratio, which accounts for the selection bias (ie, the decision to participate in the organic market.) In the second stage of the Heckman model, demographic variables were regressed on the share of organic vegetables purchased and the inverse mills ratio. In the second stage, called the outcome equation, only the group that buys organic is included in the least squares regression. The inverse mills ratio is necessary because the estimators from the least squares model are consistent but the standard errors are not; the procedure passes along a correction factor from the first stage to the second stage to use in finding consistent estimates of the standard error; see Greene (1993) for more detailed explanation.

In all models estimated, we rely on Stata's survey component to incorporate ACNielsen's weights and strata. The use of the weights adjusts the data so that the estimates represent the U.S. population. Use of the strata provides efficient estimates by adjusting the standard errors.

Results

Logistic Model

For ease of interpretation, we opted to use logistic regressions with reported odds ratios. The estimated coefficients reflect the odds that a consumer with a characteristic (such as having a child under 6) will buy organic, relative to the odds of not buying organic. The logistic model is represented by:

1.Pr{household purchases organic}=f(race, children under six, age, education, income)

The dependent variable is the binary organic household variable (1=purchased organic and 0 = did not purchase organic). Race is captured in five dummy variables, representing Caucasian, Asian, African-American, Other, and Hispanic, with the largest category, Caucasian, omitted from the regression. The presence of a child under six is represented by a dummy variable. Age of the head of household is comprised of three groups, less than 30, 30-49 years, and 50 and older. Age less than 30 was omitted. Education of the head of the household has four categories, high school education or less, attended college, graduated college, and post graduate work, with high school education or less dropped. Household income is a continuous variable, as explained earlier.

Logistic models were estimated, first using the aggregated vegetable dataset, and then the salad, carrot and spinach datasets. [4] Within the aggregate vegetable dataset race, education and household income were statistically significant at the five percent level. African Americans were .64 times less likely than Caucasians to purchase organic vegetables. Increases in education levels of consumers consistently increased the odds of purchasing organic vegetables, when compared to consumer with a high school education or less. Consumers with some college education were 29% more likely to purchase organic produce, while consumers who graduated college, or had post college education were 53% and 80% more likely to purchase organic vegetables than those with a high school education or less. The interpretation of the impact of income on the odds of buying organic vegetables, relative to buying conventional vegetables, is different because income is a continuous variable. In this case, the estimated coefficient is 1.00002. Thus, when income increases by 1 unit, the odds of buying organic vegetable is 1.0002; this change is small, but significant.

Logistic results for the salad and carrot datasets were similar to the aggregate vegetable results. Like the aggregate vegetable dataset race (specifically African American),

[4] Comprehensive result tables for all regressions can be found in Appendix A.

education level and household income were all statistically significant. However, age was also a statistically significant factor, a result that varied from the aggregate dataset. Statistically significant results for salads and carrots are listed below.[5]

Table 1: Estimated odd ratios for Packaged Salad and Carrot Logit Models

Variable	Packaged Salad: Odds Ratio *(SE)*	Carrots: Odds Ratio *(SE)*
African American	0.76 *(0.07)*	0.70 *(0.09)*
Some College	1.47 *(0.11)*	1.38 *(0.11)*
Graduated College	1.93 *(0.15)*	1.56 *(0.11)*
Post College Degree	2.47 *(0.24)*	1.66 *(0.18)*
Household Income	1.00 *(0.00)*	1.00 *(0.00)*
Age: 30-49	0.69 *(0.91)*	0.73 *(0.11)*

Consistent with the aggregate dataset, African American consumers are less likely to consume organic salads and vegetables than Caucasian consumers. As education levels increase, consumers are more likely to purchase organic salads and carrots, when compared to those who have a high school education or less. Similarly, as household income increases, so does the likelihood of purchasing organic salads and carrots. Interestingly, consumers between the ages of 30 and 49 are 0.69 times less likely to purchase salads and 0.73 less likely to purchase carrots than consumers that are younger then 30.

