



# The healthfulness of food and beverage purchases after the federal food package revisions: The case of two New England states



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## ABSTRACT

**Objective.** In 2009, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) implemented new food packages to improve dietary intake among WIC participants. This paper examines how the healthfulness of food purchases among low-income households changed following this reform.

**Methods.** Point-of-sale data for 2137 WIC-participating and 1303 comparison households were obtained from a regional supermarket chain. The healthfulness of purchased foods and beverages was determined per their saturated fat, sugar, and sodium content. A pre-post assessment (2009–2010) of the product basket healthfulness was completed using generalized estimating equation models. Data were analyzed in 2015.

**Results.** At baseline, healthy products accounted for most of the food volume purchased by WIC participants, but beverages were dominated by moderation (less healthy) items. With new subsidies for fruit, vegetables and whole grains, the WIC revisions increased the volume of healthy food purchases of WIC-participating households by 3.9% and reduced moderation foods by 1.8%. The biggest improvements were reductions in moderation beverages (down by 24.7% in volume), driven by milk fat restrictions in the WIC food package revisions. The healthfulness of the product basket increased post-WIC revisions; mainly due to a reduction in the volume of moderation food and beverages purchased (down by 15.5%) rather than growth in healthy products (up by 1.9%). No similar improvements were seen in a comparison group of low-income nonparticipants.

**Conclusions.** After the WIC revisions, the healthfulness of participant purchases improved, particularly for beverages. Efforts to encourage healthy eating by people receiving federal food assistance are paying off.

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## 1. Background

For many American families, poor diet quality is a significant barrier to improving health and prolonging a disease-free lifespan. This is especially true for low-income families that have economic, time and access barriers to putting nutritious meals on the table. Poor diets in low-income communities are the result of both compositional and environmental factors (Dubowitz et al., 2008; Booth et al., 2001; Lovasi et al., 2009), including disparities in access to healthy food (Powell et al., 2007; Small and McDermott, 2006), higher prices, and poor product quality (Dubowitz et al., 2008; Andreyeva et al., 2008; Block and Kouba, 2006).

Federal food assistance programs support one in four American households in achieving adequate nutrition (Vilsack, 2011). Economic incentives provided by these programs could be one strategy to improving the food environment and diet quality in low-income communities

and reducing inequalities. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides a set of nutrient-dense foods (via WIC food packages), nutrition education, and medical referrals to 8.0 million participants (U.S. Department of Agriculture, 2015), including 51% of infants born in the U.S., 28% of children age five and under, 29% of pregnant women, and 30% of postpartum women (Oliveira and Frazão, 2015). Because of its broad reach and targeted impact at a critical age of human growth and development, WIC has considerable potential for early intervention to establish healthier eating habits in low-income populations.

The WIC food packages were initially revised in 2007 to increase participants' consumption of fruits, vegetables and whole grains while reducing saturated fat, cholesterol and sugar intake. Additional goals were to promote breastfeeding, provide WIC participants with a wider variety of food options and give states greater flexibility in administering the program (Institute of Medicine for the National Academies, 2005; U.S. Department of Agriculture, 2014a). Designed as cost-neutral changes, the WIC revisions were implemented in all states by October 2009 and finalized in 2014. The changes included the addition of whole grain products, fruit and vegetable cash value vouchers,

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reductions in milk, cheese and juice allowances, restrictions on milk fat content, and incentives to encourage breastfeeding. The revisions provided a unique natural experiment to assess the ability of food assistance policy to improve diet quality in low-income populations.

There is substantial interest in the impact of the WIC revisions on dietary and health outcomes in low-income populations. There is evidence that the WIC revisions have improved the availability and variety of healthy foods in underserved communities (Andreyeva et al., 2012; Altarum Institute, 2010; Hillier et al., 2012; Zenk et al., 2012; Havens et al., 2012; O'Malley et al., 2014), including in non-WIC stores that were not subject to the WIC regulations requiring to stock healthier foods (Andreyeva et al., 2012). A number of studies documented improvements in food choices aligned with the revisions: reduced participant purchases of juice (Andreyeva et al., 2013), whole milk and cheese (Andreyeva et al., 2014), and instead more fruit, vegetables (Andreyeva and Luedicke, 2014), low-fat milk (Andreyeva et al., 2014) and whole grain products (Andreyeva and Luedicke, 2013).

Importantly, the WIC food package revisions were associated with improved dietary intake of WIC participants (Schultz et al., 2015). In a national sample, WIC-participating children were found to have a 3.7 point higher Healthy Eating Index (HEI) compared to eligible nonparticipants (Tester et al., 2016). Further evidence of similar improvements were reported in the WIC National Food and Nutrition Survey (NAFTAN) (Spaulding et al., 2014), survey data from California (Whaley et al., 2012) and New York (Chiasson et al., 2013) and dietary assessments in Chicago (Kong et al., 2014). There was mixed evidence on breastfeeding initiation and intensity (Schultz et al., 2015), with only a small change in duration of breastfeeding (Wilde et al., 2012; Wilde et al., 2011) or increases in local populations such as Los Angeles County (Langellier et al., 2014). Finally, obesity rates among preschool-age children (Ogden et al., 2014; Ogden et al., 2016) and low-income young children in particular (Sekhobo et al., 2013; May et al., 2013) started to decline recently. For example, obesity rates among all U.S. children aged 2–5 yr declined from a peak of 13.9% in 2003–2004 before the WIC revisions to 8.4% in 2011–2012 and 9.4% in 2013–2014 (Ogden et al., 2016). It remains to be seen how the WIC revisions affect diet quality and obesity among WIC participants in the long term.

