SNAP Household Food Expenditures Using Non-SNAP Payment Methods

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Abstract
The primary objective of this study is to analyze SNAP households’ out-of-pocket (OOP) food at home (FAH) expenditures. Using the FoodAPS data set, descriptive statistics describe SNAP households’ OOP FAH expenditures by payment type, retailer authorization, item eligibility and luxury food composition. A double-hurdle model is used to identify program, household and environmental factors affecting SNAP households’ OOP FAH expenditures. Results indicate that expenditures at unauthorized retailers and on restricted foods comprise a small share of SNAP households’ FAH purchases. Luxury foods, however, comprise 12\% of their total food expenditures, with the majority of these expenditures allocated to inexpensive luxury items such as soda and candy. Correspondingly, the share of FAH expenditures allocated to luxury foods is inversely related to OOP FAH expenditures. Results further indicate that emergency food assistance and National School Lunch Program participation are associated with lower OOP FAH expenditures. Other factors with a significant impact include the number of days since SNAP benefit receipt, household composition, shopping frequency, grocery list usage and geographic indicators.


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Introduction
The goal of the Supplemental Nutrition Assistance Program (SNAP) is to improve low-income households’ food security and access to a healthy diet (Yaktine & Caswell 2014). While research has shown that low-income households participation in SNAP does lead to increased food security and modest improvements in dietary quality, the program falls short of fully meeting its goals (Andreyeva et al. 2015; Gregory et al. 2013). In 2013, 51% of SNAP households were food insecure, and recent research suggests that SNAP participants are less likely to meet key dietary guidelines than eligible and higher income households (Andreyeva et al. 2015; Coleman-Jensen et al. 2014; Gregory et al. 2013).

In a 2013 report commissioned by the USDA, Caswell & Yaktine identify potential program, household and environmental factors that explain why food insecurity and failure to meet key dietary guidelines persist among low-income households receiving SNAP. Key program factors identified as affecting SNAP benefit adequacy include food restrictions, food incentives, SNAP retailer authorization and monthly benefit allotments. Identified household factors include income, other program benefits, food preferences and cultural influences, while environmental factors include prices, location and transportation access.

In recent years, a range of policy changes have been proposed or implemented in an effort to improve the adequacy of SNAP benefits. Food incentive programs, such as the Healthy Incentives Pilot and Double Up Food Bucks, were implemented to encourage SNAP households to purchase more fresh fruits and vegetables (Klerman et al 2014; Weatherspoon et al. 2012). Several states have also considered legislation to further restrict SNAP purchases. Proposed restrictions primarily target non-essential, luxury foods such as steak, lobster, soda, candy and prepared baked goods, which may detract from benefit adequacy due to their high price or lower nutritional quality (Chrisinger 2017; Todd & Ver Ploeg 2014). In addition to incentives and restrictions, a handful of researchers have suggested that SNAP benefit allotments should be made more frequently, in order to smooth consumption over the SNAP benefit month (Smith et al. 2016; Casterllari et al. 2016).

The majority of studies assessing the adequacy of SNAP benefits have compared SNAP participants’ food security or diet quality to that of eligible and higher income non-participants (Bitler 2014). However, further insight on SNAP benefit adequacy can be obtained through a comparison of SNAP households food at home (FAH) purchases acquired using SNAP to those acquired using other out-of-pocket (OOP) payment methods. Hastings and Shapiro (2017), Smith et al. (2016) and Beatty and Tuttle (2014) find that low-income households treat SNAP benefits differently from cash, suggesting that the composition of SNAP households’ food purchases may vary by payment method.

The objective of this study is to analyze SNAP households’ OOP FAH expenditures. This study adds to the literature by being the first to describe SNAP households’ OOP FAH expenditures by payment type, SNAP retailer authorization, SNAP item eligibility and luxury food composition. A double-hurdle model is used to identify program, household and environmental factors affecting SNAP households’ OOP FAH expenditures. Results from this analysis provide useful insight for the evaluation of recently proposed SNAP policy changes, including luxury food restrictions, healthy food incentives and alterations to the SNAP benefit formula and distribution cycle.
Overview of the Supplemental Nutrition Assistance Program
In 2016, the USDA’s Supplemental Nutrition Assistance Program (SNAP) provided food assistance to nearly 43 million Americans (US 2017a). Households are eligible to receive SNAP benefits if their gross income is less than 130% of the poverty line, net income is less than or equal to the poverty line and their liquid assets are valued at less than $2,000 (or $3,250 for elderly or disabled households). Further, households that receive benefits from Supplemental Security Income (SSI), Temporary Assistance for Needy Families (TANF) or state-run General Assistance (GA) programs are categorically eligible to receive SNAP (Falk & Aussenberg 2014).