Logistic results for the spinach dataset varied greatly from the other datasets. Race, presence of children under six years, and household income were the only statistically significant variables. Asian Americans were 0.14 times less likely to purchase organic spinach than Caucasian consumers. Conversely, consumers with children under the age of six were 96% more likely to purchase organic spinach than households with children under the age of six. Similar to the other datasets, as household income increases so does the probability of purchasing organic spinach.

The general picture presented by the logistic analysis is that education level, some races, and household income demographics affect the odds that consumers will purchases organic vegetables, relative to conventional vegetables, in general and broken down into produce sectors.

Another way of interpreting the logistic results is to calculate the predicted probabilities of buying organic vegetables, relative to buying conventional vegetables.[6] This can be done under a variety of scenarios. These results are preliminary, and are intended to give a flavor of how the probability of buying organic vegetables varies as certain demographic factors changed. The predicted probabilities are based on average income of the aggregate vegetable sample.[7] Presented are the predicted probabilities for Caucasian households under different assumptions about age and head of household education level, and presence of children under the age of 6 in the households. Predicted probabilities increased under all scenarios as the education level of the head of household rose. Households without children had a higher predicted probability of purchasing organic vegetables.

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[5] Coefficients are statistically significant at the 5% level. Note that these tests indicate difference from the odds ratio being equal to 1.

[6] Predicted probabilities are a conversion of the estimated odds ratio coefficients from a logistic model into relative probabilities.

[7] The average income for the aggregate vegetable dataset is $59,940.

Table 2: Predicted probability of buying organic vegetables, relative to buying conventional vegetables, for Caucasian households at average income

Scenario	Predicted Pr{organic}
kids, 30-49, some college	0.07
kids, 30-49, grad college	0.24
kids, 30-49, grad school	0.40
no kids, 30-49, some college	0.11
no kids, 30-49, grad college	0.28
no kids, 30-49, grad school	0.44
kids, over 50, some college	0.16
kids, over 50, grad college	0.33
kids, over 50, grad school	0.49
no kids, over 50, some college	0.20
no kids, over 50, grad college	0.37
no kids, over 50, grad school	0.53

Heckman Two-Stage Model

The second question we addressed is what demographics influence the share of household expenditures spent on organic vegetables. The Heckman two-stage model was estimated using the same four datasets. In the first stage, a probit model was estimated, using the following demographic variables. Then a linear regression was estimated using the following variables, as well as the inverse mills ratio (λ).

2.

$$orgshare = \alpha + \beta_1 Race_{Asian} + \beta_2 Race_{Black} + \beta_3 Race_{Hisp} + \beta_4 Race_{Other} + \beta_5 childlt6 + \beta_6 Age_{30-49} + \beta_7 Age_{>50} + \beta_8 Edu_{\text{Some College}} + \beta_9 Edu_{\text{College College}} + \beta_{10} Edu_{\text{Post College}} + \beta_{11} Income + \lambda$$

The linear regression results for the aggregate dataset reported a R^2 value of 0.28. All variables except Asian race, Hispanic race, and other race were statistically significant at the five percent level. Shares spent on organic vegetables are expected to decrease by 0.008 with African American consumers, decrease by 0.004 for households with children under six years of age, decrease by 0.008 and 0.007 for consumers that are in age groups 30-49 and greater than 50. Conversely, consumers with higher education levels will consistently increase their frequency of purchases of organic vegetables. Lastly, as consumer incomes increase, the share spent on organic vegetables increases slightly. We'll revisit the interpretation of these coefficients in the next version; these interpretations do not incorporate the cross equation marginal effects. However, the initial results are fairly consistent with the logit results presented earlier for the aggregate vegetable dataset.

When the linear model was run on the individual vegetable categories, the R^2 values were significantly stronger and few variables were statistically insignificant, suggesting that the model fits the disaggregated data better than the aggregated data. This preliminary finding warrants a closer look, which will be part of the next version of the paper. For the salad dataset, R^2 was 0.47 and only Hispanic race and African American race were insignificant at the five percent level. The education and household income variables all increase shares as education levels and incomes increased. Shares decreased with children under six, and if consumers were African American. The only deviance from the aggregate regression was shares spent on salads increase slightly with Asian consumers.

