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An Overview of SNAP, Food Security, and Geographic Factors in Food Purchase and Acquisition Decisions

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I. Introduction

In April 2012 the Economic Research Service (ERS) and the Food and Nutrition Service (FNS) in the U.S. Department of Agriculture embarked on an ambitious new data collection enterprise known as the National Household Food Acquisition and Purchase Survey (FoodAPS). FoodAPS is innovative in that it is the first nationally representative household survey to collect comprehensive data on household food expenditures and acquisitions, including those obtained using benefits from food assistance programs. The survey includes data from 4,826 households, including Supplemental Nutrition Assistance Program (SNAP) households, low-income eligible households not participating in SNAP, and higher income households. FoodAPS is specifically well suited to address factors affecting food demand, including access to food stores, as well as the pressing public health threat posed by food insecurity and how well America's food and nutrition assistance programs serve to alleviate that threat.¹

The data in FoodAPS were collected for all sample household members over a seven-day period between April 2012 and January 2013. The total survey period for the typical household was nine days, with the initial and final days consisting of in-person interviews (training on the first visit and reviewing documents on the last visit), and the seven days in between consisting of recording food acquisitions and meals and snacks eaten supplemented by phone calls to the survey research firm (Mathematica Policy Research) on days 2, 5, and 7. The food acquired was delineated into food at home (FAH) and food away from home (FAFH), and detailed information on quantities and prices, product descriptions, and geographic location of the sample household was recorded. The survey also collected information on non-food spending, the demographic

¹ Discussion papers of these research projects are available at <http://www.ukcpr.org/research/discussion-papers>

composition of the household, income, food security, health status, diet and nutrition knowledge, program participation (e.g., in SNAP, National School Lunch Program), and food access such as distance to food stores and restaurants. FoodAPS survey data are linked with information created from a nationally representative geographic sample from Information Resources, Inc. (IRI) on the local food environment of the sampled households that contains information about the prices of food at retail outlets. In addition, there is information from other sources associated with FoodAPS on the nutrient content of food acquisitions based on scanner barcodes; access to farmers' market and food pantries; area-level socio-economic characteristics; and some food policy information, such as state and local tax policies.

To foster new research utilizing this extensive data resource, ERS and FNS commissioned the University of Kentucky Center for Poverty Research and the University of Illinois to sponsor a competitive grants program. In response to the 2014 Request for Proposals, 60 completed applications were submitted, and after a rigorous external review process, 12 were selected for funding. Final reports were submitted in the summer of 2016, and below we provide a summary of the research results. Appendix 1 contains a complete listing of the final reports and electronic copies of the final reports can be found at <http://www.ukcpr.org/research/food-assistance/foodaps>.

II. Household Food Behaviors and SNAP

A. How do food prices across geographic space affect food insecurity and the sufficiency of SNAP benefits?

SNAP is the cornerstone of the food assistance system in the United States, and the consequences and implications of participation in SNAP have been widely examined (Bartfeld et al. 2015). A large literature demonstrates that SNAP decreases food insecurity and improves

health for recipients (Hoynes et al. 2016; Gregory et al. 2015; Hoynes and Schanzenbach 2016; Gundersen and Ziliak 2014, 2015). SNAP benefits are based on an assessment of need that takes into account household size, income, adjustments to income, and the cost of a nutritious diet. While SNAP benefits are set nationally, local prices, household characteristics outside of benefit calculation, and the timing of benefits can potentially affect the behavior of recipients and the effectiveness of SNAP. However, data quality is often an issue that prevents researchers and policy makers from understanding what individuals receiving SNAP and those at risk for food insecurity purchase, the nutritional quality of purchases, and shopping habits.

The detailed FoodAPS data permit researchers to examine the sufficiency of SNAP benefits in achieving nutrition policy goals. SNAP benefits are designed to provide sufficient funds for households to adhere to the Thrifty Food Plan (TFP), a food plan constructed by the USDA that outlines a nutritious diet at minimal cost to households. For example, the TFP suggests a two parent family with two children aged 2-5 should be able to afford a nutritious diet for \$128.80 per week (Ziliak 2016). Heterogeneity of prices across geographic space may be important to the feasibility of meeting dietary needs through the TFP. These differences in food prices across the U.S. could generate substantial differences in the real value of SNAP benefits, since benefits are only indexed to regional food prices in Alaska and Hawaii.