For eligible households, SNAP benefit levels are determined by subtracting 30% of their net income from the maximum benefit. Net income refers to gross income minus the following deductions: standard, earning, dependent, child support, medical expense and excess shelter (US 2017b). The maximum benefit is set based on the cost of the Thrifty Food Plan (TFP) for a representative family and is adjusted based on household size. The maximum benefit is constant across all contiguous states, but higher in Alaska, Hawaii and US Territories (Aussenberg 2016). SNAP benefits are distributed on a monthly basis to participating households via an electronic benefits transfer (EBT). The average SNAP household receives SNAP allotments equivalent to 70% of the maximum benefit, with 30% of households receiving the maximum benefit (Hoynes et al. 2014).

SNAP benefits may be used to purchase food for home preparation and consumption, but cannot be used to purchase alcohol, tobacco, vitamins, meal supplements or hot foods (Aussenberg 2016). Further, SNAP benefits must be redeemed at SNAP authorized retailers, which meet the Food and Nutrition Act’s staple food and inventory share requirements (Aussenberg 2016). The majority of households receiving SNAP are infra-marginal, meaning they spend more on food than they receive from SNAP (Hoynes et al. 2014). Under Southworth’s (1945) model of consumer choice, infra-marginal households are hypothesized to treat SNAP benefits no differently than cash (Kim 2016). While some studies find support for Southworth’s hypothesis (Lusk 2017; Hoynes & Schanzenbach. 2009), the majority of recent studies find that households have a greater marginal propensity to spend out of SNAP than cash (Hastings & Smith 2017; Smith et al. 2016; Beatty & Tuttle 2014; Wilde et al. 2009; Breunig & Gasgupta 2005).

Data
Analysis of SNAP households’ OOP FAH expenditures is conducted using the National Household Food Acquisition and Purchase Survey (FoodAPS) public use data set. Developed by the USDA Economic Research Service and Food and Nutrition Service, FoodAPS is a nationally representative survey of households’ weekly food purchases, demographics, resources and environment. Administered from April 2012 to January 2013, FoodAPS surveyed a total of 4,826 households. Each household surveyed completed one-week FAH and food away from home (FAFH) acquisition diaries. Households also completed pre and post surveys on their demographics, food consumption habits and resources. Supplementing the information obtained from households, FoodAPS includes a geographic component that characterizes each household’s food environment.

FoodAPS is ideal for this analysis in that it contains a large sample of SNAP households and provides detailed food purchase and acquisition data by SNAP payment type. Of the 4,826
households surveyed, 1,581 households have at least one member receiving SNAP benefits. Of these households, 41 were removed for failing to report the amount of their last SNAP benefit received and 54 were removed from the sample for not reporting any food expenditures over the survey period. An additional seven households were removed due to missing survey questions, resulting in a final sample size of 1,479 SNAP households. Of these households, 1,118 made out-of-pocket FAH purchases.

In the descriptive analysis conducted in this study, the 1,479 SNAP households are grouped into three categories based on the share of the maximum benefit they receive. This is done to determine if the composition of SNAP households’ out-of-pocket FAH purchases is homogenous across SNAP benefit levels. Following (Nord 2012), the three categories are delineated as follows:

1. Low benefit household: $0 < \text{maximum benefit share} \leq 33\%$
2. Moderate benefit household: $33\% < \text{maximum benefit share} \leq 66\%$
3. High benefit household: $66\% < \text{maximum benefit share} \leq 100\%$

Households’ maximum benefit share is calculated from FoodAPS as follows:

$$\text{maximum benefit share}_i = \frac{\text{midpoint(last SNAP amount range)}_{i}}{\text{2012 maximum benefit level}_{i}}. \tag{1}$$

In the FoodAPS public use data set, households last SNAP benefit amount is reported as a range. In equation 1, household $i$’s last SNAP benefit amount is equated to the midpoint of this range. Household $i$’s maximum benefit share is then obtained by dividing the last SNAP benefit amount by the 2012 maximum benefit level corresponding to households $i$’s size (US 2014). Using the maximum benefit share, a total of 302, 607 and 552 households are classified as low, moderate and high benefit households respectively.

**Methods**

Descriptive statistics are used to describe SNAP households’ OOP FAH expenditures. Cragg’s Double-Hurdle model is then used to identify program, household and environmental factors affecting households’ OOP FAH expenditure levels.

**Descriptive Statistics**

SNAP households’ OOP FAH expenditures are described across the following dimensions: (1) payment methods, (2) item eligibility and (3) retailer authorization. Analysis of payment methods describe OOP FAH expenditures made using cash, debit, credit, WIC/TANF and other payment types. Expenditures on SNAP restricted items are described in total, as well as in the following disaggregate categories: alcohol, hot foods and vitamins/meal supplements. SNAP households’ OOP FAH expenditures are also compared to SNAP expenditures by luxury food composition. Based on New York Senate Bill S6761, which seeks to restrict the purchase of luxury foods using SNAP, this study defines the following goods as luxury foods: candy, soda, steak, shellfish and baked goods (S.B. S6761, 2015-2016 Leg. Sess. N.Y. 2016).

