

## Effects of the Revised Food Packages for Women, Infants, and Children (WIC) in Connecticut

Tatiana Andreyeva

*JEL Classifications: Q18*

*Keywords: Food Policy, WIC, Food Access, Nutrition, Demand, Supply*

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides healthy foods (via WIC food packages), nutrition education, and medical referrals to approximately half of the infants born in the United States, 25% of children under five years of age, 29% of pregnant women and 26% of postpartum women (Oliveira and Frazao, 2009). By creating demand for a limited number of specific healthy foods among millions of low-income households, WIC has significant capacity to influence purchases of WIC-prescribed foods, their supply in WIC stores, and ultimately access to healthy foods for WIC and non-WIC individuals.

In 2009, WIC implemented revised food packages, based on recommendations from the Institute of Medicine (Institute of Medicine, 2005) that better reflect dietary recommendations and promote good nutrition and healthy weight in WIC participants. The main changes included the provision of cash-value vouchers for fruits and vegetables, the addition of whole grain and soy products, some restrictions on the fat content of milk, and reduced milk and juice allowances. These were the most significant WIC food package changes since the program's inception in 1972, and provided a unique natural experiment to assess their effects on the food environment in low-income communities. This article briefly reviews the findings from research on how the WIC food package revisions influenced the food retail landscape and access to healthy foods in Connecticut.

### The Connecticut Study

To understand the impact of the revised WIC food packages on the food environment and access to healthy foods—proxied by WIC-approved food categories—Andreyeva et al (2012) conducted a pre-post evaluation of stocking inventories in convenience and grocery stores (other than supermarkets) in the state of Connecticut. The study included all food stores from five Connecticut towns selected to represent communities of diverse income and food retail characteristics. Researchers completed a three-wave systematic inventory of 245 non-chain grocery and convenience stores in spring 2009—before implementation of the WIC food package revisions in Connecticut on October 1, 2009—and in spring 2010 and spring 2011—approximately six and 18 months after implementation. The number of WIC-approved stores varied from 30 in 2011 to 36 in 2009. Supermarkets were not part of this analysis as healthy foods were available in these stores before the WIC policy change. Trained raters used a standardized inventory tool to assess availability, prices, and variety for 65 food products, as well as produce quality. The 65 food products included the various WIC-approved foods, such as milk, whole grain bread and tortillas, fresh/canned/frozen fruits and vegetables, cereal, tofu, soy milk, brown rice, juice, eggs, peanut butter, dry beans, cheese, baby foods, and canned fish. The assessment also included less healthy substitutes of the WIC-approved foods, such as white rice and white bread. The methodology followed the protocol of the Nutrition Environment Measures Survey in Stores (NEMS-S) that was shown to have a high degree

of inter-rater and test-retest reliability (Glanz, et al. 2007).

To summarize the multiple dimensions of food access such as availability, variety, and prices and quality, the study developed a composite score of the healthy food supply (described in Andreyeva, et al. 2012). The score weighted availability and variety of whole grain products and fruits and vegetables most heavily, as these are foods particularly deficient in the diets of many Americans (Institute of Medicine, 2005). The score assigned a greater weight to fresh fruit and vegetables than to frozen and canned fruit and vegetables, given that the lack of fresh produce is a bigger problem in convenience stores. Changes in the composite scores for WIC-authorized stores and for stores not participating in WIC measured the effect of the WIC food package revisions. Estimation was based on a three-level linear random intercept model that controlled for store size, participation in the Supplemental Nutrition Assistance Program (SNAP) and WIC, and a set of control variables describing the food environment surrounding each store. These included proximity to a supermarket, population density, census tract household income, and competition among food stores and fast food outlets in the area—measured by kernel density of competing establishments within half a mile of each store.

### **Significant Improvements in Access to Healthy Foods due to the WIC Revisions**

Within six to seven months after implementation of the new WIC food packages, the provision of healthy foods in convenience and grocery stores in Connecticut had improved significantly. Most of the improvements occurred in WIC-authorized stores, although non-WIC stores also showed progress. Although the availability of many of the assessed healthy foods—including fresh fruits

and vegetables and low-fat milk—increased following the WIC food package revisions in WIC-authorized stores, the most substantial gains were for whole grain products. Only 8% of WIC-authorized convenience and grocery stores—regardless of the size—had any whole wheat/whole grain bread at baseline; 81% did so after the revisions took effect. The Connecticut WIC program has a minimum inventory requirement that every WIC store should stock at least six packages of WIC-approved whole wheat or whole grain bread at any time of service (Connecticut WIC Program, 2012).