The carrots dataset reported a R^2 value of 0.54 and only Asian race was statistically insignificant. The results were consistently the same as the salads and aggregate datasets where shares spent on organic carrots decrease with each race category, age category and with the presence of children under six. Shares increase with increases in education levels and incomes. In the spinach dataset, the R^2 was the highest of all datasets at 0.65 and all variables were statistically significant at the five percent level. Again, shares spent on organic spinach decreased with each race, age and children under six categories, and rose with increases in education and household incomes.

Final Remarks

Using 2004 AC Nielsen Homescan data, we analyzed which demographic factors influenced the odds of consumers purchasing organic vegetables, along with the odds of purchasing organic pre-packaged salads, carrots and spinach. We also analyzed once households decided to purchase organic vegetables, which demographics influenced the share of household vegetable expenditures spent on organic vegetables (both in the aggregate vegetable and individual carrot, salad and spinach datasets). Logit models were used for the first round of analysis and the Heckman two-step model was utilized for the second share calculating stage.

Throughout all stages of analysis, consumer's education level, and household income were the most consistent variables that impact the odds of purchasing organic products. These same demographics statistically affect the share of vegetable expenditures spent on organic vegetables. These results vary with the previous consumer survey results from Barry, and Hartman, which reflected minorities, and lower income consumers purchased organic products. However, these results hold consistent to the generally held stereotype that organic consumers are wealthy, well educated Caucasians.

As organic markets continue to grow, understanding the demographic factors that influence the probability a consumer will purchase organic vegetables or the demographic factors that influence the share of household income spent on organic vegetables can help guide retail markets in gaining a better understanding of the most profitable customer bases to market organic products. This is especially important since organic vegetables, and organic produce in general, is considered a gateway product that introduces consumers to organic products. If a consumer tries organic vegetables, they are likely to continue expanding their consumption of other organic products.

From these preliminary results, Caucasians that are well educated with higher incomes are the most likely market sector to focus marketing organic vegetables to. However, these results also provide an understanding of demographic gaps that are missing from the organic vegetable consumer profile, such as African Americans. Next steps in this paper will be to address some technical issues regarding interpretation of the Heckman coefficients, and fine-tuning the econometric analysis. Further research should explore why African Americans, and other minorities are less likely to purchase organic vegetables, which may provide insight into ways to target marketing of organic vegetables towards this undeveloped, large market segment.

References

Barry, M. 2004. "The New World Order: Organic Consumer Lifestyle Segmentation." [n]sight. Volume VI, Number 2.

Baxter, Brent. 2006. "who's buying organic?: demographics 2006," hartbeat taking the pulse of the marketplace, May 17, 2006. Accessed online at http://www.hartman-group.com/products/HB/2006_05_17.html; August 3, 2006

Glaser, L. and G. Thompson, 1999. "Demand for Organic and Conventional Frozen Vegetables." Selected Paper presented at Annual Meeting of the American Agricultural Economics Association, Nashville, TN. August.

Glaser, Lewrene K. and Gary Thompson. 2000. "The Demand for Organic and Conventional Milk." Presented at the Western Agricultural Economics Association meeting, Vancouver, British Columbia.

Govidnasamy, R. and J. Italia. 1990. "Predicting Willingness to Pay a Premium for Organically Grown Fresh Produce." *Journal of Food Distribution Research.* Volume 30, Number 2, pages 44-53.

Greene, William H. 1993. *Econometric Analysis.* Macmillion Publishing Company. New York, Oxford, Singapore, Sydney.

Loureiro, M. and S. Hine. "Discovering Niche Markets: A Comparison of Willingness to Pay for a Local (Colorado Grown), Organic, and GMO-Free Product." Selected Paper presented at Annual Meeting of the American Agricultural Economics Association, Chicago, IL. 2001.