In a study conducted for this project, Bronchetti et al. (2016) examine the adequacy of SNAP benefits in meeting the TFP while taking into account the regional variation in food pricing. The authors calculate the percentage of SNAP recipients and SNAP-eligible households for whom SNAP benefits are adequate to purchase the TFP. They simulate potential SNAP benefits based on household income, family size, expenses, and composition. Results suggest that 20 to 30 percent of SNAP recipient households face TFP prices that are too high to be

purchased with SNAP benefits plus 30 percent of net income.

They also find that, although many SNAP recipient households are struggling to afford the TFP, the proportion of SNAP recipients affording the TFP increases if the distance the household is assumed to shop in is expanded. For those households who cannot afford the TFP, average dollar shortfalls are around \$150 per month. One interpretation of these results is that SNAP benefit levels should be more closely linked to local area food prices as is done in Alaska and Hawaii.

Regional price variation is not limited to food. Many studies (Berkowitz et al. 2014; Bhattacharya et al. 2003) document that a substantial trade off exists among many low income households between necessities such as food, rent, medical care, and other basic household needs. Basu et al. (2016) examine how cost of living, inclusive of food, impacts the healthfulness of food acquisitions. They also examine if SNAP participation is associated with living in lower cost of living areas, and if SNAP recipients purchase more healthful food.

Using an endogenous treatment effects model, and estimating cost of living through Bureau of Economic Analysis and the Census Bureau regional price indices, the authors find that higher area-level cost of living is associated with less healthful food acquisition. The authors also found that SNAP recipients were no more likely to live in low cost of living areas, nor were they more likely to purchase more healthful food. If SNAP recipients are unable to purchase the TFP, and are likely to live in high cost of living areas where nutritious diets are harder to obtain, directed increases in SNAP benefits may be worth considering.

B. Do local food prices impact diet quality among SNAP participants and nonparticipants?

Lyford et al. (2016) explore how SNAP beneficiaries navigate food consumption in an

attempt to understand the impact of regional food price differences. The authors utilize the detailed geographic and consumption data present in FoodAPS to control for local market structure and the market for food items, as well as controlling for demographic characteristics. The authors also address the endogeneity of SNAP participation with an instrumental variables approach. They find that on average, although an index of food prices paid by SNAP recipients was 0.09 points lower than the index of non-participants, SNAP recipients are not systematically disadvantaged, and that budgeting plays a crucial role in the affordability of food for individuals receiving SNAP.

Chang et al. (2016) also note the importance of budgeting, examining how cost and financial literacy impact diet quality and sufficiency. Similar to Lyford, et al. (2016), they examine various measures of consumer competency, including how households handle bills, whether the household receives payday loans or cash advances, and whether or not the household employs store savings methods such as coupons or loyalty benefits. To identify the causal impact of SNAP on consumer competency, state policy and administrative indicators are used as instrumental variables for SNAP participation.

The authors find somewhat mixed results, with prices negatively associated with financial management practices such as coupon use, using nutrition facts, and using a grocery list, but positively associated with loyalty programs and other store specific savings. However, SNAP participation improved financial management practices. These findings suggest that low income individuals struggle implementing many competent consumption strategies.

These results compliment those found in Lyford et al. (2016), who suggest that SNAP recipients are better at budgeting, that budgeting improves food consumption, and that more education could improve food choices. Chang et al. (2016) find that, while SNAP recipients are

better able to employ competent consumer strategies, these strategies are far from ubiquitous. Thus, these results taken together suggest that broad financial education could play an important role in the effectiveness of the SNAP program in helping recipients afford plentiful and healthful food. Existing work through the USDA's SNAP-Ed program has focused efforts in this budgeting and financial management, and these results, along with those in the recent randomized control trial in Indiana funded by UKCPR and FNS (Rivera et al. 2016), suggest that education in budgeting should continue, and perhaps be expanded. This information would allow SNAP recipients means to better afford a healthful diet by paying comparatively lower food prices.