The fact that only 81% of WIC stores had any whole wheat/whole grain bread in stock at the time of the 2010 inventory suggests that some stores were not in compliance. Anecdotal evidence indicates that overall availability of whole wheat/whole grain bread in 16-oz loaves—the only WIC-allowed size—was problematic in the short run after implementation of the new WIC packages, as manufacturers started to produce 16-oz loaves. Until implementation, the typical loaf of bread weighed 18 or 24 ounces, and some stores—particularly the smaller stores—were unable to secure a steady supply of WIC-approved 16oz whole wheat/whole grain bread. Results from the 2011 inventory confirm this hypothesis as all WIC stores at that point had the required 16-oz whole wheat or whole grain bread.

WIC's minimum inventory requirements explain some, but not all of the improvements in the availability of newly-approved WIC foods. Brown rice, another new product in the revised WIC food packages, was not part of WIC's required minimum inventory, so WIC stores could choose not to carry it. Still, its availability in WIC convenience and grocery stores increased from 22% in 2009 to 94% in 2010 and 100% in 2011, suggesting that customer

demand encouraged WIC stores to stock this healthy product. Much longer shelf-life of brown rice versus breads can be another reason why more stores carried this product than bread.

Interestingly, the proportion of non-WIC stores that carried whole wheat/whole grain bread and brown rice after the WIC revisions also increased, to 35% and 25%, relative to 25% and 15% at baseline in 2009. These stores were not subject to WIC's minimum inventory requirements and did not service WIC customers that were redeeming vouchers for newly approved WIC foods. Yet many chose to add whole wheat/whole grain bread and brown rice to their inventories, although to a smaller extent relative to WIC-authorized stores. Competition with WIC stores might explain some of this spillover effect. Furthermore, higher demand from WIC stores might have improved distribution chains as suppliers started carrying new WIC foods to serve all small stores. Better access to whole grain products in stores, which hopefully translates into increased purchases and consumption of whole grains, can help reduce inadequacies in whole grain intake among WIC participants. For example, 1999-2004 national data showed that fewer than 5% of U.S. adults met dietary recommendations to consume at least three daily servings of whole grains (O'Neil, et al. 2010).

In addition to improved availability, the variety of whole grain products—brown rice, whole wheat/whole grain bread, whole grain cereal, whole grain tortillas—also increased, from an average of four to an average of seven varieties in WIC stores, and from three to four varieties in non-WIC stores. Whole grain cereals were the main contributors to the increased variety count of whole grain products—two and three respectively—and their growth in non-WIC stores accounted for 50%

of the variety increase. The main contributor to the growth in varieties of whole grain products in WIC stores was brown rice.

An important result of the WIC food package revisions is that it had a greater positive impact on those most in need for improvement in access to healthy foods. Low-income communities had fewer choices of healthy foods in convenience and grocery stores at baseline, but experienced more significant advances than wealthier areas in availability and variety of healthy foods and produce quality after the WIC revisions. Between 2009 and 2010, the composite score of healthy food supply increased 16% in WIC stores in higher-income areas and 39% in lower-income areas. The selection of foods in neighborhood stores is particularly important for low-income residents without adequate transportation who have to rely on these stores. Greater improvement in the provision of healthy foods in low-income communities might help reduce income-related disparities in food access and health. Poor diet quality and related excess body weight continue to be barriers to healthy life for many Americans, especially among people of lower socioeconomic status. Prior research has demonstrated that the food environments where people make food choices are related to their nutrition (Booth, et al. 2001), body weight (Robert and Reither, 2004), and chronic health conditions (Diez Roux, et al. 2001).

The observed improvements in the provision of healthy foods were measured six to seven months after implementation of the WIC food package revisions. A second measurement was obtained a year later, in the spring of 2011, to determine whether improvements seen in the short term were maintained and perhaps increased. Across all measures of the provision of healthy foods, including the composite score of healthy food

supply and availability, and variety of healthy foods, there was no significant change between 2010 and 2011 in either WIC or non-WIC stores. All improvements in access to healthy foods that were achieved shortly after the WIC revisions in 2010 were sustained a year later. This suggests that the beneficial changes in food access have become accepted and integrated into the food retail landscape and will likely maintain this course in the future, assuming the relevant policy environment does not change. At the same time, the improvements seen in 2010 did not expand further in 2011.