Loureiro, M., J. McCluskey, and R. Mittlehammer. 2001. "Assessing Consumer Preferences for Organic, Eco-labeled, and Regular Apples." *Journal of Agricultural and Resource Economics.* December.

Thompson, G. and L. Glaser. 2001. "National Demand for Organic and Conventional Baby Foods," Selected Paper presented at Annual Meeting of the Western Agricultural Economics Association, Logan, Utah, July 8-11.

Thompson, G. and J. Kidwell. 1998. "Explaining the Choice of Organic Produce: Cosmetic Defects, Prices, and Consumer Preferences." *American Journal of Agricultural Economics* v80, n2 (May): 277-8

The Hartman Group, 2000, *The Organic Consumer Profile*, The Hartman Group, Bellevue, WA.

Hartman Group. 2002. *Hartman Organic Research Review: A Compilation of National Organic Research Conducted by the Hartman Group.* Bellevue, Washington.

Hartman Group. 2004. *Organic Food and Beverage Trends.* Bellevue Washington.

Howie, M. 2004. "Research Roots out Myths Behind Buying Organic Foods." *Feedstuffs.* March 29.

Nutrition Business Journal (NBJ). 2006. *U.S. Organic Food Sales ($Mil) 1997-2010e-*

Thompson, G.D., 1998, Consumer Demand for Organic Foods: What We Know and What We Need to Know, *American Journal of Agricultural Economics*, 80: 1113-1118.

United States Department of Agriculture. 2002. *Organic Food Standards and Their Labels: the Facts.* National Organic Program, April 2002, updated January 2007, accessed February 7, 2007 at http://www.ams.usda.gov/nop/Consumers/brochure.html.

Appendix A

Table 3: Logit Analysis Results

Variable	**Aggregate: Odds Ratio *(SE)***	**Salad: Odds Ratio *(SE)***	**Carrots: Odds Ratio *(SE)***	**Spinach: Odds Ratio *(SE)***
Hispanic	1.12 *(0.13)*	1.16 *(0.18)*	0.97 *(0.17)*	0.74 *(0.33)*
Black	**0.64*** *(0.04)*	**0.76*** *(0.07)*	**0.7*** *(0.09)*	0.88 *(0.26)*
Asian	0.83 *(0.1)*	1.1 *(0.17)*	0.89 *(0.18)*	**0.14*** *(0.06)*
Other	0.93 *(0.07)*	1.05 *(0.11)*	0.88 *(0.11)*	0.68 *(0.22)*
Child < 6	0.96 *(0.07)*	0.88 *(0.09)*	0.89 *(0.1)*	**1.69*** *(0.42)*
Age: 30-49	0.83 *(0.08)*	**0.69*** *(0.1)*	**0.73*** *(0.11)*	**0.49*** *(0.17)*
Age: 50 >	0.91 *(0.09)*	0.76 *(0.11)*	0.77 *(0.12)*	0.56 *(0.21)*
Some College	**1.29*** *(0.06)*	**1.47*** *(0.11)*	**1.38*** *(0.11)*	1.28 *(0.26)*
College Grad	**1.53*** *(0.08)*	**1.93*** *(0.15)*	**1.56*** *(0.13)*	1.3 *(0.28)*
Post College	**1.8*** *(0.12)*	**2.46*** *(0.24)*	**1.66*** *(0.18)*	**1.86*** *(0.42)*
HH Income	**1.00*** *(0.00)*	**1.00*** *(0.00)*	**1.00*** *(0.00)*	**1.00*** *(0.00)*

*Denotes significance at the 5% level.