C. What is the importance of the SNAP benefit cycle and consumer competency for food consumption?

For SNAP beneficiaries, financial management is complicated by distribution rules. Not only do recipients have to make income stretch between pay periods, they also have to allot SNAP dollars across the benefit month. The benefit month is the period between which benefits are distributed. For example, in Alaska, benefits are made available at the beginning of every month, while benefits in Kentucky are randomly distributed based on a household's case number. Many households have a large spike in food consumption and expenditure when benefits arrive, only for this consumption to taper off at the end of the benefit month. Kuhn (2016) and Berning et al. (2016) examine the consequences and causes of these SNAP cycles. Kuhn (2016) finds strong evidence of this cycle, with expenditure decays of roughly 4% per day over the course of the benefit month, and a loss of up to 12 meals per month. However, Kuhn notes that the correlation between expenditure and consumption cycles is weaker than expected, and that children are insulated from these cycles (especially young children), due to parental

oversight and food provided at school. Kuhn also notes that diet quality decreases over the benefit month, and that travel time to grocery stores is not predictive of more severe expenditure cycles.

Berning et al. (2016) examine two behavioral responses of SNAP participants associated with the SNAP benefit cycle—short run impatience and the degree of substitutability between SNAP dollars and cash. The authors find strong evidence of time inconsistent spending, with households spending much more on food the day that benefits are issued. The authors also find that spending falls significantly in the days following benefit distribution, similar to Kuhn (2016). Berning et al. also find that households purchase more healthful foods and that perishable foods and FAH in general decline over the benefit cycle.

The research by Seligman et al. (2012) suggests that this benefit cycle may be associated with diabetes and acute onset of hypoglycemia and hospital admissions. The evidence suggests that the SNAP benefit may be inadequate to meet the needs across the month, which is likely tied to the TFP being too low (Caswell and Yaktine 2013; Ziliak 2016).

D. How does food access across geographic location influence prices and shopping habits?

Hillier et al. (2016) also examine the cyclicity of SNAP benefits, but in relation to the spatial distribution of stores and the nutritional content of meals, analyzing the role of these mechanisms in determining food shopping decisions in time and space. The authors first determine a choice set of stores where households could shop. They find that SNAP participants' store choices are influenced by demographic characteristics and, in the main, this leads them to shop at large supermarkets. They find, similar to studies mentioned above, that the nutritional quality of food at home choices decreases over the benefit cycle, and that purchases at

natural/gourmet and limited assortment stores were more healthful than those purchased at large supermarkets, perhaps reflecting the different set of products available at those stores. However, the authors also find that the health quality of purchases by SNAP households were not significantly different than those by households which were not SNAP eligible, but that purchases by SNAP eligible non-recipients were of lower health quality than those of SNAP recipient households. These results show how diet quality is a complex web of benefits, timing, location, and individual preferences, but they offer some insight on the relationship between store choice and SNAP policy.

IV: The Role of the Local Food Environment on Food Purchases

A. What is the role of the local food environment and food prices on food security?

When investigating the impact of food environments, it is crucial to account for household characteristics as well as the local prices that each household faces. Few data sources have the necessary links between local food retailers and pricing, household food purchases, food insecurity, and their spatial relation. With the FoodAPS, however, researchers can more fully investigate the role of food deserts and food prices via the merging of FoodAPS with information created from IRI data. Evidence from the FoodAPS suggests that the conventional wisdom surrounding food deserts (areas with low food access) may be misguided and that local prices play a larger role than proximity to food retailers.

In a study conducted for this project, Downing and Laraia (2016) use the FoodAPS to examine the impact of food prices and food deserts on food security and health. The average household in the dataset lives between 3-5 miles from the nearest supermarket. Food insecure households live slightly closer to supermarkets (2.5 miles) and shop closer to home (3.8 miles) than food secure households. They find that living in a food desert is not associated with being

food insecure, which is consistent with, e.g. Bitler and Haider (2011). Food deserts may not have large impacts on health as well. They find that there is no difference in obesity by food environment.

Using the FoodAPS, Allard and Ruggles (2016) indicate that many population sub-groups identified in the literature as being vulnerable to low food resource access, such as households headed by a black person and low-income households, actually have greater or comparable spatial access to several different types of food resources compared to less vulnerable population sub-groups. Over 90 percent of poor and non-poor households report using supermarkets or superstores as their primary food shopping venue. Additionally, black and Hispanic households are much closer to the nearest SNAP supermarket or superstore than white households. Black and Hispanic households also are within 1 mile of about 0.5 more supermarkets and superstores than white households. There is also no significant difference in supermarket access between SNAP participants and eligible non-participants. However, urban households are much closer to SNAP retailers and concentrations of SNAP retailers than households in suburban and rural areas. So while there are not differences in food access by income or participation, there are significant differences between urban and suburban/rural locations.