Similar beneficial results of the WIC food package revisions on the provision of healthy foods were seen in other states. A four-state evaluation study by the Altarum Institute completed a pre-post store inventory assessment of small food stores in New Hampshire, Pennsylvania, Wisconsin, and Colorado (Gleason, et al. 2011). Availability of most of the newly-approved healthy WIC foods increased after implementation of the revised WIC food packages. For example, significant increases in availability were seen in WIC stores for soy milk, whole wheat bread, whole wheat tortillas, and brown rice in New Hampshire, Pennsylvania, and Wisconsin (Gleason, et al. 2011). Low-fat (1%) milk increased in availability in stores in New Hampshire and Wisconsin, which were the two states not allowing WIC participants to buy reduced-fat (2%) milk. Availability of fresh fruit improved in three study states, with less significant increases for vegetables that were more available than fruit at baseline and had less room for improvement (Gleason, et al. 2011). In Connecticut, all WIC-approved stores had fresh fruit after the revisions—growth from 50% at baseline, and availability of fresh and frozen vegetables also increased significantly. Differences in baseline availability and WIC's minimum inventory requirements might explain some of the differences in

findings across states. For example, the state of Connecticut required WIC stores to stock at least one variety of fresh fruit and one variety of fresh vegetables, but not all states had the same requirement for WIC stores to provide fresh produce.

From a public policy perspective, it is important to demonstrate sustainability of any positive changes that new policies or programs generate. It is well-known that the effectiveness of some policies can decline over time to the extent that their costs can no longer justify their benefits. While the study in Connecticut did not find any further improvements in the provision of healthy foods between 2010 and 2011, it did find that the successful results from 2010 were sustained a year later. This is good news for WIC policymakers, WIC participants, and low-income communities. Future research should examine if the effects of the WIC revisions can be sustained and increased over the long term, especially as new participants and stores filter through the WIC program. It is also important to understand how to achieve further expansions in the effects of the WIC revisions on access to healthy foods.

In summary, the WIC food package revisions successfully increased availability of many healthy foods because they addressed both the demand and the supply issues of access: (a) they created demand for new healthy foods through WIC vouchers provided to WIC participants, and (b) they immediately improved supply via minimum stocking requirements to WIC-authorized stores.

### **Food Retailer Practices, Attitudes and Beliefs about the Supply of Healthy Foods**

Food retailers such as convenience stores and groceries are an integral part of the food environment and could be a promising venue for improving availability of healthy foods

in low-income communities. Prior research has shown that stocking decisions of such stores can be linked to dietary outcomes among store customers. For example, living near convenience stores selling fruits and vegetables was linked to higher produce intake among store clients that resided in the area (Bodor, et al. 2008). To better understand stocking decisions among small food retailers and their barriers to providing healthy foods, the inventory study in Connecticut included a survey of managers and owners of WIC-authorized convenience and grocery stores other than supermarkets. In addition, control non-WIC stores were selected, matched on store type and proximity to WIC stores, usually within the same census tract (Andreyeva, et al. 2011).

In-person interviews (30-45 minutes each) were completed with 68 store owners or managers directly involved in ordering food products. All WIC-authorized convenience and non-chain grocery stores (n=40) were recruited, with 35 agreeing to participate (88% response rate). More non-WIC control stores were recruited, of which 33 stores participated in the survey (65% response rate). To assess pre-post changes due to the WIC revisions, interviews were completed before and after implementation of the revised WIC food packages—spring 2009 and spring 2010. The subjects were interviewed on their business practices, attitudes and beliefs about the supply of healthy foods, supplier networks, perceived demand and profits for different categories of foods, barriers to carrying healthy foods, and WIC-related issues, including implementation of the revised WIC food packages.

To explain limited availability of healthy foods in convenience and small grocery stores, it is important to understand both the demand and the supply perspectives of such businesses. Small neighborhood stores might

face significant barriers in stocking healthy foods, varying from limited supply networks to inadequate storage capacity or refrigeration. Another reason for not stocking nutritious food could be lack of demand among the store clientele. Previous assessments from focus groups suggested that retailers would stock healthy foods if they perceived sufficient demand (Gittelsohn, et al. 2006). The WIC revisions provided a unique opportunity to test the hypothesis of whether demand or supply determine availability by generating demand for newly-approved WIC foods—via new subsidies—so that the most likely barrier to stocking healthy foods would be supply limitations.