Table 4: Heckman Model: Probit Results

Variable	**Aggregate: Odds Ratio *(SE)***	**Salad: Odds Ratio *(SE)***	**Carrots: Odds Ratio *(SE)***	**Spinach: Odds Ratio *(SE)***
Hispanic	0.07 *(0.04)*	0.08 *(0.08)*	-0.02 *(0.09)*	-0.17 *(0.2)*
Black	**-0.24*** *(0.06)*	**-0.14*** *(0.05)*	**-0.17*** *(0.06)*	-0.05 *(0.14)*
Asian	-0.11 *(0.07)*	0.06 *(0.08)*	-0.07 *(0.1)*	**-0.86*** *(0.22)*
Other	-0.05 *(0.04)*	0.01 *(0.06)*	-0.06 *(0.06)*	-0.17 *(0.15)*
Child < 6	-0.02 *(0.04)*	-0.06 *(0.05)*	-0.06 *(0.05)*	**0.26*** *(0.12)*
Age: 30-49	-0.1 *(0.06)*	**-0.19*** *(0.07)*	**-0.16*** *(0.08)*	**-0.36*** *(0.18)*
Age: 50 >	-0.05 *(0.06)*	**-0.14*** *(0.08)*	-0.13 *(0.08)*	-0.3 *(0.19)*
Some College	**0.14*** *(0.03)*	**0.19*** *(0.04)*	**0.16*** *(0.04)*	0.11 *(0.09)*
College Grad	**0.24*** *(0.03)*	**0.34*** *(0.04)*	**0.22*** *(0.04)*	0.12 *(0.1)*
Post College	**0.34*** *(0.04)*	**0.48*** *(0.05)*	**0.26*** *(0.05)*	**0.3*** *(0.11)*
HH Income	**2.66e-07*** *(2.66e-07)*	**4.15e-06*** *(3.29e-07)*	**1.29e-06*** *(3.67e-07)*	**1.99e-06*** *(6.99e-07)*

*Denotes significance at the 5% level.

Table 5: Heckman Model: OLS Results

Variable	Aggregate: Coefficients *(SE)*	Salad: Coefficients *(SE)*	Carrots: Coefficients *(SE)*	Spinach: Coefficients *(SE)*
Hispanic	0.002 *(0.002)*	0.007 *(0.005)*	**-0.008*** *(0.004)*	**-0.064*** *(0.01)*
Black	**-0.01*** *(0.001)*	**-0.021*** *(0.002)*	**-0.019*** *(0.003)*	**-0.015*** *(0.005)*
Asian	0.003 *(0.003)*	**0.029*** *(0.007)*	-0.011 *(0.007)*	**-0.219*** *(0.014)*
Other	-0.001 *(0.001)*	0.002 *(0.003)*	**-0.008*** *(0.003)*	**-0.048*** *(0.008)*
Child < 6	**-0.004*** *(0.001)*	**-0.009*** *(0.003)*	**-0.014*** *(0.002)*	**0.083*** *(0.01)*
Age: 30-49	**-0.008*** *(0.002)*	**-0.035*** *(0.005)*	**-0.028*** *(0.004)*	**-0.103*** *(0.022)*
Age: 50 >	**-0.01*** *(0.002)*	**-0.026*** *(0.005)*	**-0.021*** *(0.004)*	**-0.08*** *(0.021)*
Some College	**0.007*** *(0.001)*	**0.026*** *(0.002)*	**-0.033*** *(0.002)*	**0.029*** *(0.005)*
College Grad	**0.016*** *(0.001)*	**0.053*** *(0.003)*	**0.044*** *(0.002)*	**0.034*** *(0.005)*
Post College	**0.02*** *(0.002)*	**0.071*** *(0.005)*	**0.05*** *(0.003)*	**0.088*** *(0.01)*
HH Income	**5.28e-08*** *(1.10e-08)*	**4.87e-07*** *(2.97e-08)*	**1.87e-07*** *(2.21e-08)*	**6.88e-07*** *(6.31e-08)*
Mills Ratio (λ)	**0.09*** *(0.002)*	**0.533*** *(0.013)*	**0.761*** *(0.006)*	**1.611*** *(0.027)*

*Denotes significance at the 5% level.

Contact information

Carolyn Dimitri,
Economic Research Service, USDA – USA

Phone: (202) 694-5252
Email: cdimitri@ers.usda.gov