Expenditures on food items from each of the dimensions of interest are obtained from FoodAPS. However, in cases where households make purchases using both SNAP and OOP payment methods, FoodAPS does not indicate which individual items were purchased with each respective payment method. For food items purchased using both methods, item
SNAP expenditures and item out-of-pocket expenditures are calculated as follows:

\[
 Item\ SNAP\ Exp = \begin{cases} 
 \left( \frac{SNAP\ Amt}{Total\ Paid - Restricted\ Exp} \right) \cdot Item\ Exp & \text{if SNAP eligible} \\
 0 & \text{if SNAP restricted}
\end{cases}
\]

(2)

\[
 Item\ FAH\ OOP\ Exp = ItemExp - Item\ SNAP\ Exp
\]

(3)

where \(SNAP\ Amt\) is the amount of SNAP benefits applied toward the total purchase, \(Total\ Paid\) is the amount paid for the total purchase, \(Restricted\ Exp\) is the amount of the total purchase allocated to SNAP restricted items and \(ItemExp\) is the cost of the individual item purchased. For SNAP restricted items purchased, item SNAP expenditures were set equal to zero. Intuitively, the item’s SNAP expenditure is determined by multiplying the item’s expenditure by the share of the shopping trip paid for using SNAP.

**Cragg’s Double-Hurdle Model**

The second objective of this analysis is to identify program, household and environmental determinants of households’ OOP FAH expenditures. Modeling of households’ OOP FAH expenditures is complicated by the presence of zero expenditures. Of the 1,479 SNAP households, 251 (17%) did not purchase FAH using OOP methods. In order to address the prevalence of zero expenditures, Cragg’s Double-Hurdle (DH) model is employed. The DH model is specified as follows:

\[
 y_i = \begin{cases} 
 y_i^* > 0 \text{ and } s_i = 1 \\
 0 & \text{otherwise}
\end{cases}
\]

(4)

\[
 s_i = \gamma + Z_i \delta + u_i \quad u \sim (0,1)
\]

(5)

\[
 y_i^* = \alpha + X_i \beta + \varepsilon_i \quad \varepsilon \sim (0, \sigma^2)
\]

(6)

where \(y_i^*\) is latent OOP FAH expenditures, \(y_i\) is the observed OOP FAH expenditures, \(s_i\) is a binary indicator of positive OOP FAH expenditures and \(Z_i\) and \(X_i\) are vectors of program, household and environmental factors affecting households’ decision to purchase FAH OOP and their level of OOP FAH expenditures respectively (Wooldridge 2010). In this analysis, the inverse mills ratio from equation 4 is included in \(X_i\) to correct for potential sample selection bias.

The log-likelihood function for the DH model is given by:

\[
 \ell_i(\theta) = 1[y_i = 0] \log[1 - \Phi(Z_i \delta)] + 1[y_i > 0] \log[\Phi(Z_i \delta)] + 1[y_i > 0](- \log \Phi \left( \frac{X_i \beta}{\sigma} \right) + \log \left\{ \phi \left( \frac{y_i - X_i \beta}{\sigma} \right) \right\} - \log(\sigma))
\]

(7)

and estimates are obtained using maximum likelihood estimation (Wooldridge 2010). Average partial effects are obtained, which measure how an explanatory variable affects the expected value of the dependent variable, holding all other explanatory variables at their mean. Following Burke (2009), APEs of participation, unconditional expenditures and conditional expenditures are calculated as shown in Equations 8 through 10 respectively:
\[
\frac{\partial P(y > 0 | Z)}{\partial Z_j} = \delta_j \phi(Z\delta) \\
\frac{\partial E(y | X, Z)}{\partial Z_j} = \delta_j \phi(Z\delta) \ast \left\{ (X\beta + \sigma) \ast \lambda \left( \frac{X\beta}{\sigma} \right) \right\} + \phi(Z\delta) \ast \beta_j [1 - \lambda \left( \frac{X\beta}{\sigma} \right) \left\{ \left( \frac{X\beta}{\sigma} \right) + \lambda \left( \frac{X\beta}{\sigma} \right) \right\}] + \phi(Z\delta) \ast \beta_j \left( \frac{X\beta}{\sigma} \right) \ast \lambda \left( \frac{X\beta}{\sigma} \right) \ast \lambda \left( \frac{X\beta}{\sigma} \right) \\
\frac{\partial E(y | y > 0, X)}{\partial X_j} = \beta_j [1 - \lambda \left( \frac{X\beta}{\sigma} \right) \left\{ \left( \frac{X\beta}{\sigma} \right) + \lambda \left( \frac{X\beta}{\sigma} \right) \right\}] + \phi(Z\delta) \ast \beta_j \left( \frac{X\beta}{\sigma} \right) \ast \lambda \left( \frac{X\beta}{\sigma} \right) \ast \lambda \left( \frac{X\beta}{\sigma} \right).
\]