Given the consistent findings of minimal differences in food access, perhaps more important are the local food prices faced by each household. As discussed above, large heterogeneity in food prices across the U.S. can generate substantial differences in the real value of SNAP benefits and their potential impact. Though food deserts themselves are not associated with food insecurity, akin to the findings of Gregory and Coleman-Jensen (2013), Downing and Laraia (2016) find that food insecurity is linked with presence of high cost supermarkets, but not

with the absence of supermarkets, in high poverty neighborhoods. Indeed, they find that 13 percent of food insecure households lived in high poverty areas with higher than average supermarket prices, compared with only 5 percent of food secure households. Additionally, households who select their supermarket based on low prices compared to other reasons such as variety or produce selection are 5-7% more likely to be food insecure.

B. How does food retail environment affect food purchases?

A unique feature of FoodAPS is that it allows research to construct a precise food environment for every individual in the dataset, for both FAH and FAFH purchases. This depth, combined with the rich geographic information on the precise distance between retail food outlets visited and each household's residence, as well the number and types of outlets in proximity to each household, allows researchers to construct detailed pictures of household's retail environments. Previous studies have needed to rely on broad area-based measures of access instead of individual level measures.

Gustafson and Allen (2016) use a fractional multinomial logit analysis to examine all FAH and FAFH venues a household faces and find that close proximity to superstores or supermarkets increases the share of weekly food purchases made there, and that car access increases the share of FAFH purchases and decreases the share of FAH purchases other than superstores or supermarket.

The structural model of Taylor and Villas-Boas (2016) is able to translate these preferences into a consumer's willingness to pay (WTP). That is, how much would a consumer be willing to pay per week for a particular food environment. Using a discrete choice model, Taylor and Villas-Boas find that households have the highest willingness to pay for superstores, supermarkets, and fast food, at approximately \$15 per week in distance traveled. To put this in

perspective, a WTP of \$15 represents 9.6% of the weekly food expenditures of the average household in FoodAPS. Equating these estimates to dollars per mile, FoodAPS households are willing to pay \$2-\$5 per week to have a superstore 1 mile closer to their home, \$1-\$4 per week for a fast food restaurant to be 1 mile closer to home, and \$1-\$6 per week for a supermarket to be 1 mile closer to home. Furthermore, across heterogeneous household characteristics, the households in this sample have low WTP for farmers' markets to be closer to home. This implies that simply building farmers markets will not induce households to shop there.

Both studies find that SNAP participation plays a role in food venue choice. SNAP participation increases the share of purchases at superstores and decreases the share spent at FAFH venues, on average. SNAP households are also willing to pay more than non-SNAP households to have FAH outlets closer to their home. Regarding household income, Taylor and Villas-Boas argue that low-income households would be receptive to policymakers promoting the building of certain types of food stores (i.e., superstores) over other types (i.e., convenience and smaller grocery stores). Additionally, households either without car access and not living in a food desert, living in a rural area, or that state closeness-to-home as their reason for primary store choice, receive greater disutility from distance than their counterparts. Taken together, these findings suggest that food-access incentives potentially should be designed to fit the sociodemographic composition of each identified low-income, low-access neighborhood in question.

C. How does food environment affect health?

If policy makers want to encourage the building of supermarkets and supercenters in low-access neighborhoods, it is also important to consider what food the households will purchase and what the health consequences may be. Gustafson and Allen (2016) examine this question

specifically and find that shopping at these types of stores influences what is purchased. At supermarkets, SNAP households tend to purchase lower calorie beverages and fruits and vegetables. Whereas at supercenters, SNAP households purchase healthier food items, but they also purchase sugar-sweetened beverages, snacks, and higher calorie items.

Bowen et al. (2016) expand on this result by providing a more comprehensive measure of healthy eating by using a Healthy Eating Index that incorporates dollars spent and amount of food (measured by weight) in several categories: fruit, vegetables, snacks, and sweetened beverages. They employ multilevel models with neighborhood and state effects to analyze the associations between household characteristics, neighborhood characteristics, regional attributes, and dietary quality. The authors find that the number of large food stores in the neighborhood is significantly and positively associated with dietary quality, while other neighborhood characteristics such as neighborhood deprivation is not significantly associated with dietary quality. Importantly, Bowen et al. also incorporate household finances and regional prices to give a more complete picture of determinants of a household's food purchases. Their model shows that at the household level, financial condition and home ownership are significantly and positively related to dietary quality; highlighting the importance of financial security, while U.S. citizenship status and living in a rural area were negatively associated with dietary quality. Interestingly, their measure of a regional food price index was not significant while the neighborhood random effects were significant, stressing the importance of using local food prices as done by Downing and Laraia (2016).

