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RESEARCH ARTICLE

Nutritional Profile of Purchases by Store Type: Disparities by Income and Food Program Participation

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Introduction: Policymakers have focused on the food retail environment for improving the dietary quality for Supplemental Nutrition Assistance Program (SNAP) participants. Yet little is known about where SNAP households make food and beverage purchases or how purchases may vary by store type, SNAP participation, and income level. The objective of this study was to examine the association between SNAP-income status (participant, income-eligible non-participant, higher-income non-participant) and healthfulness of household purchases across store types.

Methods: Data included household packaged food purchases (N=76,458 unique households) from 2010 to 2014, analyzed in 2017 with multivariable adjusted models to examine the nutritional profile of purchases by store type (grocery, convenience, big box, and other stores) for SNAP participating households, income-eligible non-participants, and higher-income non-participants. Outcomes included volume and nutrients (kilocalories, total sugar, saturated fat, and sodium) and calories from food groups.

Results: All households purchased the greatest volume of foods and beverages from grocery stores, followed by big-box and other stores, with relatively little purchased from convenience stores. The largest differences between SNAP participants and non-participants were observed at grocery stores and big-box stores, where SNAP households purchased more calories from starchy vegetables, processed meat, desserts, sweeteners and toppings, total junk food, sugar-sweetened beverages, and milk, than income-eligible and higher-income SNAP non-participants. SNAP purchases also had considerably higher sodium density. Across store types, the nutritional profile of income-eligible non-participants' purchases was similar to higher-income households' purchases.

Conclusions: More research is needed to identify strategies to improve the nutritional profile of purchases among SNAP households.

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INTRODUCTION

The Supplemental Nutrition Assistance Program (SNAP) is the largest nutrition assistance program in the U.S.[1] Although previous research has found that both SNAP participants and lower-income non-participants show considerable room for improvement in their dietary quality, studies also find that, compared with non-participants, SNAP households often have lower nutritional quality of food/beverage purchases[2–6] and overall dietary intake.[7,8] SNAP participants also have higher rates of diet-related diseases, such as metabolic syndrome and obesity, than non-participants.[9]

The food retail environment has emerged as a key arena for reducing diet-related health disparities among SNAP participants and low-income populations in general. Many low-income individuals simultaneously have low access to supermarkets and easy access to convenience stores.[10] Because supermarkets tend to offer more

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healthful foods than convenience stores,[11] improving access to supermarkets has been identified as a policy priority in an attempt to improve the nutritional quality of low-income household diets. Some evidence suggests that introducing full-service grocery stores does not improve dietary quality in low-socioeconomic communities.[12–15] This lack of effect may be because many households choose to shop at stores other than the nearest store,[16] or because living in a low-income area is more important for the healthfulness of purchases than living in a low-access area.[17]

However, other studies find that the nutritional quality of purchases is associated with the store type where the food is purchased.[18–21] For example, some studies report that food purchases made at big-box stores, warehouse clubs, and convenience stores have higher densities of total sugar, sodium, saturated fat, and energy than purchases made at grocery stores and supermarkets.[18,21] Additionally, one national study found candy and gum account for 35% of calories purchased at convenience stores.[21] Some research suggests that shopping at big-box stores is associated with lower nutritional quality of food and beverage purchases.[19,20]

Yet little research has examined the nutritional profile of food and beverage purchases across different store types by SNAP participation status or income level. One study found that the majority of respondents reported supermarkets or supercenters as their primary store type for food shopping, with little difference by SNAP participation or income, but did not examine the volume or nutrient contributions of different store types.[16] Thus, it is unclear how the nutritional profile of purchases differs by SNAP status or income level within store type. A better understanding of disparities in nutritional profile of purchases within each store type can inform policies seeking to improve diet quality in these populations.

The objective of the current study is to examine SNAP participants and non-participants' food and beverage purchases in terms of volume and nutritional profiles from grocery, convenience, big-box, and other stores.

METHODS

Study Sample

Data analyses were conducted in 2017 and included data on packaged foods and beverages from Nielsen Homescan[22,23] quarters in which SNAP status was available (quarter 4 in 2010 and 2011, quarters 2 and 4 in 2012–2014). Products include packaged produce with a barcode (e.g., bagged lettuce), but excludes loose produce (e.g., a single lemon) as well as away-from-home food purchases (e.g., restaurants). Using a handheld scanner, after each shopping trip households record the barcode of all purchases as well as place of purchase. Each product was linked to detailed nutrition information.[24] Similar to previous studies,[25–28] household purchases were aggregated to the quarterly level in order to understand households' usual purchasing patterns. Sociodemographic characteristics include household composition, race/ethnicity, age of household members, education, income, and geographic location (i.e., 52 metropolitan areas and 24 nonmetropolitan areas).

Measures

Households were classified as a SNAP participant based on self-report of any member in the household currently participating in SNAP. Of the total 477,222 household-by-quarter observations from 2010 to 2014, SNAP status was available for 268,465 household-by-quarter observations from 76,458 unique households. Average length in the study was 3.0 (SD=1.6) years. Previous work with this sample found that respondents with non-missing SNAP status tended to be smaller, less likely to have children, and with higher income compared with households missing SNAP status.[4] Sensitivity analyses were performed to account for selection into the analytic sample through applying an inverse-probability weight calculated as the inverse of the predicted probability of response to the SNAP assessment.

Nonparticipating households were further classified by income level based on SNAP eligibility at the federal level as either SNAP income-eligible ($\leq$130% of the Federal Poverty Level)[29] or higher-income ($>$130% Federal Poverty Level) households.

Households recorded place of purchase, which were aggregated into four store types: grocery, convenience, big box, and other. Grocery stores included all full-service grocery stores and supermarkets; convenience stores included small stores not expected to carry a full array of groceries (e.g., convenience stores, gas mini-marts, service stations); big-box stores included large discount stores (e.g., Walmart, Target) and warehouse clubs (e.g., Sam's Club, wholesale clubs, other warehouse clubs); and other stores included all other store types, including dollar stores, drug stores, bodegas, beverage supply stores, and bakeries, as well as non-food stores (e.g., department stores) where some food may be sold.

Analyses included food and beverage groups (Appendix Table 2, available online) that have been associated with health outcomes (e.g., fruits and vegetables,[30,31] nuts,[32] processed meat,[33] junk food,[34] and milk[35]) or are the focus of recent proposals to improve diet quality in SNAP (e.g., candy and sugar-sweetened beverages [SSBs]).[4,36]

Statistical Analysis

Sociodemographic characteristics, the proportion of households reporting purchases from each store type and mean number of shopping trips per quarter by store type were examined across SNAP-income groups. Within each store type, Ordinary Least Squares regression was applied to estimate adjusted mean per capita volume and nutrient values (calories, total sugar, saturated fat, and sodium) of purchases by SNAP-income group. There were a high proportion of nonconsumers of convenience and other store types, causing some zero-inflation in purchase outcomes. To address this, sensitivity analyses were conducted among consumers only for these store types.

All multivariate adjusted estimates controlled for household composition (household size, number of children, and household structure [married versus not]), education (maximum educational