Description of Variables

Table 1 provides definitions and descriptive statistics for the expenditure (y) and explanatory variables (Z and X) included in the DH model. Following Caswell & Yaktine (2013), explanatory variables are grouped into three categories: (1) program, (2) household and (3) environmental factors.
environmental factors.

The main expenditure variable, \( OOP\ FAH\ Exp \), represents SNAP households’ weekly OOP FAH expenditures. FAH is defined as food items obtained from supermarkets or other food stores (US 2015). \( OOP\ FAH\ Exp \) are obtained from FoodAPS by summing households’ FAH expenditures made using all non-SNAP payment methods. In cases where food purchases were made using both SNAP and OOP methods, FoodAPS provides the amount of SNAP expenditures allocated to the purchase. OOP food expenditures are thus obtained by subtracting the SNAP expenditures from the total paid for the food purchase.

The first category of explanatory variables, program factors, includes households’ maximum benefit share, days since SNAP benefit receipt, as well as the share of FAH expenditures allocated to restricted foods, unauthorized retailers and luxury foods. SNAP benefits are meant to fill the gap between household income and the cost of the Thrifty Food Plan. Thus, households’ OOP FAH expenditures are expected to increase as their maximum benefit share decreases.\(^1\) The existence of a SNAP benefit cycle, in which SNAP expenditures decline and OOP expenditures increase over the course of the benefit month, is well established in the literature (Damon et al. 2013; Castellari et al. 2016; Hasting & Washington 2010; Smith et al. 2016). The number of days since SNAP benefit receipt is therefore expected to have a positive effect on OOP FAH expenditures.

By definition, the share of FAH expenditures households allocate to restricted items or unauthorized retailers increases their OOP FAH expenditures. However, the effect of ineligible item and retailer shares on the level of OOP FAH expenditures is unclear. In order to assess the effect of a potential luxury food ban on purchases using SNAP, the share of FAH expenditures allocated to luxury foods is also considered. The effect of luxury food shares on OOP FAH expenditures likely depends on the types of luxury foods being purchased. If households primarily purchase expensive luxury items, such as steak and shellfish, the luxury food share is expected to have a positive effect on OOP FAH expenditures. However, if households primarily purchase inexpensive luxury items, such as candy and soda, the luxury food share is hypothesized to have an inverse effect on OOP FAH expenditures.

The second category of explanatory variables, household factors, includes household composition, race, education obtainment of other food assistance and shopping habits. Costs of the Thrifty Food Plan (TFP), used to set SNAP maximum benefits, vary with age (Carlson et al. 2007). However, SNAP maximum benefits are set for a representative family of a particular size (Caswell & Yaktine, 2013). Variables representing the number of children and seniors in a household are therefore included to account for the potential effect of this mismatch on households’ OOP FAH expenditures. The TFP also does not fully account for the time costs associated with meal preparation. Davis & You (2010) and Mancino & Newman (2007) find that SNAP households, particularly those employed, purchase of the TFP is constrained by time costs. Faced with time constraints, households may purchase more expensive, prepared food products, leading to greater OOP FAH expenditures. In this analysis, time constraints are proxied by the household head’s employment status.

\(^1\) Note that income and household size are excluded from the model given Wilde & Ranney’s (1996) finding that 90% of the variation in SNAP benefits is attributable to income and household size.
Household obtainment of food assistance from the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), the National School Lunch Program (NSLP) and food pantries are controlled for using indicator variables. Prior research has shown that SNAP households receiving WIC benefits have smoother food consumption over the SNAP benefit cycle (Calloway et al. 2015; Wilde & Ranney 2000). Obtaining WIC benefits is expected to increase OOP FAH expenditures, given that it provides additional dollars to allocate to FAH spending. Conversely, receiving NSLP assistance is expected to decrease OOP FAH expenditures given Smith et al.’s (2016) finding that households compensate for the SNAP benefit cycle by obtaining free food from schools. Similarly, receiving assistance from food pantries is expected to decrease households’ OOP FAH expenditures.