This paper contributes to the WIC evaluation literature by examining the healthfulness of the total product basket purchased by WIC-participating households after implementation of the WIC food package revisions in Connecticut and Massachusetts.

## 2. Research design

### 2.1. Data

The study is based on point-of-sale data from a supermarket chain with >60 stores in New England, U.S. This chain has a loyalty card system, which allows customers to benefit from store promotions and price discounts. A unique feature of the data is information on the source of funds used to pay for each purchase, including: SNAP benefits, WIC benefits, cash assistance or non-SNAP electronic benefit transfers (EBT), and other funds (e.g., cash). A household's redemption of benefits indicates program participation at the time of each transaction, which we use to measure a household's WIC, SNAP and non-SNAP EBT participation status. We do not have purchases made without the use of loyalty cards, which is a small share of all transactions (<5%, according to the supermarket). As using a loyalty card provides substantial price discounts on a variety of products, most customers, but especially more price-sensitive low-income households, have a strong incentive to use their card for all purchases. One loyalty card is assumed to represent one household, although in reality some families could have multiple cards or multiple households within the same extended family could share a single card.

### 2.2. Sample

The sample is drawn from low-income households that used WIC benefits when shopping at the grocery chain in January 2009–December 2010. We do not have data for households that never used WIC benefits to pay for any of their purchases (e.g., high-income families not receiving assistance). Approximately half of the sampled WIC households also used SNAP benefits. Due to de-identified nature of the point-of-sale data, no socio-demographic information was available.

As the WIC package revisions went into effect in both states on October 1, 2009, we selected a panel of 2137 households that shopped at the chain using WIC on a regular basis (at least quarterly) before and after the change: January–September 2009 (pre-revision) and January–September 2010 (post-revision). The period of October–December 2009 was excluded to isolate the effects of the transition period when both the old and new WIC packages were in circulation. A comparison sample of 1303 households was selected from former WIC households that were low-income due to a recent history of WIC participation, but were not expected to be affected by the WIC revisions as they were no longer participants. Specifically, households were selected into the comparison group if they used WIC benefits in the first quarter of 2009, but discontinued using WIC through the end of 2009 and all 2010 while still shopping regularly at the store.

We examined all purchases made by WIC-participating households during Jan–Sept 2009 and Jan–Sept 2010 ( $N = 199,085$  transactions in the two states). For comparison households, we assessed all their purchases during Apr–Sept 2009 and Apr–Sept 2010, excluding the time period when they participated in WIC (Jan–Mar 2009) and a matching 3-month period in 2010 ( $N = 58,050$  transactions). Household (or loyalty card) level data were aggregated at the monthly level; if a household made multiple purchases per month, purchases were summed.

## 3. Product identification and categorization

Each product sold at the chain has a unique Universal Product Code (UPC), which is linked to description of a product, department, category and sub-category in the store proprietary database. To retrieve nutrition information, product/container size and ingredients for all purchased UPCs, two syndicated databases were merged with the store UPC data: Gladson (Gladson. Nutrition database, 2011) and Information Resources, Inc. (IRI) (Information Resources Inc. Nutrition Data, 2014). Gladson was first matched (60% match by UPC), followed by IRI (83% match). Given its more recent records, IRI overrode Gladson if there was conflicting information. For UPCs that lacked information in the databases (e.g., store prepared foods, private label), online search was completed to look up individual UPCs.

The sample of WIC-participating and comparison households purchased a total of 29,204 unique food and beverage UPCs during the 18 months of our analysis. Non-food products were not included in this analysis. Each food and beverage UPC item was assigned to one of 12 categories and 44 sub-categories (Appendix 1) based on categorization in the USDA Food Intake Surveys: What We Eat in America, Food Categories 2001–2010 (U.S. Department of Agriculture. What We Eat in America. Food Categories, 2001–2010) and Food Patterns Equivalents Database 2005–2006 (Bowman et al., 2014). For categories that included grains, we categorized products as 100% whole grain, some whole grain, refined grain (0% whole grain), or no grain. We used the Food Patterns Equivalents Database methodology and a guide for the National School Lunch and Breakfast programs (U.S. Department of Agriculture, 2014b) to identify whole grain products. Two coders reviewed and verified all UPC coding and product categorizations.

### 3.1. Product healthfulness classification

Each food and beverage was classified as either a Healthy, Neutral or Moderation (less healthy) product based on criteria in the USDA

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