Both issues of demand and supply were highlighted as important by small retailers in the Connecticut study. Customer demand however was always the dominant business factor behind stocking decisions, suggesting that retailers' perceptions of little demand for healthy foods among their customers explained few options of healthy foods prior to the WIC revisions in these stores. Survey respondents reported significantly weaker demand for healthy foods such as fruit and vegetables, whole grain products, lower-fat milk as compared to soda and salty snacks. Supply barriers were reported as secondary in explaining limited offerings of healthy foods. Less healthy foods were also perceived as providing a higher profit margin (Andreyeva, et al. 2011). There was substantial variation in the types of suppliers used, from convenient manufacturer delivery for chips and soda to self-supply for fresh fruits and vegetables.

At baseline, WIC-authorized convenience and grocery stores in the state of Connecticut anticipated few problems in accommodating new WIC requirements to provide a larger selection of healthy WIC-approved foods. Retailers already had suppliers to provide these foods or could

identify new suppliers upon need. Most felt confident about finding additional shelf space or equipment to provide the new WIC foods. A few stores were not sufficiently equipped for some of the new requirements, such as carrying fresh fruit and vegetables at all times, potentially leading to loss of their WIC authorization status. Knowing how to handle and store produce was one skill that some small retailers identified as lacking (Andreyeva, et al. 2011).

Post-implementation survey of the same stores showed that none of the WIC-authorized stores had dropped out from the program due to inability to meet new WIC requirements. The majority of WIC-authorized stores was successful in implementing the revised WIC food packages, increased availability of healthy foods, and reported higher demand for many of the new healthy WIC foods. Similar findings were reported in two studies that interviewed managers or owners of small WIC stores in eight cities across the United States (Ayala, et al. 2012; Gittelsohn, et al. 2012). Most respondents reported an increase in sales of newly-approved WIC foods, regardless of the supply mechanism used.

Increased program requirements were not a deterrent to stores, and improved demand from WIC participants was an important incentive to serve these customers and continue participation in the WIC program. In fact, in the spring of 2012 when the state of Connecticut had an open enrollment to become an authorized WIC store, hundreds of non-WIC stores applied and many successfully joined the WIC program. This suggests that access to healthy foods in the state might have improved even further, as the newly-authorized WIC stores had to carry a number of healthy WIC foods, which might have been previously lacking on their shelves. To understand the long-term effects of the WIC revisions on WIC stores, ongoing monitoring of store

participation and inventories and search for strategies to overcome supply barriers is important for future research.

### **WIC Policy Demand and Supply Changes Improve Access to Healthy Foods**

The results of the reviewed studies on the effect of the WIC food package revisions on access to healthy foods suggest an immediate and potentially long-term success. Policies designed to promote consumption of healthy foods and address the supply issues improve availability of healthy foods in underserved communities. The recent revisions to the WIC food packages subsidized consumption of important healthy foods for low-income women and children, while simultaneously addressing supply issues by requiring retailers to stock minimum amounts of certain nutritious foods. As a result, there were significant improvements in availability of many healthy foods in WIC and—to a smaller degree—non-WIC convenience and grocery stores in Connecticut, especially in low-income communities. These findings provide evidence for the potential of national food assistance and nutrition programs to increase demand for healthier food choices and improve the food environment through policy change. National food policy that promotes consumption of healthy foods, but also requires changes in supplies, can improve local food environments for program participants and non-participants alike. As the WIC food package revisions were designed to be cost-neutral, this can occur at no additional cost to taxpayers.

### **For More Information**

Andreyeva, T., Luedicke, J., Middleton, A.E., Long, M.W., and Schwartz, M.B. (2012). Positive influence of the revised Special Supplemental Nutrition Program for Women, Infants, and Chil-

dren food packages on access to healthy foods. *Journal of the Academy of Nutrition and Dietetics*, 112(6), 850-858.

Andreyeva, T., Middleton, A.E., Long, M.W., Luedicke, J., and Schwartz, M.B. (2011). Food retailer practices, attitudes and beliefs about the supply of healthy foods. *Public Health Nutrition*, 14(6), 1024-1031.

Ayala, G.X., Laska, M.N., Zenk, S.N., Tester, J., Rose, D., Odoms-Young, A., McCoy, T., Gittelsohn, J., Foster, G.D., and Andreyeva, T. (2012). Stocking characteristics and perceived increases in sales among small food store managers/owners associated with the introduction of new food products approved by the Special Supplemental Nutrition Program for Women, Infants, and Children. *Public Health Nutrition*, May 14, 1-9.