Households’ food shopping habits, including shopping frequency, FAFH expenditure shares and use of grocery lists are also considered. Smith et al. (2016) and Wilde & Ranney (2000) find that grocery list usage and shopping frequency are positively associated with steady food expenditure and intake over the benefit month. In addition to more evenly spreading SNAP across the benefit month, these findings indicate that grocery list users and frequent shoppers may supplement SNAP expenditures with OOP FAH expenditures later in the benefit month to maintain a steady food intake. Shopping frequency and grocery list usage are thus hypothesized to positively affect OOP FAH expenditures. While FAFH expenditures are relatively stable over the benefit month (Wilde & Ranney 1998), households may substitute FAFH for OOP FAH. Thus, an inverse relationship is expected between FAFH expenditure shares and OOP FAH expenditures.

In addition to program and households factors, several environmental factors are expected to affect SNAP households’ OOP FAH expenditures. Recent studies report that, despite SNAP maximum benefits being fixed across the continental US, there is significant variation in food prices across geographic regions (Gregory & Coleman-Jensen 2013; Leibtag 2007). Regional indicator variables are included to account for this geographic price variation. Food prices are also found to vary across rural and urban areas, likely due to lower access to traditional food retailers (Caswell & Yaktine 2013; Morris et al. 1992). A rural indicator variable is included to account for this variation. Further, seasonal indicator variables are used to account for seasonal variation in food prices.

**Table 2. Average Household Food Expenditures by Household SNAP Benefit Level**

<table>
<thead>
<tr>
<th>Expenditure Type</th>
<th>Low Benefit HH (N=320)</th>
<th>Moderate Benefit HH (N=607)</th>
<th>High Benefit HH (N=552)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>Share</td>
<td>$</td>
</tr>
<tr>
<td>SNAP</td>
<td>34.77</td>
<td>24%</td>
<td>58.18***</td>
</tr>
<tr>
<td>OOP FAH</td>
<td>72.12</td>
<td>50%</td>
<td>49.08***</td>
</tr>
<tr>
<td>OOP FAFH</td>
<td>37.14</td>
<td>26%</td>
<td>27.12***</td>
</tr>
<tr>
<td>Total</td>
<td>144.03</td>
<td>100%</td>
<td>134.38***</td>
</tr>
</tbody>
</table>

*** Means differ from those of Low Benefit HH at the 0.01 level

SNAP Households’ Out-of-Pocket Food Expenditures

In this section, SNAP households’ OOP FAH expenditures are described by payment type, retailer authorization, item eligibility and luxury composition. Shown in Table 2, OOP
FAH expenditures account for 59%, 38% and 29% of low, moderate and high benefit households’ total food expenditures respectively. As expected, the share of total food expenditures made using SNAP increases with households’ maximum benefit share, while OOP FAH and FAFH expenditure shares decrease. Despite these differences, households’ average total food expenditures do not significantly differ by benefit level.

**OOP FAH Payment Type**

Households’ average OOP FAH expenditures by payment type are shown in Figure 1. Comprising over 73% of OOP FAH expenditures, cash and debit cards are the most commonly used OOP payment method among all SNAP households. Across benefit levels, use of cash is slightly more common and debit card use is slightly less common among moderate and high benefit households than low benefit households. Credit cards comprise less than 10% of OOP FAH expenditures for all households, with credit card use increasing slightly with households’ SNAP benefit level. Similarly, OOP expenditures made using WIC or TANF comprise less than 10% of all households OOP FAH expenditures. However, high benefit households’ share of OOP FAH purchased using WIC or TANF is 5 percentage points higher than that of low benefit households. This suggests high benefit households may have a greater reliance on WIC and/or TANF for making OOP FAH expenditures.

**Unauthorized SNAP Retailers**

Shown in Table 3, SNAP households’ expenditures at unauthorized retailers comprise a small share of total food expenditures, at less than 6% for all households. As expected, expenditures at unauthorized retailers comprise a larger share of moderate and high benefit households OOP FAH dollars, than low benefit households. However, high benefit households allocate slightly less OOP FAH dollars to purchases at unauthorized retailers than moderate benefit households. Further, OOP FAH expenditures at unauthorized retailers comprise a similar share, ~5%, of total food expenditures for low and moderate benefit households. High benefit households, however, spend a slightly lower share of total food expenditures, 3.3%, at unauthorized retailers. In combination, these findings suggest
that total food expenditures at unauthorized retailers are similar for low and moderate benefit households. However, high benefit households appear to do slightly more of their shopping at SNAP retailers. This finding may reflect that high benefit households, which rely heavily on SNAP, are more likely to frequent retailers that accept SNAP than households with lower benefit levels.