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List of FY 2014 Grantee Final Reports

“The Spatial Context of Food Shopping: Understanding How Local Food Retailer Access and Pricing Affect Household Behavior”

Scott W. Allard, University of Washington; and Patricia Ruggles, NORC at the University of Chicago

“Cost of Living, Healthy Food Acquisition, and the Supplemental Nutrition Assistance Program”

Sanjay Basu, Stanford University; Christopher Wimer, Columbia University; and Hilary Seligman, University of California at San Francisco

Published as Basu, S., Wimer, C., & Seligman, H. (2016, Nov.). Moderation of the relation of county-level cost of living to nutrition by the Supplemental Nutrition Assistance Program. *American Journal of Public Health, 106 (11)*, 2064-2070.

“The Effects of Benefit Timing and Income Fungibility on Food Purchasing Decisions among SNAP Households”

Joshua P. Berning, University of Georgia; Gregory Colson, University of Georgia; Jeffery H. Dorfman, University of Georgia; Travis A. Smith, University of Georgia; and Xiaosi Yang, University of Georgia

Published as Smith, T., Berning, J., Yang, X., Colson, G., & Dorfman, J. (2016). The effects of benefit timing and income fungibility on food purchasing decisions among SNAP households. *American Journal of Agricultural Economics, 98(2)*, 564-580.

“Contextualizing Family Food Decisions: The Role of Household Characteristics, Neighborhood Deprivation, and Local Food Environments”

Sarah Bowen, North Carolina State University; Richelle Winkler, Michigan Technological University; J. Dara Bloom, North Carolina state University; and Lillian MacNell, North Carolina State University

“Variation in Food Pricing and SNAP Adequacy for Purchasing the Thrifty Food Plan”

Erin Bronchetti, Swarthmore College; Garret Christensen, University of California-Berkeley; and Benjamin Hansen, University of Oregon

“The Effect of Food Price on Food Insecurity and Diet Quality: Exploring Potential Moderating

Roles of SNAP and Consumer Competency”

Yunhee Chang, University of Mississippi; Jinhee Kim, University of Maryland; and Swarn Chatterjee, University of Georgia

“Supermarket Proximity and Price: Food Insecurity and Obesity in the United States”

Janelle Downing, University of California-Berkeley; and Barbara Laraia, University of California-Berkeley

“The Relationship between Neighborhood Food Environment and Food Store Choice on the Purchasing Habits among Supplemental Nutrition Assistance Program (SNAP) Participants and Lower-Income Households”

Alison Gustafson, University of Kentucky; James Allen IV, University of Kentucky; Nancy Schoenberg, University of Kentucky; and Mark Swanson, University of Kentucky

“Influence of SNAP Participation and Food Environment on Nutritional Quality of Food at Home Purchases”

Amy Hillier, University of Pennsylvania; Benjamin Chrisinger, Stanford University; Tony E. Smith, University of Pennsylvania; Eliza Whiteman, University of Pennsylvania; and Michael Kallan, University of Pennsylvania

“Causes and Consequences of the Calorie Crunch”

Michael Kuhn, University of Oregon

“Do SNAP Recipients Get the Best Prices?”

Conrad Lyford, Texas Tech University; Carlos Carpio, Texas Tech University; Tullaya Boonsaeng, Texas Tech University; and Raymond March, Texas Tech University

“Food Store Choices of Poor Households: A Discrete Choice Analysis of the National Household Food Acquisition and Purchase Survey”

Rebecca Taylor, University of California-Berkeley; Sofia Berto Villas-Boas, University of California-Berkeley

Published as Taylor, R., and S. B. Villas-Boas, 2016. “Food Store Choices of Poor Households: A Discrete Choice Analysis of the National Household Food Acquisition and Purchase Survey (FoodAPS),” *American Journal of Agricultural Economics*, 98(2), 513-532.

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