Bodor, J.N., Rose, D., Farley, T.A., Swalm, C., and Scott, S.K. (2008). Neighbourhood fruit and vegetable availability and consumption: the role of small food stores in an urban environment. *Public Health Nutrition*, 11(04), 413-420.

Booth, S.L., Sallis, J.F., Ritenbaugh, C., Hill, J.O., Birch, L.L., Frank, L.D., Glanz, K., Himmelgreen, D.A., Mudd, M., Popkin, B.M., Rickard, K.A., St Jeor, S., and Hays, N.P. (2001). Environmental and societal factors affect food choice and physical activity: Rationale, influences, and leverage points. *Nutrition Reviews*, 59 (3 Pt 2), S21-S65.

Connecticut WIC Program. (2012). Minimum Inventory and Pricing Requirements for WIC Vendors. Available online: [http://www.ct.gov/dph/lib/dph/wic/vendors/minimum\\_inventory-pricing\\_requirements.pdf](http://www.ct.gov/dph/lib/dph/wic/vendors/minimum_inventory-pricing_requirements.pdf)

Diez Roux, A.V., Merkin, S.S., Ar-

nett, D., Chambless, L., Massing, M., Nieto, F.J., Sorlie, P., Szklo, M., Tyroler, H.A., and Warson, R.L. (2001). Neighborhood of residence and incidence of coronary heart disease. *New England Journal of Medicine*, 345(2), 99-106.

Gittelsohn, J., Laska, M.N., Andreyeva, T., Foster, G., Rose, D., Tester, J., Lee, S.H., Zenk, S.N., Odoms-Young, A., McCoy, T., and Ayala, G.X. (2012). Small retailer perspectives of the 2009 Women, Infants, and Children program food package changes. *American Journal of Health Behavior*, 36(5), 655-665.

Gittelsohn, J., Dyckman, W., Tan, M.L., Boggs, M.K., Frick, K.D., Alfred, J., Winch, P.J., Haberle, H., and Palafox, N.A. (2006). Development and implementation of a food store-based intervention to improve diet in the Republic of the Marshall Islands. *Health Promotion Practice*, 7(4), 396-405.

Glanz, K., Sallis, J.F., Saelens, B.E., and Frank, L.D. (2007). Nutrition Environment Measures Survey in Stores (NEMS-S): Development and evaluation. *American Journal of Preventive Medicine*, 32(4), 282-289.

Gleason, S., Morgan, R., Bell, L., and Pooler, J. (2011). Impact of the revised WIC food package on small WIC vendors: insight from a four-state evaluation. Portland, ME: Altarum Institute; available online: [http://www.altarum.org/files/pub\\_resources/FourStateWICFoodPackageEvaluation-Full%20Report-20May11.pdf](http://www.altarum.org/files/pub_resources/FourStateWICFoodPackageEvaluation-Full%20Report-20May11.pdf).

Institute of Medicine for the National Academies. (2005). WIC Food Packages: *Time for a Change*. Washington, DC.

Oliveira, V., and Frazão, E. (2009). *The WIC Program: Background, Trends, and Economic Issues*, 2009

*Edition.* U.S. Department of Agriculture: Economic Research Service. Report No.: Economic Research Report No. 73.

O'Neil, C.E., Zhanovec, M., Cho, S.S., and Nicklas, T.A. (2010). Whole grain and fiber consumption are associated with lower body weight measures in US adults: National Health and Nutrition Examination Survey 1999-2004. *Nutrition Research*, 30(12), 815-822.

Robert, S.A., and Reither, E.N. (2004). A multilevel analysis of race, community disadvantage, and body mass index among adults in the US. *Social Science and Medicine*, 59(12), 2421-2434.

U.S. Department of Agriculture. (2012). Food and Nutrition Service. WIC Program Annual Costs. Available online: [http://www.fns.usda.gov/pd/37WIC\\_Monthly.htm](http://www.fns.usda.gov/pd/37WIC_Monthly.htm)

## **Author Information**

*Tatiana Andreyeva (tatiana.andreyeva@yale.edu) is Director of Economic Initiatives at the Rudd Center for Food Policy and Obesity at Yale University, New Haven, Connecticut.*

*The studies described in this review were funded by a grant from the Economic Research Service (ERS) at the U.S. Department of Agriculture. The views presented in the paper are those of the author and not necessarily those of ERS or USDA. The author is grateful for very helpful comments provided by Dr. Elizabeth Frazao and Dr. David Weatherspoon. Special thanks to all of the researchers and research assistants who worked on the studies as well as the food stores that participated in our interviews and inventories.*