**SNAP Restricted Food Items**

Table 3 also details households’ OOP FAH expenditures on SNAP ineligible items, which include alcohol, vitamins and meal supplements and hot foods. The share of OOP FAH expenditures allocated to SNAP ineligible food products increases with household benefit levels. However, the share of total food expenditures allocated to ineligible items is similar across benefit levels at ~3%. This lack of variation across benefit levels indicates that SNAP item restrictions may not have a significant effect on the purchase of restricted foods. Given that the majority of SNAP households are infra-marginal (Hastings & Shapiro 2017; Hoynes et al. 2014) and spending on ineligible items is low at ~$3.50 per week, restrictions likely result in households shifting payment for ineligible items from SNAP to OOP methods.

**Luxury Food Purchases**

SNAP households’ expenditures on luxury foods, which include candy, soda, steak, shellfish and baked goods, are presented in Table 4. On average, SNAP households spend between 11.6% and 13.9% of their total food dollars on luxury foods. The majority of these expenditures are allocated to less expensive luxury foods such as candy, soda and baked goods. Expenditures on more expensive luxury foods, i.e. steak and shellfish, are low across all benefit levels; moderate and high benefit households allocate only 1.5% of all food expenditures to steak and shellfish. As expected, luxury food expenditures made using SNAP increase and OOP payment methods decrease with households’ benefit level. Combining SNAP and OOP expenditures, the share of households’ total food expenditures allocated to luxury items decreases with their benefit level. Relative to low benefit households, moderate and high benefit households spend 2 and 2.3 percentage points less of their total food expenditures on luxury foods respectively.

**Determinants of SNAP Households’ Out-of-Pocket Food at Home Expenditures**

DH model estimates and APEs used to identify program, household and environmental factors affecting SNAP households’ OOP FAH expenditures are presented in Table 5. The model fits the data well, with many significant coefficients and a Wald Chi² test statistic.
significant at the 1% level. The inverse mills ratio included in the second stage of the DH model is significant, indicating that sample selection bias was present, but has been corrected.

**Program Factors**

As expected, households’ maximum benefit share has a significant, inverse effect on their probability of purchasing FAH OOP, as well as their OOP FAH expenditure levels. A 1% increase in maximum benefit share corresponds to a $0.26 decrease in households’ OOP FAH expenditures. This implies, that a household that goes from receiving a maximum benefit share of 1%, to receiving the full maximum benefit would spend $25.74 less OOP on FAH. Given that households’ average OOP FAH expenditures are $50.89, this finding suggests that SNAP households purchase some FAH OOP regardless of benefit level. Mirroring findings of prior studies, the number of days since last SNAP receipt increases the probability that households will purchase FAH OOP and their level of OOP FAH expenditures. Among households purchasing FAH OOP, each additional day since SNAP benefits were received increases OOP FAH expenditures by an average of $0.55. Over the course of the benefit month, this equates to a $16.50 increase in OOP FAH expenditures.

Households’ unauthorized retailer and ineligible item expenditure shares are excluded from stage one of the DH model as they perfectly predict whether FAH is purchased OOP. In the second stage, estimates indicate that households’ unauthorized retailer and ineligible item expenditure shares do not significantly affect households’ level of OOP FAH expenditures. This finding supports the notion that SNAP restrictions result in infra-marginal SNAP households shifting payment for ineligible items from SNAP to OOP payment methods.

### Table 4. Average Household FAH Expenditures on Luxury Items by Payment Type and SNAP Benefit Level

<table>
<thead>
<tr>
<th></th>
<th>Low Benefit HH (N=302)</th>
<th>Moderate Benefit HH (N=607)</th>
<th>High Benefit HH (N=552)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$ Share (All FAH)</td>
<td>$ Share (All FAH)</td>
<td>$ Share (All FAH)</td>
</tr>
<tr>
<td><strong>Luxury - SNAP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candy</td>
<td>4.83</td>
<td>7.05</td>
<td>8.91</td>
</tr>
<tr>
<td>Soda</td>
<td>0.56</td>
<td>1.19</td>
<td>1.64</td>
</tr>
<tr>
<td>Steak</td>
<td>2.20</td>
<td>2.23</td>
<td>2.64</td>
</tr>
<tr>
<td>Shellfish</td>
<td>0.53</td>
<td>0.68</td>
<td>0.83</td>
</tr>
<tr>
<td>Baked Goods</td>
<td>1.41</td>
<td>0.39</td>
<td>0.69</td>
</tr>
<tr>
<td><strong>Luxury - OOP FAH</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candy</td>
<td>10.05</td>
<td>5.74</td>
<td>4.79</td>
</tr>
<tr>
<td>Soda</td>
<td>3.13</td>
<td>2.17</td>
<td>1.85</td>
</tr>
<tr>
<td>Steak</td>
<td>0.48</td>
<td>0.27</td>
<td>0.14</td>
</tr>
<tr>
<td>Shellfish</td>
<td>2.48</td>
<td>0.26</td>
<td>0.17</td>
</tr>
<tr>
<td>Baked Goods</td>
<td>2.64</td>
<td>1.85</td>
<td>1.17</td>
</tr>
<tr>
<td><strong>Luxury - Total</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candy</td>
<td>14.88</td>
<td>12.79</td>
<td>13.70</td>
</tr>
<tr>
<td>Soda</td>
<td>6.93</td>
<td>4.40</td>
<td>4.49</td>
</tr>
<tr>
<td>Steak</td>
<td>1.01</td>
<td>0.95</td>
<td>0.97</td>
</tr>
<tr>
<td>Shellfish</td>
<td>2.61</td>
<td>0.65</td>
<td>0.86</td>
</tr>
<tr>
<td>Baked Goods</td>
<td>4.05</td>
<td>4.41</td>
<td>4.28</td>
</tr>
</tbody>
</table>

Low Benefit HH (N=302)  Moderate Benefit HH (N=607)  High Benefit HH (N=552)
The share of total SNAP expenditures allocated to luxury foods has a significant, inverse effect on households’ probability of purchasing FAH OOP. Further, households SNAP luxury share and OOP luxury share have significant, inverse effects on their level of OOP FAH expenditures. The inverse effects likely reflect the fact that the majority of SNAP households’ luxury food expenditures are for inexpensive luxury items such as soda, candy and baked goods. Thus as the share of expenditures allocated to these inexpensive, luxury goods increases, the need to purchase FAH OOP decreases.

**Household Factors**
Additional factors affecting households’ OOP FAH expenditures include household composition, race, obtaining other types of food assistance, shopping frequency, grocery list usage and FAFH share. Considering household composition, the number of seniors in a household is positively related to the probability of purchasing FAH OOP, while the

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stage 1</th>
<th>Stage 2</th>
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<tbody>
<tr>
<td></td>
<td>Coefficient</td>
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<tr>
<td><strong>Program Factors</strong></td>
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<tr>
<td>Max Benefit Share</td>
<td>-0.01***</td>
<td>-1.59E-03***</td>
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<tr>
<td>Unauthorized Retailer Share</td>
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<tr>
<td>Restricted Food Share</td>
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<td>Luxury SNAP Share</td>
<td>-0.01***</td>
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<td>Luxury OOP FAH Share</td>
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<td>SNAP Day</td>
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<td><strong>Household Factors</strong></td>
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<tr>
<td>Kids</td>
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<tr>
<td>Seniors</td>
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<tr>
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<td>African-American</td>
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<td>College</td>
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<tr>
<td>Job</td>
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<td>WIC</td>
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<td>NSLP</td>
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<td>Food Pantry</td>
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<tr>
<td>Shopping Frequency</td>
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<td>FAFH Share</td>
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<td><strong>Environmental Factors</strong></td>
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<tr>
<td>Midwest</td>
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<td>South</td>
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<tr>
<td>West</td>
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<td>Wald Chi2(21)</td>
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</table>

* *, ** and *** represent significance at the 0.10, 0.05 and 0.01 level
number of children is positively related to households’ OOP FAH expenditure levels. Results further indicate that OOP FAH expenditures vary based on race. Possibly reflecting differences in preferences or dining habits, households headed by an African-American spend less for FAH OOP, on average, than households headed by a Caucasian.

In combination with SNAP, receiving additional food assistance from WIC, the NSLP and food pantries has a significant effect on households’ OOP FAH expenditures. The WIC indicator variable is excluded from stage one of the DH model as it perfectly predicts whether FAH is purchased OOP. Contrary to expectation, second stage results indicate that receiving WIC does not significantly affect the level of SNAP households’ OOP FAH expenditures. One possible explanation for this finding is that SNAP households may be substituting WIC benefits for FAH expenditures made using other OOP payment methods, as opposed to increasing their OOP FAH expenditures. Receiving free lunches through the NSLP or free food from food pantries does not affect the probability of households purchasing FAH OOP, but does have a significant, inverse effect on households’ OOP expenditure levels. The effect is relatively large, with NSLP participation on average decreasing SNAP households’ OOP FAH spending by $6.42, or 13% of total OOP FAH purchases. Similarly, receiving emergency food assistance from food pantries decreases OOP FAH expenditures by $10.78, or 21% of total OOP FAH expenditures.

Two household factors previously linked with smoother spending over the benefit month, shopping frequency and grocery list usage (Smith et al. 2016; Wilde & Ranney 2000), have a significant, positive effect on the probability of SNAP households’ purchasing FAH OOP. This finding may reflect that households’ that make frequent shopping trips and/or use grocery lists consciously plan to purchase FAH OOP in order to smooth food intake over the SNAP benefit month. As expected, results further show that households’ FAFH expenditure shares have a significant, inverse effect on OOP FAH expenditure levels.

Environmental Factors
Several environmental factors further impact SNAP households’ OOP FAH expenditures, including regional and rural indicators. Households in the Western region of the US are less likely to purchase FAH OOP, while households in the Midwest have lower OOP FAH expenditures than those in the Northeast. These regional indicators are likely capturing regional differences in food prices. Similarly, living in a rural census tract has a significant, positive effect on households OOP FAH expenditures. This result mirrors prior studies’ finding that rural households face higher food prices due to lower access to traditional food retailers (Caswell & Yaktine 2013; Morris et al. 1992).

Discussion
The primary objective of this study was to analyze SNAP households out-of-pocket (OOP) food at home (FAH) expenditures. Using the FoodAPS public use data set, descriptive statistics describe SNAP households’ OOP FAH expenditures by payment type, SNAP retailer authorization, SNAP item eligibility and luxury food composition. A double-hurdle model is then used to identify program, household and environmental factors affecting SNAP households’ OOP FAH expenditures. Results indicate that expenditures at unauthorized SNAP retailers and on SNAP ineligible foods comprise a small share of SNAP households FAH home purchases. Luxury foods comprise 12% of SNAP households’ total food expenditures, with the majority of expenditures allocated to inexpensive luxury items.
such as soda and candy. Correspondingly, the share of FAH expenditures allocated to luxury foods is inversely related to OOP FAH expenditures. Results further indicate that emergency food assistance and NSLP participation are associated with lower OOP FAH expenditures. Other factors with a significant impact on OOP FAH expenditures include the number of days since SNAP benefit receipt, household composition, shopping frequency, grocery list usage and geographic indicators.

This study’s analysis has direct implications for legislation aiming to restrict the purchase of luxury foods with SNAP. Such legislation seeks to improve SNAP households health and promote better nutrition by limiting the purchase of non-essential, luxury foods such as candy, soda, baked goods, steak and lobster. Results from this study indicate that SNAP households across all benefit levels do allocate a significant amount of expenditures to inexpensive luxury food items such as candy, soda and baked goods. However, the need to restrict the purchase of expensive luxury food items, such as steak and shellfish, seems unfounded given SNAP households on average allocate less than 2% of FAH expenditures to these items. Further, restricting the purchase of inexpensive luxury foods is unlikely to result in improved public health and nutrition as the bill intends. On average, SNAP households’ allocate 12% of OOP FAH expenditures to luxury foods. This leaves 88% of OOP FAH expenditures for households to allocate to luxury items currently being purchased with SNAP. In combination with the fact that the majority of SNAP households are infra-marginal, these findings collectively suggest that SNAP households’ will respond to a restriction on luxury foods by shifting SNAP expenditures on luxury foods to OOP expenditures, and thus will not experience an improvement in dietary quality or health.

Further, this study provides a first look at SNAP households’ food expenditures at unauthorized SNAP retailers and on all SNAP restricted food items. In their work on alternative approaches to defining SNAP benefit adequacy, Yaktine and Caswell (2014) identify SNAP retailer authorization and food purchase restrictions as factors that may be relevant in defining benefit adequacy, but for which there is insufficient evidence to do so. Results from this analysis indicate that such SNAP restricted FAH purchases comprise a small share of households’ total FAH expenditures. By definition, SNAP households share of food dollars allocated to SNAP restricted retailers and foods perfectly predict households’ probability of purchasing FAH OOP. However, restricted FAH expenditure shares do not significantly affect SNAP households’ level of OOP FAH expenditures. This finding implies that SNAP food restrictions aimed at improving the adequacy of SNAP benefits may not deter households’ from purchasing restricted items or from shopping at restricted retailers.

Findings from this study also provide policymakers with insight into how households’ food expenditures are affected by receiving WIC, TANF, NSLP and/or food pantry assistance, in conjunction with SNAP. Results indicate that WIC and TANF benefits are used only for a small share of SNAP households’ OOP FAH expenditures. Correspondingly, WIC benefits are found to have no significant impact on SNAP households’ level of OOP expenditures. However, receiving assistance from the NSLP or food pantries in conjunction with SNAP is found to decrease households’ OOP FAH expenditures. The reduction attributable to the NSLP and food pantry usage is substantial, averaging 13% and 21% of households’ OOP FAH expenditures respectively. For policymakers, these findings serve to underscore the importance of other publically funded food assistance programs and emergency food assistance for SNAP households’ obtainment of food.
Mirroring findings from prior studies, this analysis also finds that the number of days since SNAP benefit receipt increases households’ OOP FAH expenditures. Further, results show that household composition of adults, seniors and children has an effect on households’ OOP FAH expenditures. These findings provide further support for prior studies’ recommendations to change the frequency of SNAP distribution and to restructure the benefit formula to account for differences in family composition beyond household size.

References


